

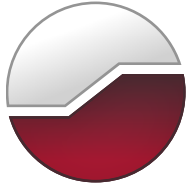


GEMTEC

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**Regulator Draft Report
Environmental Impact Assessment
Registration Document
Crane Mountain Landfill Clay Source Development
Saint John, New Brunswick**

GEMTEC Project: 9042.27-R01



GEMTEC

www.gemtec.ca

Submitted to:

Fundy Regional Service Commission
10 Crane Mountain Road
Saint John, New Brunswick
E2M 7T8

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Environmental Impact Assessment
Registration Document
Crane Mountain Landfill Clay Source Development
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February 1, 2019
GEMTEC Project: 9042.27-R01

GEMTEC Consulting Engineers and Scientists Limited
589 Rothesay Avenue
Saint John, New Brunswick, Canada
E2H 2G9

February 1, 2019

File: 9042.27-R01

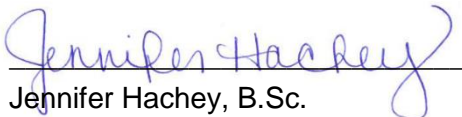
Fundy Regional Service Commission
10 Crane Mountain Road
Saint John, New Brunswick
E2M 7T8


Attention: Mr. Marc MacLeod, Executive Director

**Re: Regulator Draft Report - Environmental Impact Assessment
Crane Mountain Landfill Clay Source Development, Saint John, New Brunswick**

GEMTEC Consulting Engineers and Scientists Limited (GEMTEC) is pleased to submit this electronic copy of the Regulator Draft Report of the Environmental Impact Assessment (EIA) for the proposed Crane Mountain Landfill Clay Source Development, in Saint John, New Brunswick (the "Project"). The Project is proposed on a portion of the Service New Brunswick (SNB) Parcel Identifier (PID) 00289595.

If you have any questions or concerns about the report or the information presented herein, please do not hesitate to contact the undersigned.


Jennifer Hachey, B.Sc.
Environmental Biologist
GEMTEC


Marco Sivitilli, P.Eng.
Civil/Geotechnical Engineer
GEMTEC

cc: New Brunswick Department of Environment and Local Government, Environmental Impact Assessment, Fredericton, New Brunswick

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1.0 INTRODUCTION

The Fundy Regional Service Commission (FRSC) has retained GEMTEC Consulting Engineers and Scientists Limited (GEMTEC) to prepare an Environmental Impact Assessment (EIA) registration document for the proposed Crane Mountain Landfill (herein referred to as the “Landfill”) Clay Source Development in Saint John, New Brunswick. The general locations of the proposed Project and the Landfill are presented in Figure 1.

This document is the Regulator Draft Report of the EIA registration for the proposed Crane Mountain Landfill Clay Source Development in Saint John, New Brunswick (herein referred to as the “Project”). The document details the necessary information as outlined in the New Brunswick Department of Environment and Local Government (NBDELG) document “A Guide to Environmental Impact Assessment in New Brunswick” dated January, 2018.

The proposed project type is specified as an undertaking outlined in Schedule A of the *New Brunswick Environment Impact Assessment Regulation 87-83* under paragraph:

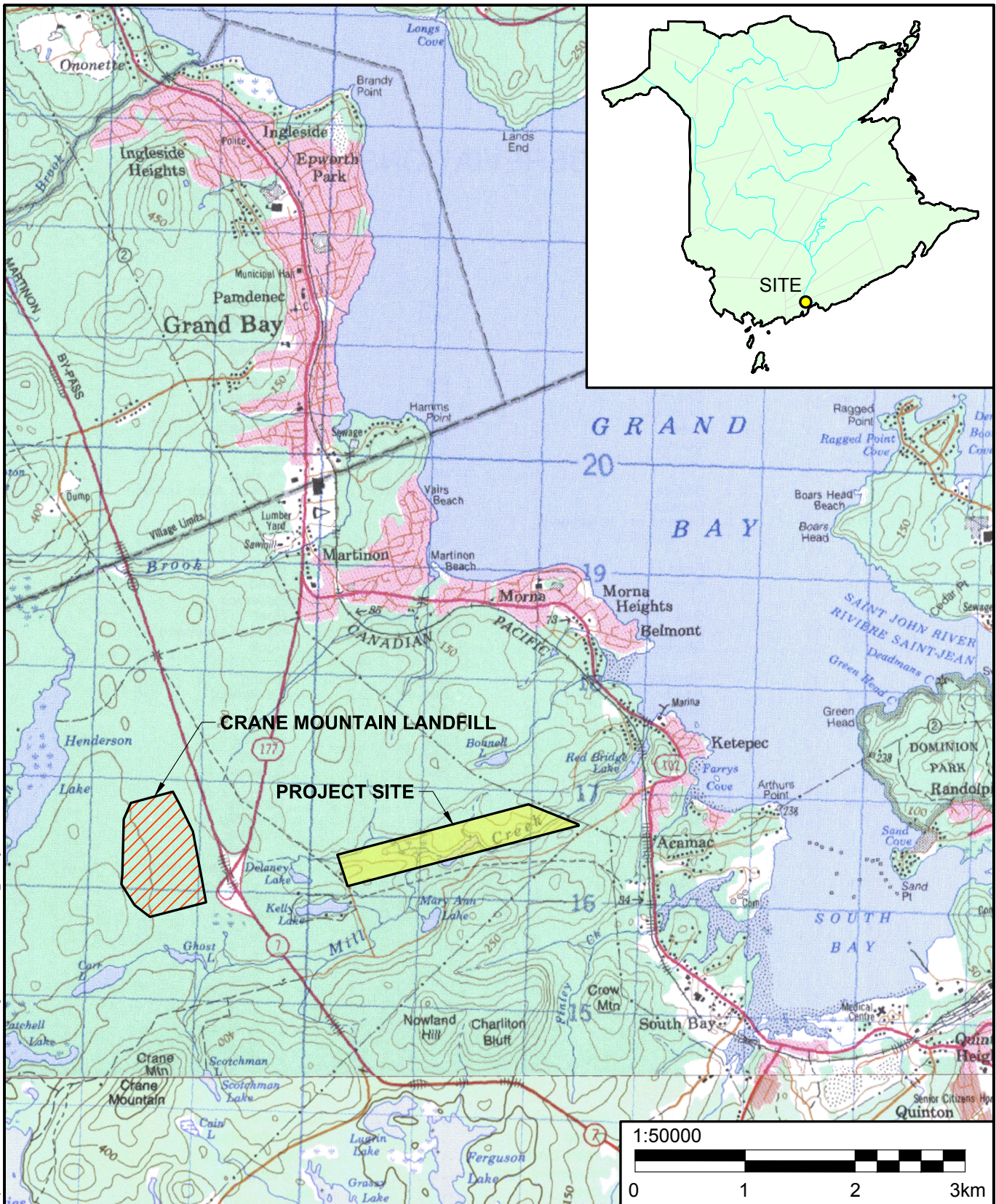
- (v): all enterprises, activities, projects, structure, works or programs affecting two hectares or more of bog, marsh, swamp or other wetland.

As such, the Project must be registered with the Sustainable Development and Impact Evaluation Branch, Department of Environment and Local Government for a determination review.

The Project does not meet the definition of commercial extraction or processing of a mineral as defined by the *New Brunswick Mining Act*, as a “mineral” is defined under the Act as, “any natural, solid, inorganic or fossilized organic substance and such other substances as are prescribed by regulation to be minerals, but does not include:

- a. sand, gravel, ordinary stones, clay or soil unless is it to be used for its chemical or special physical properties, or both, or where is taken for contained minerals,
- b. ordinary stone used for building or construction”.

The Project will include extracting clay and aggregate (ordinary) stone to provide construction materials for future landfill disposal cells and general maintenance projects at the Crane Mountain Landfill between 2020 and the current anticipated end of the landfill life expectancy, which at this time is understood to be approximately 2048.



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Project
 ENVIRONMENTAL IMPACT ASSESSMENT
 CRANE MOUNTAIN LANDFILL CLAY AND
 AGGREGATE QUARRY

Drawing
 GENERAL SITE LOCATION PLAN

Drawn By
 AGSD

Date
 JAN, 2019

File No.
 90422706

Drawing No.
 FIGURE 1

Revision No.
 0



GEMTEC
 CONSULTING ENGINEERS
 AND SCIENTISTS

1.1 Name of the Undertaking and Project Proponent

1.1.1 Name of the Undertaking

Crane Mountain Landfill Clay Source Development, Saint John, New Brunswick.

1.1.2 Project Proponent

The name and contact information of the Proponent is presented in Table 1.

Table 1 Proponent Information

Name of Proponent	Fundy Regional Service Commission (FRSC)
Address of Proponent	10 Crane Mountain Road Saint John, New Brunswick E2M 7T8
Mailing Address of Proponent	P.O. Box 3032 Grand Bay-Westfield, New Brunswick E5K 4V3
Proponent Contact	Mr. Marc MacLeod, Executive Director FRSC Telephone: (506) 738-1212 Email: mmacleod@fundyrecycles.com
Principal Contact Person for EIA	Ms. Jennifer Hachey, B.Sc. GEMTEC Consulting Engineers and Scientists Limited 589 Rothesay Avenue, Saint John, New Brunswick, E2H 2G9 Telephone: (506) 453-1025 Email: jennifer.hachey@gemtec.ca
Property Ownership	John Law Corporation

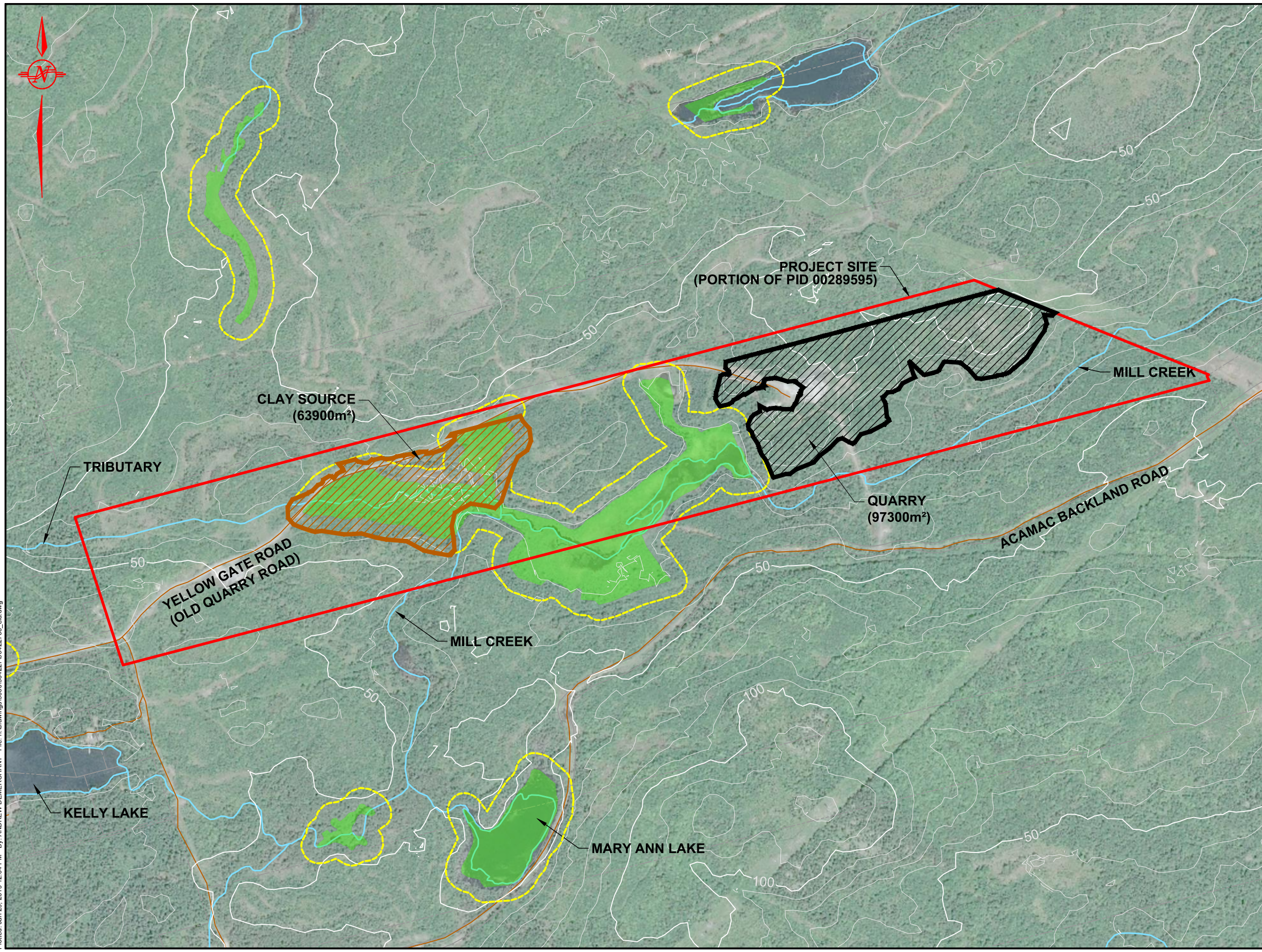
2.0 PROJECT OVERVIEW

The Project is located on the southwestern portion of the land parcel identified by Service New Brunswick (SNB) as property identifier (PID) 00289595 (herein referred to as “Project Site”; as presented in Figure 2), approximately 1.2 kilometres (km) west of the Landfill. The PID is currently owned by John Law Corporation; however, the FRSC has developed an agreement with the landowner to acquire a portion of the property pending the successful approval of the Project.

The Project is in support of the on-going Landfill operations, more specifically, the construction of future municipal solid waste disposal cells between the year 2020 and 2048 (the current expected end of the Landfill lifetime). Currently, the Landfill retains third-party subcontractors to supply and deliver clay material and aggregate material for cell construction. However, by securing the Project Site, the Landfill will own a viable and secure source of suitable construction materials for future disposal cells and other projects (*i.e.*, containment cell capping, daily cover, road maintenance, *etc.*). This is expected to reduce construction costs and most importantly provide a secure and dependable source for a vital component of the liner system (high quality clay). Operational and maintenance costs are also anticipated to be reduced by allowing the Landfill to produce and construct using their own maintenance aggregate materials.

High-quality clay material is an integral component of the Landfill’s composite liner system. The FRSC has experienced issues and complications with securing suitable clay through the public tendering process due to several factors, such as: a limited supply and depletion of approved clay sources; high prices for clay material; and, lack of interest by contractors to supply the clay material. A lack of clay during construction of a new municipal solid waste containment cell could potentially have devastating effects for the Landfill, by delaying or effectively stopping construction and putting the Landfill operations at risk, which in turn may affect all Landfill users by increasing user fees. By securing and owning their own approved, high quality clay source, the Landfill would greatly mitigate the risks associated with public tendering for the supply of clay material for landfill liner material. The reduction of construction and operational costs/uncertainties is expected to have a positive effect on disposal fees for the FRSC, which would benefit landfill users, including the municipalities and local service districts included in the FRSC jurisdiction.

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LEGEND

	REGULATED WETLAND (GeoNB)
	30m WETLAND BUFFER

Drawn By	AGSD	Checked By	JH
Calculations By		Checked By	

Date
JAN, 2019

Project
ENVIRONMENTAL IMPACT ASSESSMENT
CRANE MOUNTAIN LANDFILL CLAY AND
AGGREGATE QUARRY

Drawing
PROJECT SITE LOCATION PLAN

Scale
1:7500

File No.	Drawing	Revision No.
90422706	FIGURE 2	0



2.1 Purpose / Rationale / Need for the Undertaking

The FRSC and the Landfill provide community services to the Greater Saint John Region (*i.e.*, City of Saint John, Grand Bay-Westfield, Rothesay, Quispamsis, Hampton, St. Martins, Musquash, Petersville, *etc.*), with the Landfill specifically providing municipal waste disposal services. The funding model for the FRSC is based on the regional tax base and population; however, the Landfill operation is funded solely through tipping fees. The Project is to be funded by the Landfill's annual operational budgets.

The Landfill opened in November of 1997 and has an engineered expected lifetime of approximately 50 years (*i.e.*, 2048). The operational plan of a sanitary landfill requires the continued construction of disposal cells, the general construction sequence for a disposal cell at the Landfill is as follows:

1. Excavation of a shallow basin adjoining an existing cell. A subdrain system is installed to alleviate any groundwater flow from the bottom of the cell. This system also serves as a leak detection system. The cell walls and base (bottom) will be sloped and graded to facilitate the flow of any liquids (*i.e.*, surface water during construction or leachate during operation) to a collection point (*i.e.*, de-watering pump during construction and leachate collection system during operation);
2. The construction of a composite liner system as a barrier between the disposal cell and the surrounding natural environment. The liner is constructed along the cell base (bottom) and walls using a layer of high-quality clay overlain by a thick High Density Polyurethane (HDPE) liner. The current composite liner of the cells at the Landfill consists of 600 millimetre (mm) layer of compacted clay material overlain by a 2 mm thick HDPE. This liner design was developed by Porter Dillon (the Landfill's Engineer at the time of design) and was approved by the NBDELG prior to the construction of Cell 1 in 1997. The design meets the NBDELG requirement of having a soil liner with a 25 year "breakthrough" criteria;
3. To assist with leachate collection in the cell, a layer of drainage aggregate is placed along the base (bottom) and walls of the cell;
4. Leachate collection systems are installed in each cell. Currently, the Landfill leachate is collected in an on-site holding pond and is transported off-site (via trucks) and is deposited into the City of Saint John wastewater (sewage) collection and treatment system;
5. Once the cell has been constructed, the disposal of waste occurs on a daily basis. The waste material is compacted, then capped with daily cover material (maintenance aggregate) to reduce smells, mitigate against animal pests, and to reduce windblown waste; and
6. The expected lifetime of each cell varies on the quantity of deposited waste and the size of the cell. Generally, the Landfill cells are constructed to last 3 to 5 years. Once full, the

cell is capped with an additional layer of the low permeability capping material (*i.e.*, clay material and/or geosynthetic clay liner (GCL)) and up to two metres of soil. Landfill gas collection wells have also been historically installed on closed/capped Landfill cells. Landscaping is undertaken via erosion control structures and re-vegetation efforts.

As of February 2019, eight containment cells (Cell 1 to Cell 8) have been constructed at the Landfill, beginning in 1997. Based on the engineered expected lifetime of the Landfill, it is expected that nine additional cells will be constructed between 2020 and 2048. Cells are constructed on an as-needed basis; however, it is expected that Cell 9 will be built in 2021, and Cells 10 to 17 will be built between 2024 and 2048. It is important to note that cell construction is completed on an as-needed basis and utilization of the Project Site will not be continuous over the entire Project timeline.

As previously stated, the key justification for the Project is to allow the Landfill to secure their own source of clay liner material. For over 10 years, the Landfill has experienced issues with the procurement of a supply of clay material for containment cell construction, putting cell construction at risk, which in turn puts landfill operations at risk. Securing an approved source of high quality clay would mitigate several risk factors for tendering and construction of Landfill cells by not having to depend on third-party subcontractors for the supply of clay material. The reduction of construction and operational costs and risk is expected to have a positive effect on disposal fees for the FRSC. This is anticipated to result in direct benefits to the municipalities and local service districts in the FRSC jurisdiction.

Early in the Landfill service life, sources of clay material were field tested using the Seal Double Ring Infiltrometer (SDRI) test method (as required by NBDELG) to determine the permeability (*i.e.*, suitability for Landfill clayey material). Three sources of clay material were accepted and identified as: the Dexter Pit; the Saint's Rest Pit; and the Five Fathom Hole Pit. All three sources were owned by local contractors. Historically, the Landfill had difficulty securing these sources of suitable clay material, as described below:

- Originally, the Landfill tendered construction contracts included; the supply and placement of clay, the installation of the HDPE liner, placement of geotextiles, *etc.*, as one large package. In the mid-2000s, the tender contracts were changed to separate the clay supply and placement components, due to issues with high prices for clay material, and the fact that only one of the three aforementioned approved clay source contractors were bidding on the cell construction. The other two clay sources were either depleted or the contractors who owned them were no longer bidding on the Landfill construction work;
- In 2015, during the tendering for Cell 7, none of the contractors who owned the previously approved clay sources noted above bid on the clay supply contract. The contract was awarded to a contractor with a new clay source (referred to as Cambridge Clay) which was essentially a stockpile of clay material that had been excavated for an unrelated

storm-water management infrastructure project in the City of Saint John. This clay was approved by NBDELG for use provided that a SDRI test was conducted to verify laboratory permeability tests. The Cambridge Clay material passed the SDRI test and Cell 7 was successfully completed on time; and

- In 2018, the clay supply contract for Cell 8 was tendered in December, 2017 to ensure that clay was readily available and to avoid supply issues during construction. Just prior to the tender closing (only a week before award) the lowest bidder for the clay supply contract withdrew their bid by declining to sign a supply contract. This required the Landfill to retain the second lowest bidder (higher price). The retained contractor was planning to use one of the four previously approved sources for the contract (Dexter Pit); however, material quality issues were apparent from the beginning of the 2018 construction season (*i.e.*, the available clay quality was variable and of borderline quality). The contractor was shut down several times during the first few weeks of clay placement, but eventually a new, previously unapproved clay source and secured. Again, the proposed new clay source (referred to as Spruce Lake Clay) was approved by NBDELG based on SDRI laboratory testing. Cell 8 was completed in the fall of 2018, behind schedule by several weeks due to the clay supply issues.

As can be inferred from the above commentary, the historic difficulty of securing a clay supply has placed cell projects at risk. In the event that clay could not be secured, the Landfill would use an alternative liner detail, which has the potential be an expensive and time consuming endeavor. This could require several months to conduct engineering analysis and obtain NBDELG approval. With future cells being constructed on a “just-on-time” schedule, just as the previous cell is scheduled to be filled/completed, a construction delay could have significant economic effects on the Landfill and ultimately to Landfill users (may increase user fees or may prevent the Landfill from accepting municipal solid waste entirely).

FRSC is of the opinion that its mandate is partially based on the high quality material used in the current approved cell liner design, which has allowed them to generally operate with the good faith of the public. Having their own secure supply of high-quality clay for use as a liner and cover material will allow the Landfill to continue using the approved existing liner design.

The Landfill has investigated the option of finding their own clay material sources on several occasions (once in 2009 and again in 2016). Desktop studies and limited preliminary field reviews were conducted for several potential sources, but these sources were either located a significant distance from the Landfill, located on privately held property, or located within or in very close proximity to protected natural areas. The opportunity presented with the proposed property (*i.e.*, the Project Site) provides a clay source in close proximity to the Landfill (closer than any historically utilized sources or other potential sources investigated) and a tentative land transfer agreement with the current landowner pending the determination of sufficient clay quality, quantity, and receipt of regulatory approval.

Preliminary geotechnical testing for the proposed source showed that the clay material properties (*i.e.*, clay content, permeability, plasticity index, *etc.*) meet the specified requirements for the Landfill clay liner and is of sufficient quantity to complete all remaining disposal cells (Cell 9 to Cell 17). This source has sufficient quantity that it could likely also be used for a significant amount of the Landfill capping/closures activities.

The fact that the Project Site contains quarriable, high quality rock material (*i.e.*, aggregate) is an added advantage for the Landfill. The quarriable rock is not the main priority of the FRSC and this Project; however, it provides a source of suitable aggregate to future contractors who may not have their own nearby source, thus potentially reducing overall construction costs for Landfill infrastructure.

It is of important note that the aggregate quarry does not impact any regulated wetland, nor does it meet any other trigger under the *New Brunswick Environmental Impact Assessment Regulation 87-83*. However, the quarry footprint and quarrying activities are considered a component of the Project and therefore, the scope of work and any environmental impacts are assessed during this EIA.

2.2 Project Location

The Project will be carried out within the City of Saint John limits, near the communities of Morna, Belmont, Ketepec, and Acamac. The Project Site encompasses the western portion of PID 00289595 and covers an approximate area of 60 hectares (ha), as presented on Figure 2. Central coordinates of the Project Site are 45.269478°, -66.181177°. The Project Site is currently accessible via Route 177 to Acamac Backland Road, then Yellow Gate Road (herein referred to, and known locally as “Old Quarry Road”).

The Project Development Area (PDA) is defined as the physical footprint required for the construction and operation of the Project. It is expected that the PDA will include the aggregate and clay source open pits, a sedimentation pond, Old Quarry Road, any other required access routes, any lay-down areas, and temporary structures (*i.e.*, trailer, portable toilets, equipment storage, *etc.*). For the purposes of this report, the PDA has been divided into two components - the Clay PDA for the area of potential clay extraction and the Quarry PDA for the potential area of aggregate rock extraction. The estimated footprint of the combined PDAs is 16 ha within the Project Site as presented on Figure 2.

2.3 Siting Considerations

The location of the Project was chosen as it contains a viable and secure source of suitable clay and potential aggregate materials required for Landfill construction and operations. The close proximity of the Landfill to Project Site minimizes hauling routes, which in turn reduces the overall construction costs. As an added benefit, the carbon footprint of the future cell construction may also be reduced as a result of the shorter truck hauling distance to this Project Site compared to

other previously utilized clay sources. Based on preliminary desktop geological studies, land use and ownership review, this Site is currently the closest known source of suitable landfill liner quality clay to the Landfill. No reasonable alternative sites were identified for the proposed Project.

Further to this, potential Landfill ownership of the property reduces the reliance on third-party subcontractors during cell construction for supply of clay material.

The Project Site is not located within either a wellfield or watershed protected area (GeoNB, 2018). One provincially regulated wetland is present on PID 00289595, south of Old Quarry Road. This wetland is characterized as a forested swamp complex with on-going beaver activity. The clay deposit within the wetland is of glaciolacustrine origin deposited by glacial meltwater in a historic lake or possibly marine environment.

Two New Brunswick Hydrographic Network (NBHN) mapped watercourses are present within the Project Site:

- Mill Creek originates off-site and flows west to east through a rural, forested area. The watercourse crosses the four-lane section of Route 7, approximately 1 km southwest of the Project Site. An unnamed tributary to Kelly Lake and an unnamed tributary to Mary Ann Lake converge with Mill Creek, approximately 0.55 km and 0.40 km south of the Project Site, respectively. Mill Creek enters the southern Project Site boundary and flows over a bedrock outcrop in a falls/chute structure (Photo 1, Appendix A; Figure 2). Mill Creek is not situated within either PDA; and
- An unnamed tributary of Delaney Lake (herein referred to as the “Tributary”) originates near Delaney Lake west of the Project Site and flows west to east. The Tributary collects overland flows from the steep topography in the western portion of the Project Site and flows under Old Quarry Road via a concrete pipe culvert into the Clay PDA (Photo 2 and Photo 3, Appendix A; Figure 2). Mill Creek intersects the Tributary in the central portion of the Project Site, outside the Clay PDA. The collective watercourse (Mill Creek) flows east into an open water wetland. A beaver dam is located at the eastern portion of the wetland, creating the impoundment.

In addition, there is a man-made impoundment (herein referred to as the “Pond”) which is the result of historic (1990s) clay extraction pit on the Project Site (Photo 4, Appendix A). Drainage channels and roadside ditching are directed south, under Old Quarry Road via two culverts to outlet into the Pond. A small drainage channel flows southeast from the Pond to outlet into Mill Creek.

2.3.1 Engineering Investigations

In June 2018, GEMTEC was retained by the FRSC to conduct a preliminary aggregate and clay source investigation on the Project Site. The investigation was conducted as a two-phased approach:

- A preliminary desktop review of known bedrock and surficial geology, Google Earth imagery and Lidar data; and
- Field reconnaissance by a geotechnical engineer and a test pit/borehole investigation.

The desktop review of New Brunswick granular resource and surficial geology mapping showed potential for both clay and bedrock sources on the Project Site. Based on Google Earth imaging, two previously exposed, partially developed rock sources (quarries) were located on the Project Site. Also, the historical clay pit (Pond as described above) was known to provide the clay material used in a capital project (sanitary sewer lagoon) in the Town of Grand Bay-Westfield, New Brunswick in the 1990s. The current property owner (John Law Corporation) confirmed the presence of a potential clay source within the Project Site. Based on the desktop review, GEMTEC developed a preliminary test pit and borehole location plan to optimize the investigation in consideration of Project Site access to determine the potential resource coverage.

Seventeen (17) test pits were excavated using a sub-contracted excavator on June 4, 2018 and six boreholes were advanced using a track mounted geotechnical drill rig between June 6 and June 8, 2018. Test pits were excavated to identify and delineate the footprint of the potential clay source. Three of the boreholes were drilled in potential aggregate quarry sites and three boreholes were to assess the thickness of the potential clay source. A figure showing the borehole and test pit locations is presented in Appendix B as well as the associated borehole and test pit logs.

Based on the findings of the geotechnical investigation, it was determined that the Project Site has suitable material for the following:

- Maintenance aggregate (daily cover);
- Granular subbase material (used for roadways and cell base);
- Granular base material (used for roadway maintenance and construction);
- Frost protection material (to be placed in newly constructed cells for a measure of protection for the liner during freezing conditions);
- Riprap;
- Clay liner material; and
- Clayey capping material.

The estimated footprint of suitable clay source is approximately 63,900 square metres (m²) with an overall estimate quantity of approximately 250,000 cubic metres (m³; Clay PDA, Figure 2). For preliminary estimating purposes, the thickness of the recoverable clay material is taken to be 4 metres. This is considered to be a conservative estimate and is based on the thickness of clay material encountered during the test pit and borehole investigation.

Based on the geological mapping information, geotechnical investigation data and using CAD software, the estimated footprint of suitable aggregate material, *i.e.*, that can be quarried, is approximately 97,3000 m², with an overall extractable quantity of approximately 770,200 m³ (Quarry PDA, Figure 2).

2.4 Project Description

The clay source is located within the footprint of a regulated wetland (forested swamp complex) that was likely a historic lake basin (source of the mineral clay; Photo 5, Appendix A). The Tributary flows north to south through the clay PDA, and will be re-aligned as part of the Project.

The clay material will be extracted using open pit methods. The aggregate material will be extracted from the Quarry PDA in “quarry face” operation by leveling an existing hill area. The quarry depth is not anticipated to be below the existing surrounding areas and therefore will not create an open pit. The aggregate will be extracted from a historic quarry face already existing on the Project Site (Photo 6, Appendix A).

Old Quarry Road provides access to the Project Site but road enhancement will be required (Photo 3, Appendix A) prior to the start of operations.

Based on preliminary Project plans, the FRSC is proposing to commence site mobilization and preparation activities (construction phase) in the spring of 2020, the extraction/quarrying activities (operational phase) in summer 2020 (as required for cell construction, cell capping and other maintenance projects), and the closure/reclamation phase in 2048 to 2049. The Project is expected to be completed in three general phases: the construction phase, the operational phase and the reclamation phase, as detailed in Section 2.4.1 to Section 2.4.3. A preliminary Project timeline is presented in Table 2.

Table 2 General Project Timeline

Project Phase	Start	End
Obtain Regulatory Approvals and Land Transfer	February 2019	April 2020
Construction Phase (site mobilization and preparation of the site)	April 2020	June 2020
Operational Phase (blasting, excavation, processing and hauling material from Project Site to the Landfill) ¹	June 2020	September 2048
Reclamation Phase (demobilizing the site, decommissioning all site operations, grade/restore overburden, and undertaken re-vegetation activities).	September 2048	December 2049

1. Not continuous. There may be periods when no operational activities are undertaken on the Project Site.

2.4.1 Construction Phase

The construction phase of the Project will include the following main components:

- Mobilization to the Project Site;
- Road Upgrades and Access Road Construction
- Grubbing and Vegetation Clearing;
- Tributary Realignment; and
- Sedimentation Pond Construction.

2.4.1.1 Mobilization to the Project Site

Construction equipment will be mobilized to the Project Site as required. It is expected that during the construction phase of the Project, the required equipment will include, but is not limited to, bulldozer(s) or front-end loader(s), rock truck(s) or dump truck(s), excavator(s), grader(s), and personnel truck(s). A temporary mobile work and/or storage trailer may be installed, as well as temporary on-site toilets.

2.4.1.2 Road Upgrades and Access Road Construction

Old Quarry Road will require upgrades in order to accommodate the necessary heavy machinery and haul trucks needed during the Project. Fill will be placed to grade and widen the roadway to facilitate access to the Clay PDA and Quarry PDA. The enhancement of the roadway may include the excavation of drainage ditching and the installation or replacement of cross-drain culverts to accommodate surface water flow within the Project Site. Any drainage ditching will be directed

towards the sedimentation pond or Mill Creek and/or the Tributary, as per the current drainage patterns on-site.

An access road will be constructed in a southerly direction from Old Quarry Road. This road will provide access to the clay source (Clay PDA) and will be constructed using clean, granular fill. A work pad may be constructed at the terminus of the road to support Project equipment. The exact location and dimensions of the access road and work pad have not yet been determined.

2.4.1.3 Grubbing and Vegetation Clearing

Vegetation clearing will be kept to a minimum and will be carried out only as required for site mobilization and ground preparation. Clay and aggregate extraction sites will be cleared of vegetation in succession (*i.e.*, as the operational phase progresses). Vegetation clearing will likely be conducted outside the migratory bird nesting and breeding season; should vegetation clearing take place within these seasons, an appropriate bird survey will be conducted prior to any work, if required. Any organic material or overburden stockpiles will be windrowed and stabilized to prevent dust and sedimentation run-off into the surrounding environment.

2.4.1.4 Tributary Realignment

A diversion channel for the Tributary will be constructed to facilitate flow away from the Clay PDA; the exact re-location of this channel has not yet been determined. The proposed channel diversion will re-align the Tributary channel outside the Clay PDA and the Tributary channel will ultimately discharge into Mill Creek, as per the pre-construction drainage regime. The diversion channel is expected to be a permanent re-alignment of the Tributary. Any required culverts along the re-alignment will be designed and constructed to provide fish passage from Mill Creek into the upstream portion of the Tributary and in accordance with current engineering practices and standards. Following the construction of the diversion channel, the original channel will be permanently blocked and removed.

2.4.1.5 Sedimentation Pond Construction

A water management plan will be developed for the Project and preliminary plans include the construction of a sedimentation pond specific to the de-watering activities at the Clay PDA. It is expected that during the construction and operational phases of the Project, water from precipitation, snow melt and groundwater seepage, *etc.* may be impounded within the open pit excavation. The sedimentation pond will be designed in accordance with current engineering practices and standards to provide a settling environment for suspended solids, prior to being discharged into Mill Creek or the Tributary. The sedimentation pond will also be designed to withstand seasonal influxes of water.

It is expected that the construction phase of the Project will begin as early as the spring of 2020 after all approvals and authorizations for the work have been obtained.

2.4.2 Operational Phase

The operational phase of the Project will include the following main components:

- Mobilization of Operational Equipment;
- Open Pit Extraction; and
- Transportation of Material to Project Site.

2.4.2.1 Mobilization of Operational Equipment

Operational equipment will mobilize to the site as required. It is expected that during the operational phase of the Project, the required equipment will include, but is not limited to, bulldozer(s), front-end loader(s), rock truck(s), dump truck(s), excavator(s), rock crushing and screening equipment, various conveyors, weigh scales, and personnel truck(s). A temporary mobile work and/or storage trailer and temporary toilets may be maintained on-site as well.

2.4.2.2 Open Pit/Face Extraction

Prior to the start of any extractions, baseline surface water sampling will be completed to monitor that Project activities do not negatively impact water quality in the area. Baseline samples may include: general chemistry, trace metals and total suspended solids (TSS) upstream and downstream of the PDA (Clay PDA and Quarry PDA).

The extraction will involve the progressive removal of vegetation and overburden soil to access the subterranean quarriable materials (*i.e.*, aggregate and clay). The excavation footprint will become increasingly larger over time to access the full extent of the resources within the PDAs. The clay pit will be contoured to collect any site run-off within a collection sump where it can infiltrate the ground or be pumped to a sedimentation pond. Potable water is not required for Project operations.

Aggregate Open Face

During the preliminary operational phase, aggregate will be obtained from the existing quarry face and existing rock stockpiles within the Quarry PDA (Photo 6, Appendix A). Once the existing stockpile has been depleted, a drill/blast method (*e.g.*, drilling, blasting, hauling, and crushing) will be used to extract additional aggregate resources, generally advancing east within the Project Site. All blasting will be conducted by a certified contractor in accordance to an Approval to Operate from the NBDELG. In addition, a pre-blast survey plan will be developed and implemented as required, prior to the commencement of any Project activities. The pre-blast survey may include a third-party visual and video/photography inspection and limited water quality testing (*i.e.*, general chemistry, trace metals, and/or bacteria) for residences serviced by a potable groundwater well along Acamac Backland Road and Old Quarry Road, as required. The FRSC will work with nearby landowners if concerns arise.

All blasting events will be restricted to daylight hours. It is expected that a maximum of one to five blasting events will be required on an annual basis, during peak Landfill construction periods. During periods of little or no construction at the Landfill, blasting events will be intermittent and there may be periods of several years where no work is completed at the Project Site.

Aggregate rock may be stored within the Quarry PDA at a designated stockpiling area prior to being loaded onto a highway type truck for transport to the Landfill.

At no time during the Project will the aggregate quarry directly impact any regulated wetland.

Clay Open Pit

Operating from a work-pad, and on an as-needed basis, an excavator will reach into the Clay PDA, extract the clay source and load it into a rock/dump truck for transport to the Landfill.

Based on the wet nature (*i.e.*, wetland) of the clay source PDA, it is not expected that the excavator will track within the Clay PDA until sufficient de-watering efforts have been undertaken. A vegetated buffer will be maintained between the Clay PDA and the existing wetland areas and Mill Creek during the operational activities. The open-pit extraction methods will further minimize the risk of a release of a deleterious substance into the surrounding environment via the gravity influenced direction of overland flow or seepage into the pit sump. De-watering activities may be required to remove the impounded water from the pit. All water will be pumped into a sedimentation pond to allow for the settling of suspended solids. Monitoring of the pond (water levels and sedimentation load) will be conducted to ensure that no water is released (or overtopped) from the sediment pond in exceedance of 25 mg/L TSS above the baseline conditions (measured via grab samples, as required). Water will be released at a rate that does not overwhelm the capacity of the receiving watercourse. During dry seasonal conditions (likely summer), when the sedimentation pond is free or easily drawn down of water, dredging activities will be completed, as required, to maintain the capacity sediment pond. All dredged material will be disposed of in a manner to mitigate against re-release into the environment.

2.4.2.3 Transportation of Material from the Project Site

The preferred hauling route from the Project Site to the Landfill is: west on Old Quarry Road; north on Acamac Backland Road; south on Route 177; then east on Crane Mountain Road (Figure I-1, Appendix I). During the construction phase of the Project, Old Quarry Road will be improved to provide a suitable transportation route, the Landfill will maintain and service Old Quarry Road, as required during the Project. Acamac Backland Road, Route 177 and Crane Mountain Road are serviced by the New Brunswick Department of Transportation and Infrastructure (NBDTI) and are already travelled by third-party subcontractors to provide construction materials to the Landfill, with the exception of Acamac Backland Road. One seasonal dwelling is located along the proposed haul route (on Old Quarry Road); the Landfill will notify the landowner and work to determine any concerns, as required.

It is expected that the operational phase of the Project will commence in 2020 and will continue until at least 2048. The operational activities will typically only be completed on weekdays, up to 12 hours per day (*i.e.*, daylight hours only). Work could occasionally be conducted on weekends, depending on required Landfill construction schedules and contractors. Operational activities will only be completed on an as-needed basis for on-going construction projects at the Landfill; therefore, the aforementioned activities are not expected to be continuous and there may be periods of several years where no work is completed at the Project Site. The on-site resources are not expected to be depleted prior to the end of the Landfill lifetime.

2.4.3 Reclamation Phase

The reclamation phase of the Project will include the following main components:

- Re-contouring of Open Pits and Demobilization of Equipment;
- Grading of Disturbed Areas;
- Removal of Drainage Channels and Sediment Pond Outflows; and
- Re-vegetation.

2.4.3.1 Re-contouring of Open Pits and Demobilization of Equipment

Any residual stockpiled clay or aggregate material will be returned to the associated extraction site and contoured to a stable slope. The pits may be in-filled partially with on-site overburden/stockpiled material, but there will not be sufficient material remaining on-site for an entire in-fill. It is expected that the remaining open pits will naturally impound water (*i.e.*, precipitation/snowmelt) to provide aquatic habitat features and may be enhanced to provide wetland compensation opportunities. The edges of these features, excluding any remaining rock faces, will be graded to a natural slope. All Project infrastructure (*i.e.*, de-watering infrastructure, temporary work/storage trailer, temporary toilets, crusher, mobile equipment, *etc.*) will be demobilized, unless required for the decommissioning of the Project Site.

2.4.3.2 Grading of Disturbed Areas

All disturbed areas, including storage areas, access roads, work pad, *etc.* will be graded and shaped to near natural conditions, as feasible.

2.4.3.3 Removal of Drainage Channels and Sediment Pond Outflows

Any drainage channels and sediment pond outflows will be removed, as required, to facilitate surface water flow into the remaining open pits and/or Mill Creek. The re-aligned Tributary channel will remain as per the Project construction plans to reduce the disturbance to fish habitat and migration.

2.4.3.4 Re-vegetation

All disturbed areas, excluding remaining roadways, open water features and rock faces, will be covered with on-site, stockpiled topsoil and re-vegetation efforts will be employed. Re-vegetation efforts may include hydro-seeding with native plant species.

It is anticipated that some reclamation activities will be conducted in conjunction with each clay extraction period. As a minimum, exposed soils will be stabilized to mitigate against erosion. It is expected that the final reclamation phase of the Project will commence in 2048, concurrent with the end of lifetime and closure of the Landfill. Material from the clay and aggregate PDAs may be utilized during the Landfill closure activities (*i.e.*, cover material, landfill capping material, *etc.*). All reclamation activities and final demobilization of the Project Site are expected to be completed by December 2049.

2.5 Project Related Documents

There are no known prior EIAs or environmental studies available for the Project. However, it is understood that the Project Site has historically been utilized as a clay source for municipal projects (a nearby sewage lagoon) and as an aggregate rock quarry.

3.0 ENVIRONMENTAL IMPACT ASSESSMENT METHODOLOGY

The objective of this EIA report is to meet the requirements of the *New Brunswick Environmental Impact Assessment Regulation 87-83* (as described in Section 1.0), and should, in particular:

- Consider the potential for both positive and negative changes on the environment;
- Assess potential environmental effects;
- Outline mitigation and impact management measures; and
- Identify any monitoring needs associated with the Project.

The EIA focuses on issues directly relevant to open pit clay extraction. The approach of this assessment is to focus on project-specific valued environmental components (VECs) in a method consistent with New Brunswick EIA regulatory requirements. However, the quarry footprint and quarrying activities are considered a component of the Project and therefore, some the scope of work and associated environmental impacts are assessed during this EIA.

The Guide to Environmental Impact Assessment in New Brunswick (January, 2018) outlines a list of environmental attributes that have the potential to be affected by a project. This EIA identifies the VECs (Table 3) that were assessed within and surrounding the Project Site, to determine whether activities related to the Project activities would affect them.

Table 3 VECs and Factors to be considered for Valued Environmental Components	
Valued Environmental Component	Factors to be Considered
Atmospheric Environment (Appendix C)	<ul style="list-style-type: none"> • Air quality; • Climate conditions; and • Sound Quality.
Groundwater Resources (Appendix D)	<ul style="list-style-type: none"> • Physiography and drainage; • Bedrock and surficial geology; and • Groundwater quality and quantity.
Aquatic Environment (Appendix E)	<ul style="list-style-type: none"> • Surface water quality; • Fish and fish habitat; • Species at Risk (SAR) and Critical Habitat; • Species of Conservation Concern (SOCC) and their habitat; and • Commercial/Recreational and Aboriginal (CRA) fisheries.
Wildlife and Wildlife Habitat (Appendix F)	<ul style="list-style-type: none"> • Birds and bird habitat; • Wildlife and wildlife habitat; • SAR and Critical Habitat; • SOCC and their habitat; and • Ecological significant areas.
Wetlands and Vegetation (Appendix G)	<ul style="list-style-type: none"> • Wetlands; • Flora; • SAR (vascular flora survey) and Critical Habitat; and • SOCC (vascular flora survey) and their habitat.
Archaeological and Heritage Resources (Appendix H)	<ul style="list-style-type: none"> • Structures, sites, or items of historical, archaeological, paleontological, or architectural significance.
Land Use and Economy (Appendix I)	<ul style="list-style-type: none"> • Residential land use; • Recreational land use; • Commercial and industrial land use; • Traffic pattern and volume; • Local economy; • CRA Fisheries; and • Current use of land and resources for traditional purposes by Aboriginal persons.

Table 3 VECs and Factors to be considered for Valued Environmental Components	
Valued Environmental Component	Factors to be Considered
Effects of the Environment on the Project (Appendix J)	<ul style="list-style-type: none"> • Climate conditions; • Climate change; • Seismic activity; • Natural forest fires; and • Contaminated sites.

Within each Appendix, VEC information is presented as follows:

- Section 1: Rationale for the VEC Assessment;
- Section 2: Establishment of Boundaries (spatial and temporal);
- Section 3: Assessment Methodology;
- Section 4: Description of the Existing Environment;
- Section 5: Summary of Potential Effects;
- Section 6: Proposed Mitigation Measures; and
- Section 7: Potential Significant Residual Effects.

4.0 PUBLIC INVOLVEMENT

The public involvement standards for registered projects is outlined in the Guide to Environmental Impact Assessment in New Brunswick (January, 2018).

A detailed public consultation report will be prepared and submitted by FRSC under separate cover, once the EIA is registered. It is expected that public involvement will include, at a minimum:

- A published notice of registration in the local newspaper (the Telegraph Journal);
- A Project information letter to Crane Mountain Enhancement Inc. (CMEI);
- A Project information letter to ACAP Saint John;
- A Project information letter to Members of the Legislative Assembly (MLAs) for Saint John and Grand Bay-Westfield;
- A Project information letter to local governments including: the City of Saint John and the Town of Grand Bay-Westfield;
- A Project information letter to nearby First Nations communities and the Aboriginal Affairs Secretariat;
- A notice of registration will be distributed (via registered mail) to nearby landowners of the Project Site; and
- An open-house session will be held in 2019 to address the publics' concerns regarding the Project;
- The registration and supporting documents will be made available in the Region 4 (Saint John) office of NBDELG and online at https://www2.gnb.ca/content/gnb/en/departments/elg/environment/content/environmental_impactassessment.html

5.0 REFERENCES

GeoNB Wetland Mapping. Accessed November 15, 2018. Website: <http://geonb.snb.ca/geonb/>

GeoNB Protected Wellfields. Accessed November 15, 2018.
http://geonb.snb.ca/geonb/index_wellfield.html

GeoNB Protected Watersheds. Accessed November 15, 2018.
http://geonb.snb.ca/geonb/index_watershed.html

New Brunswick Department of Environment and Local Government (NBDELG). 2008. Additional Information Requirement for Mining and Mineral Extraction. April 2014.

New Brunswick Department of Environment and Local Government (NBDELG). 2018. A Guide to Environmental Impact Assessment in New Brunswick. January 2018.

6.0 STATEMENT OF LIMITATIONS

This report has been prepared for the sole benefit of the Fundy Regional Service Commission. Any other person or entity without the express written consent of GEMTEC Consulting Engineers and Scientists Limited and the Fundy Regional Service Commission may not rely upon this report.

Any use that a third party makes of this report, or any reliance or decisions made based on it, is the responsibility of such third parties. GEMTEC Consulting Engineers and Scientists Limited accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

Some of the information presented in this report was provided through existing documents and interviews. Although attempts were made, whenever possible, to obtain a minimum of two confirmatory sources of information, in certain instances, GEMTEC Consulting Engineers and Scientists Limited has been required to assume that the information provided is accurate.

The conclusions presented represent the best judgment of the trained professional and technical staff based on current environmental standards and on the Project Site conditions observed by staff at the time the work was performed.

Should additional information become available, GEMTEC Consulting Engineers and Scientists Limited requests that this information be brought to our attention so that we may re-assess the conclusions presented herein.



APPENDIX A

Site Photos



Photo 1: View of Mill Creek at southern Project Site boundary (September 20, 2018).



Photo 2: View of the Tributary crossing under Yellow Gate Road (Old Quarry Road; September 20, 2018).



Photo 3: View of Yellow Gate Road (Old Quarry Road) on the Project Site (September 20, 2018).



Photo 4: View of the Pond (historic clay extraction pit; September 20, 2018).



Photo 5: View of the regulated wetland within the Clay PDA (September 20, 2018).

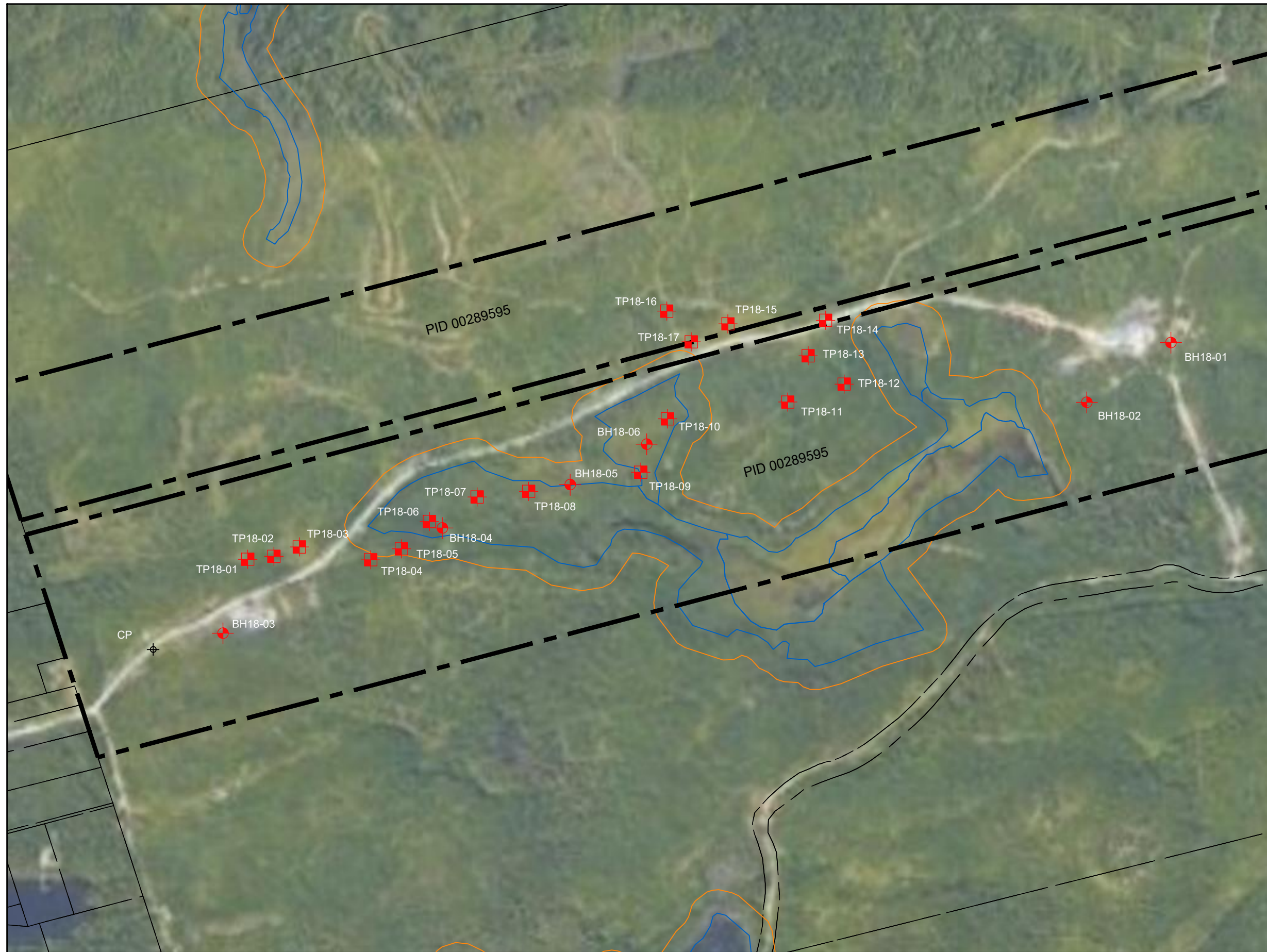


Photo 6: View of the existing quarry face within the Quarry PDA (September 25, 2018).







APPENDIX B

Engineering Investigation Information



LEGEND

	REGULATED WETLAND BUFFER (GeoNB)
	PROPERTY LINE (GeoNB)
	TEST PIT LOCATION
	BOREHOLE LOCATION

NOTES:

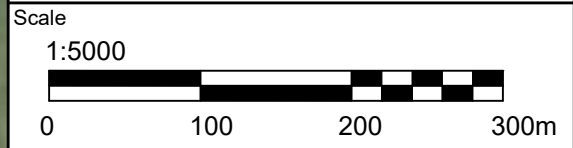
- 1) 2016 aerial photo from Google Earth.
- 2) Contours from 2014 GeoNB LiDAR data, CGVD28.

Drawn By	WAC	Checked By	MLS
Calculations By		Checked By	

Date
JUNE, 2018

Project
FUNDY REGIONAL SERVICE COMMISSION
CRANE MOUNTAIN, SAINT JOHN, NB

Drawing
TEST PIT AND BOREHOLE LOCATION PLAN
PID 00289595



File No. 90422703	Drawing FIGURE 1	Revision No. 0
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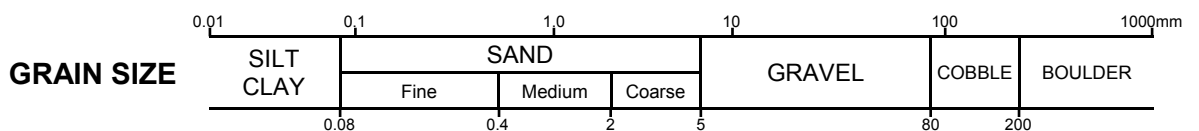
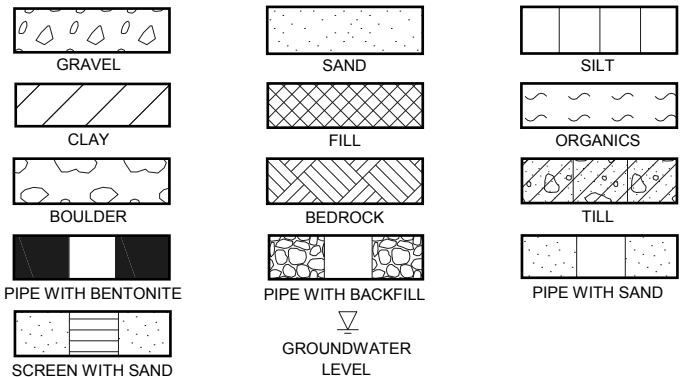
ABBREVIATIONS AND TERMINOLOGY USED ON RECORDS OF BOREHOLES AND TEST PITS

SAMPLE TYPES	
AS	Auger sample
CA	Casing sample
CS	Chunk sample
BS	Borros piston sample
GS	Grab sample
MS	Manual sample
RC	Rock core
SS	Split spoon sampler
ST	Slotted tube
TO	Thin-walled open shelby tube
TP	Thin-walled piston shelby tube
WS	Wash sample

SOIL TESTS	
w	Water content
PL, w_p	Plastic limit
LL, w_L	Liquid limit
C	Consolidation (oedometer) test
D_R	Relative density
DS	Direct shear test
G_s	Specific gravity
M	Sieve analysis for particle size
MH	Combined sieve and hydrometer (H) analysis
MPC	Modified Proctor compaction test
SPC	Standard Proctor compaction test
OC	Organic content test
UC	Unconfined compression test
γ	Unit weight

PENETRATION RESISTANCE	
<p>Standard Penetration Resistance, N The number of blows by a 63.5 kg (140 lb) hammer dropped 760 millimetres (30 in.) required to drive a 50 mm split spoon sampler for a distance of 300 mm (12 in.). For split spoon samples where less than 300 mm of penetration was achieved, the number of blows is reported over the sampler penetration in mm.</p>	
<p>Dynamic Penetration Resistance The number of blows by a 63.5 kg (140 lb) hammer dropped 760 mm (30 in.) to drive a 50 mm (2 in.) diameter 60° cone attached to 'A' size drill rods for a distance of 300 mm (12 in.).</p>	
WH	Sampler advanced by static weight of hammer and drill rods
WR	Sampler advanced by static weight of drill rods
PH	Sampler advanced by hydraulic pressure from drill rig
PM	Sampler advanced by manual pressure

COHESIONLESS SOIL Compactness		COHESIVE SOIL Consistency	
SPT N-Values	Description	C_u , kPa	Description
0-4	Very Loose	0-12	Very Soft
4-10	Loose	12-25	Soft
10-30	Compact	25-50	Firm
30-50	Dense	50-100	Stiff
>50	Very Dense	100-200	Very Stiff
		>200	Hard



DESCRIPTIVE TERMINOLOGY

(Based on the CANFEM 4th Edition)

TRACE	SOME	ADJECTIVE	noun > 35% and main fraction
trace clay, etc	some gravel, etc.	silty, etc.	sand and gravel, etc.

LITHOLOGICAL AND GEOTECHNICAL ROCK DESCRIPTION TERMINOLOGY

WEATHERING STATE	
Fresh	No visible sign of rock material weathering
Faintly weathered	Weathering limited to the surface of major discontinuities
Slightly weathered	Penetrative weathering developed on open discontinuity surfaces but only slight weathering of rock material
Moderately weathered	Weathering extends throughout the rock mass but the rock material is not friable
Completely weathered	Rock is wholly decomposed and in a friable condition but the rock and structure are preserved

CORE CONDITION
<p>Total Core Recovery (TCR) The percentage of solid drill core recovered regardless of quality or length, measured relative to the length of the total core run</p>
<p>Solid Core Recovery (SCR) The percentage of solid drill core, regardless of length, recovered at full diameter, measured relative to the length of the total core run.</p>
<p>Rock Quality Designation (RQD) The percentage of solid drill core, greater than 100 mm length, as measured along the centerline axis of the core, relative to the length of the total core run. RQD varies from 0% for completed broken core to 100% for core in solid segments.</p>

BEDDING THICKNESS	
Description	Thickness
Thinly laminated	< 6 mm
Laminated	6 - 20 mm
Very thinly bedded	20 - 60 mm
Thinly bedded	60 - 200 mm
Medium bedded	200 - 600 mm
Thickly bedded	600 - 2000 mm
Very thickly bedded	2000 - 6000 mm

DISCONTINUITY SPACING	
Description	Spacing
Very close	20 - 60 mm
Close	60 - 200 mm
Moderate	200 - 600 mm
Wide	600 - 2000 mm
Very wide	2000 - 6000 mm

ROCK QUALITY	
RQD	Overall Quality
0 - 25	Very poor
25 - 50	Poor
50 - 75	Fair
75 - 90	Good
90 - 100	Excellent

ROCK COMPRESSIVE STRENGTH	
Comp. Strength, MPa	Description
1 - 5	Very weak
5 - 25	Weak
25 - 50	Moderate
50 - 100	Strong
100 - 250	Very strong

RECORD OF BOREHOLE 18-01

CLIENT: Fundy Regional Service Commission
 PROJECT: Rock and Clay Source Exploration (Boreholes)
 JOB#: 904227
 LOCATION: Yellow Gate Road - PID 00289595

SHEET: 1 OF 1
 DATUM: CGVD28
 BORING DATE: Jun 6 2018




DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES				PENETRATION RESISTANCE (N), BLOWS/0.3m		SHEAR STRENGTH (Cu), kPa		ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	▲ DYNAMIC PENETRATION RESISTANCE (N), BLOWS/0.3m	● PENETRATION RESISTANCE (N), BLOWS/0.3m	+ NATURAL ⊕ REMOULDED			WATER CONTENT, % W _p — W — W _L
0	Power Auger	Ground Surface		47.21										
		Fresh to faintly weathered, poor quality, fine grained blue white to blue grey BEDROCK			46.68	1	RC	381	TCR = 65%; SCR = 43%; RQD = 40%					
		VOID		46.52										
1	Diamond Rotary Core	Fresh to faintly weathered, poor to excellent quality, intensely fractured to unfractured, fine grained, blue white to blue grey with brown/rust colouring in fractures BEDROCK		0.69	2	RC	1041	TCR = 100%; SCR = 100%; RQD = 100%						
2					3	RC	1524	TCR = 100%; SCR = 100%; RQD = 78%						
3					4	RC	1524	TCR = 100%; SCR = 98%; RQD = 98%						
4					5	RC	1524	TCR = 100%; SCR = 95%; RQD = 92%					Y	
5					6	RC	1524	TCR = 100%; SCR = 100%; RQD = 100%					UC	Backfilled with on-site gravel and cobbles
6					7	RC	1524	TCR = 100%; SCR = 95%; RQD = 100%					UC	
7					8	RC	1524	TCR = 100%; SCR = 100%; RQD = 100%					UC, Y	
8					9	RC	1524	TCR = 100%; SCR = 97%; RQD = 100%					UC, Y	
9														
10				34.74										
11				12.47										
12														
13		End of borehole											Groundwater not observed upon completion of borehole	
14														

GEO - BOREHOLE LOG 904227 BOREHOLES GP J GEMTEC 2018 GDT 18/07/09

RECORD OF BOREHOLE 18-02

CLIENT: Fundy Regional Service Commission
 PROJECT: Rock and Clay Source Exploration (Boreholes)
 JOB#: 904227
 LOCATION: Yellow Gate Road - PID 00289595

SHEET: 1 OF 1
 DATUM: CGVD28
 BORING DATE: Jun 6 2018

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLES				PENETRATION RESISTANCE (N), BLOWS/0.3m		SHEAR STRENGTH (Cu), kPa		ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION			
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	▲ DYNAMIC PENETRATION RESISTANCE (N), BLOWS/0.3m	● PENETRATION RESISTANCE (N), BLOWS/0.3m	+ NATURAL ⊕ REMOULDED	WATER CONTENT, %					
0	Power Auger	Ground Surface		41.97													
		Brown TOPSOIL and ORGANICS		41.77													
		Brown SAND and GRAVEL		0.20													
1	Diamond Rotary Core	Fresh to moderately weathered, excellent to very poor quality, very intensely fractured to unfractured, fine grained, green blue to green grey with white streaks and brown/rust colouring in fractures BEDROCK		0.61													
				1	RC	1194	TCR = 100%; SCR = 81%; RQD = 23%										
2				2	RC	1524	TCR = 100%; SCR = 100%; RQD = 100%									UC, Y	
3				3	RC	1524	TCR = 100%; SCR = 92%; RQD = 82%									UC, Y	
4				4	RC	1524	TCR = 100%; SCR = 80%; RQD = 63%									Y	Backfilled with on-site gravel and cobbles
5				5	RC	1524	TCR = 100%; SCR = 87%; RQD = 87%										
6				6	RC	1473	TCR = 100%; SCR = 86%; RQD = 86%									UC, Y	
7	7	RC	1016	TCR = 100%; SCR = 50%; RQD = 10%													
8																	
9																	
10																	
11		End of borehole		31.61 10.36										Groundwater not observed upon completion of borehole			
12																	
13																	
14																	

GEO - BOREHOLE LOG 9042 27 BOREHOLES.GPJ GEMTEC 2018.GDT 18/07/09

RECORD OF BOREHOLE 18-03

CLIENT: Fundy Regional Service Commission
 PROJECT: Rock and Clay Source Exploration (Boreholes)
 JOB#: 904227
 LOCATION: Yellow Gate Road - PID 00289595

SHEET: 1 OF 1
 DATUM: CGVD28
 BORING DATE: Jun 7 2018

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLES				PENETRATION RESISTANCE (N), BLOWS/0.3m		SHEAR STRENGTH (Cu), kPA		ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV.	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	+ NATURAL ⊕ REMOULDED		WATER CONTENT, %					
				DEPTH (m)					10	20	30	40			50	60
0		Ground Surface		56.97												
0.5	Diamond Rotary Core	Faintly to completely weathered, very poor to good quality, very intensely to moderately fractured, fine grained, grey to blue with white streaks and brown/rust colouring in fractures BEDROCK			1	RC	610	TCR = 100%; SCR = 0%; RQD = 0%								
1				2	RC	610	TCR = 100%; SCR = 0%; RQD = 0%									
1.5				3	RC	330	TCR = 100%; SCR = 13%; RQD = 0%									
2				4	RC	660	TCR = 100%; SCR = 0%; RQD = 0%									Y
2.5				5	RC	559	TCR = 100%; SCR = 27%; RQD = 0%									
3				6	RC	1092	TCR = 100%; SCR = 16%; RQD = 16%									
3.5				7	RC	1016	TCR = 100%; SCR = 25%; RQD = 15%									
4				8	RC	1524	TCR = 100%; SCR = 67%; RQD = 52%									UC, Y
4.5				9	RC	737	TCR = 100%; SCR = 21%; RQD = 0%									
5				10	RC	1143	TCR = 100%; SCR = 27%; RQD = 0%									Y
5.5				11	RC	508	TCR = 100%; SCR = 6%; RQD = 30%									
6				12	RC	737	TCR = 100%; SCR = 10%; RQD = 0%									
6.5				13	RC	1524	TCR = 100%; SCR = 95%; RQD = 86%									UC, Y
7				14	RC	762	TCR = 100%; SCR = 100%; RQD = 87%									
7.5				44.65										Backfilled with on-site gravel and cobbles		
8				12.32												
8.5		End of borehole													Groundwater not observed upon completion of borehole	
9																
9.5																
10																
10.5																
11																
11.5																
12																
12.5																
13																
13.5																
14																

GEO - BOREHOLE LOG 904227 BOREHOLES GP J. GEMTEC 2018.GDT 18/07/09

RECORD OF BOREHOLE 18-04

CLIENT: Fundy Regional Service Commission
 PROJECT: Rock and Clay Source Exploration (Boreholes)
 JOB#: 904227
 LOCATION: Yellow Gate Road - PID 00289595

SHEET: 1 OF 1
 DATUM: CGVD28
 BORING DATE: Jun 7 2018

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLES				● PENETRATION RESISTANCE (N), BLOWS/0.3m ▲ DYNAMIC PENETRATION RESISTANCE (N), BLOWS/0.3m	SHEAR STRENGTH (Cu), kPA + NATURAL ⊕ REMOULDED WATER CONTENT, % W_p — W — W_L	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m					
0	Power Auger	Ground Surface		31.79									
		Very loose brown to black TOPSOIL with organics		31.18	1	SS	100	1	●				
1		Very loose red brown SILT and CLAY, some sand and gravel, trace organics (wood debris)		0.61	2	SS	250	3	●				
2		Soft red brown CLAY and SILT, trace sand		1.52	3	SS	180	9	●				
4					4	AS							MH, W, wp, wL
7					5	AS							MH, W, wp, wL
9		Compact red brown sandy silt, some gravel (GLACIAL TILL)		23.41									
				8.38									
11		End of borehole		21.12									
				10.67									

GROUNDWATER OBSERVATIONS		
DATE	DEPTH (m)	ELEV (m)
18/06/07	0.61	▽ 31.18
18/06/07	8.38	▼ 23.41

GEO - BOREHOLE LOG 904227 BOREHOLES.GPJ GEMTEC 2018.GDT 18/07/09

RECORD OF BOREHOLE 18-05

CLIENT: Fundy Regional Service Commission
 PROJECT: Rock and Clay Source Exploration (Boreholes)
 JOB#: 904227
 LOCATION: Yellow Gate Road - PID 00289595

SHEET: 1 OF 1
 DATUM: CGVD28
 BORING DATE: Jun 8 2018

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLES				PENETRATION RESISTANCE (N), BLOWS/0.3m		SHEAR STRENGTH (Cu), kPA		ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	●	▲	+ NATURAL ⊕ REMOULDED	WATER CONTENT, %		
0		Ground Surface		30.28										
		Very loose brown black PEAT with ORGANICS												
1		Soft red brown CLAY and SILT, trace sand and gravel with organics		29.37 0.91	1	SS	580	1	●					
					2	SS	400	7	●	⊕				
2		Soft red brown CLAY and SILT, trace sand and gravel		28.45 1.83										
3	Vibratory Hammer													
4														
5														
6														
7		compact grey silt and sand, some gravel (GLACIAL TILL)		23.57 6.71	3	SS	600	PH		⊕				
					4	SS	400	25	●					
8		End of borehole		22.36 7.92										
9														
10														
11														
12														
13														
14														

Backfilled with auger cuttings

MH, W, wp, wL

MH, W, wp, wL

Groundwater level observed in open borehole

GROUNDWATER OBSERVATIONS		
DATE	DEPTH (m)	ELEV (m)
18/06/08	6.71	▽ 23.57

GEO - BOREHOLE LOG 904227 BOREHOLES GP J. GEMTEC 2018.GDT 18/07/09

RECORD OF BOREHOLE 18-06

CLIENT: Fundy Regional Service Commission
 PROJECT: Rock and Clay Source Exploration (Boreholes)
 JOB#: 904227
 LOCATION: Yellow Gate Road - PID 00289595

SHEET: 1 OF 1
 DATUM: CGVD28
 BORING DATE: Jun 8 2018




DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLES				PENETRATION RESISTANCE (N), BLOWS/0.3m		SHEAR STRENGTH (Cu), kPa		ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION	
		DESCRIPTION	STRATA PLOT	ELEV.	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE (N), BLOWS/0.3m		WATER CONTENT, %				
DEPTH (m)												W _p	W	W _L	
0	Vibratory Hammer	Ground Surface		30.41											
		Very loose brown black PEAT, TOPSOIL, and ORGANICS													
1		Soft red brown SILTY CLAY, some sand, trace gravel		29.55 0.86	1	SS	350	1	●					MH, W, wp, wL	Backfilled with auger cuttings
					2	SS	510	8	●	○					
2															
3															
4															
5		Compact brown SAND and GRAVEL		25.23 5.18	3	SS	300	22	●	○			MH, W, wp, wL	Groundwater not observed upon completion of borehole	
				24.80 5.61	4	SS	0	>100							
6		End of borehole													
7															
8															
9															
10															
11															
12															
13															
14															

GEO - BOREHOLE LOG 904227 BOREHOLES.GPJ GEMTEC 2018.GDT 18/07/09

RECORD OF TEST PIT 18-02

CLIENT: Fundy Regional Service Commission
 PROJECT: Rock and Clay Source Exploration (Test Pits)
 JOB#: 904227
 LOCATION: Yellow Gate Road - PID 00289595

SHEET: 1 OF 1
 DATUM: CGVD28
 BORING DATE: Jun 4 2018

DEPTH SCALE METRES	SOIL PROFILE			SAMPLE NUMBER	SAMPLE TYPE	SHEAR STRENGTH (Cu), kPA + NATURAL ⊕ REMOULDED										WATER CONTENT, % Wp ——— W ——— Wl		ADDITIONAL LAB. TESTING	WATER LEVEL IN OPEN TEST PIT OR STANDPIPE INSTALLATION
	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)			10	20	30	40	50	60	70	80	90					
0	Ground Surface		36.56																
	Brown black PEAT with organics		36.36																
	Brown sand and silt, some gravel with cobbles/boulders (GLACIAL TILL)		0.20 35.16																
1			1.40																Backfilled with excavated material
2	End of test pit																		Groundwater not observed upon completion of test pit
3																			
4																			
5																			

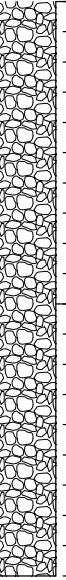
GEO - TESTPIT LOG 904227 - TEST PITS.GPJ GEMTEC 2018.GDT 18/07/09

RECORD OF TEST PIT 18-03

CLIENT: Fundy Regional Service Commission
 PROJECT: Rock and Clay Source Exploration (Test Pits)
 JOB#: 904227
 LOCATION: Yellow Gate Road - PID 00289595

SHEET: 1 OF 1
 DATUM: CGVD28
 BORING DATE: Jun 4 2018

DEPTH SCALE METRES	SOIL PROFILE			SAMPLE NUMBER	SAMPLE TYPE	SHEAR STRENGTH (Cu), kPA + NATURAL ⊕ REMOULDED										WATER CONTENT, % Wp ——— W ——— Wl		ADDITIONAL LAB. TESTING	WATER LEVEL IN OPEN TEST PIT OR STANDPIPE INSTALLATION
	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)			10	20	30	40	50	60	70	80	90					
0	Ground Surface	/ / / /	35.67																
	Brown black PEAT with organics	/ / / /																	
		/ / / /	35.37																
	Brown sand and silt, some gravel (GLACIAL TILL)	/ / / /	0.30																
		/ / / /	34.77																
1	Grey sand and silt, some gravel (GLACIAL TILL)	/ / / /	0.90																
		/ / / /	33.77																
		/ / / /	1.90																
2	End of test pit																		
3																			
4																			
5																			



Backfilled with excavated material

Groundwater not observed upon completion of test pit

GEO - TESTPIT LOG 904227 - TEST PITS.GPJ GEMTEC 2018.GDT 18/07/09

RECORD OF TEST PIT 18-04

CLIENT: Fundy Regional Service Commission
 PROJECT: Rock and Clay Source Exploration (Test Pits)
 JOB#: 904227
 LOCATION: Yellow Gate Road - PID 00289595

SHEET: 1 OF 1
 DATUM: CGVD28
 BORING DATE: Jun 4 2018





DEPTH SCALE METRES	SOIL PROFILE			SAMPLE NUMBER	SAMPLE TYPE	SHEAR STRENGTH (Cu), kPA + NATURAL ⊕ REMOULDED										WATER CONTENT, % Wp ——— W ——— Wl			ADDITIONAL LAB. TESTING	WATER LEVEL IN OPEN TEST PIT OR STANDPIPE INSTALLATION
	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)			10	20	30	40	50	60	70	80	90						
0	Ground Surface		36.56																	
	Brown TOPSOIL with organics		36.46																	
	Brown gravelly silty sand with cobbles/boulders (GLACIAL TILL)		0.10																	
1																				
2																				
3																				
			33.36		1	GS													M, W	Backfilled with excavated material
			3.20																	
	End of test pit																			Groundwater not observed upon completion of test pit
4																				
5																				

GEO - TESTPIT LOG 904227 - TEST PITS.GPJ GEMTEC 2018.GDT 18/07/09

RECORD OF TEST PIT 18-05

CLIENT: Fundy Regional Service Commission
 PROJECT: Rock and Clay Source Exploration (Test Pits)
 JOB#: 904227
 LOCATION: Yellow Gate Road - PID 00289595

SHEET: 1 OF 1
 DATUM: CGVD28
 BORING DATE: Jun 4 2018

DEPTH SCALE METRES	SOIL PROFILE			SAMPLE NUMBER	SAMPLE TYPE	SHEAR STRENGTH (Cu), kPA + NATURAL ⊕ REMOULDED										WATER CONTENT, % Wp ——— W ——— Wl		ADDITIONAL LAB. TESTING	WATER LEVEL IN OPEN TEST PIT OR STANDPIPE INSTALLATION
	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)			10	20	30	40	50	60	70	80	90					
0	Ground Surface		35.99																
	Brown TOPSOIL with organics																		
			35.59 0.40																
	Brown gravelly silty sand (GLACIAL TILL)																		
1																			
			34.59 1.40																
	End of test pit																		Groundwater not observed upon completion of test pit
2																			
3																			
4																			
5																			

GEO - TESTPIT LOG 904227 - TEST PITS.GPJ GEMTEC 2018.GDT 18/07/09

RECORD OF TEST PIT 18-06

CLIENT: Fundy Regional Service Commission
 PROJECT: Rock and Clay Source Exploration (Test Pits)
 JOB#: 904227
 LOCATION: Yellow Gate Road - PID 00289595

SHEET: 1 OF 1
 DATUM: CGVD28
 BORING DATE: Jun 4 2018

DEPTH SCALE METRES	SOIL PROFILE			SAMPLE NUMBER	SAMPLE TYPE	SHEAR STRENGTH (Cu), kPA + NATURAL ⊕ REMOULDED										WATER CONTENT, % Wp ——— W ——— Wl			ADDITIONAL LAB. TESTING	WATER LEVEL IN OPEN TEST PIT OR STANDPIPE INSTALLATION
	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)			10	20	30	40	50	60	70	80	90						
0	Ground Surface	/ / / / /	31.60																	
	Brown black PEAT with organics	/ / / / /																		
		/ / / / /	31.30																	
	Red brown SILT and CLAY, trace sand	/ / / / /	0.30																	
1		/ / / / /																		
		/ / / / /	30.40																	
	Brown SAND and GRAVEL	○ ○ ○ ○ ○	1.20																	
		/ / / / /	30.20																	
	Red brown SILT and CLAY, trace sand	/ / / / /	1.40																	
2		/ / / / /																		
		/ / / / /			1	GS														
		/ / / / /	28.10				○													
3		/ / / / /																		
		/ / / / /	3.50																	
	End of test pit	/ / / / /																		
4		/ / / / /																		
5		/ / / / /																		

Backfilled with excavated material

MH, W, wp, wL

Groundwater not observed upon completion of test pit



GEO - TESTPIT LOG 904227 - TEST PITS.GPJ GEMTEC 2018.GDT 18/07/09

RECORD OF TEST PIT 18-07

CLIENT: Fundy Regional Service Commission
 PROJECT: Rock and Clay Source Exploration (Test Pits)
 JOB#: 904227
 LOCATION: Yellow Gate Road - PID 00289595

SHEET: 1 OF 1
 DATUM: CGVD28
 BORING DATE: Jun 4 2018

DEPTH SCALE METRES	SOIL PROFILE			SAMPLE NUMBER	SAMPLE TYPE	SHEAR STRENGTH (Cu), kPA + NATURAL ⊕ REMOULDED										WATER CONTENT, % Wp ——— W ——— Wl			ADDITIONAL LAB. TESTING	WATER LEVEL IN OPEN TEST PIT OR STANDPIPE INSTALLATION
	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)			10	20	30	40	50	60	70	80	90	MH, W, wp, wL					
0	Ground Surface	▽	30.94																	
	Brown black PEAT with organics	▽																		
		▽																		
		▽																		
		▽	30.44 0.50																	
	Red brown CLAY and SILT, trace sand	▽																		
1																				
2																				
3																				
4	End of test pit		27.44 3.50		1	GS														
5																				

Backfilled with excavated material

Groundwater level observed in open test pit

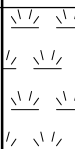

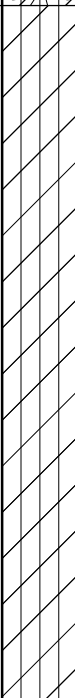
GROUNDWATER OBSERVATIONS		
DATE	DEPTH (m)	ELEV. (m)
18/06/04	0.50	▽ 30.44

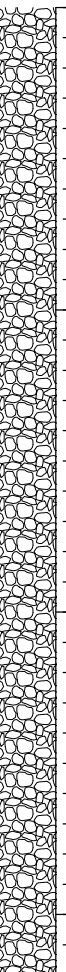
GEO - TESTPIT LOG 904227 - TEST PITS.GPJ GEMTEC 2018.GDT 18/07/09

RECORD OF TEST PIT 18-08

CLIENT: Fundy Regional Service Commission
 PROJECT: Rock and Clay Source Exploration (Test Pits)
 JOB#: 904227
 LOCATION: Yellow Gate Road - PID 00289595

SHEET: 1 OF 1
 DATUM: CGVD28
 BORING DATE: Jun 4 2018

DEPTH SCALE METRES	SOIL PROFILE			SAMPLE NUMBER	SAMPLE TYPE	SHEAR STRENGTH (Cu), kPA + NATURAL ⊕ REMOULDED										WATER CONTENT, % Wp — W — Wl		ADDITIONAL LAB. TESTING	WATER LEVEL IN OPEN TEST PIT OR STANDPIPE INSTALLATION
	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)			10	20	30	40	50	60	70	80	90					
0	Ground Surface		30.54																
	Brown black PEAT with organics																		
			30.04																
	Grey SILT and CLAY, some sand and gravel		0.50																
1			29.64																
	Red brown CLAY and SILT, trace sand		0.90																
2																			
3																			
			27.34		1	GS												MH, W, wp, wL	
			3.20																
	End of test pit																		Groundwater not observed upon completion of test pit
4																			
5																			



GEO - TESTPIT LOG 904227 - TEST PITS.GPJ GEMTEC 2018.GDT 18/07/09

RECORD OF TEST PIT 18-09

CLIENT: Fundy Regional Service Commission
 PROJECT: Rock and Clay Source Exploration (Test Pits)
 JOB#: 904227
 LOCATION: Yellow Gate Road - PID 00289595

SHEET: 1 OF 1
 DATUM: CGVD28
 BORING DATE: Jun 4 2018

DEPTH SCALE METRES	SOIL PROFILE			SAMPLE NUMBER	SAMPLE TYPE	SHEAR STRENGTH (Cu), kPA + NATURAL ⊕ REMOULDED										WATER CONTENT, % Wp ——— W ——— Wl			ADDITIONAL LAB. TESTING	WATER LEVEL IN OPEN TEST PIT OR STANDPIPE INSTALLATION
	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)			10	20	30	40	50	60	70	80	90						
0	Ground Surface		29.95																	
	Brown black PEAT with organics																			
			29.65																	
	Grey SILT and CLAY, with organics (wood debris)		0.30																	
1																				
			28.65																	
	Red brown CLAY and SILT, trace sand		1.30																	
2																				
3																				
			26.55		1	GS														
			3.40																	
	End of test pit																			
4																				
5																				

Backfilled with excavated material

MH, W, wp, wL

Groundwater level observed in open test pit


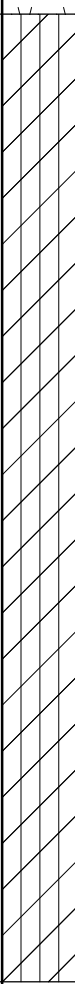
GROUNDWATER OBSERVATIONS		
DATE	DEPTH (m)	ELEV. (m)
18/06/04	0.50	▽ 29.45

GEO - TESTPIT LOG 904227 - TEST PITS.GPJ GEMTEC 2018.GDT 18/07/09

RECORD OF TEST PIT 18-10

CLIENT: Fundy Regional Service Commission
 PROJECT: Rock and Clay Source Exploration (Test Pits)
 JOB#: 904227
 LOCATION: Yellow Gate Road - PID 00289595

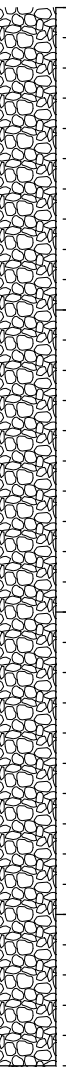
SHEET: 1 OF 1
 DATUM: CGVD28
 BORING DATE: Jun 4 2018

DEPTH SCALE METRES	SOIL PROFILE			SAMPLE NUMBER	SAMPLE TYPE	SHEAR STRENGTH (Cu), kPA + NATURAL ⊕ REMOULDED										WATER CONTENT, % Wp ——— W ——— Wl			ADDITIONAL LAB. TESTING	WATER LEVEL IN OPEN TEST PIT OR STANDPIPE INSTALLATION
	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)			10	20	30	40	50	60	70	80	90						
0	Ground Surface		31.12																	
	Brown black PEAT with organics																			
			30.82																	
	Red brown SILT and CLAY, trace sand		0.30																	
1																				
2																				
3					1	GS														
			27.62																	
			3.50																	
4	End of test pit																			
5																				

Backfilled with excavated material

MH, W, wp, wL

Groundwater not observed upon completion of test pit

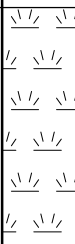



GEO - TESTPIT LOG 904227 - TEST PITS.GPJ GEMTEC 2018.GDT 18/07/09

RECORD OF TEST PIT 18-11

CLIENT: Fundy Regional Service Commission
 PROJECT: Rock and Clay Source Exploration (Test Pits)
 JOB#: 904227
 LOCATION: Yellow Gate Road - PID 00289595

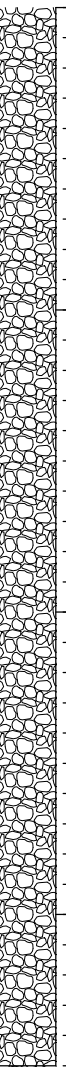
SHEET: 1 OF 1
 DATUM: CGVD28
 BORING DATE: Jun 4 2018

DEPTH SCALE METRES	SOIL PROFILE			SAMPLE NUMBER	SAMPLE TYPE	SHEAR STRENGTH (Cu), kPA + NATURAL ⊕ REMOULDED										WATER CONTENT, % Wp ——— W ——— Wl			ADDITIONAL LAB. TESTING	WATER LEVEL IN OPEN TEST PIT OR STANDPIPE INSTALLATION
	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)			10	20	30	40	50	60	70	80	90						
0	Ground Surface		33.86																	
	Brown black PEAT with organics																			
			33.06																	
1	Red brown CLAY and SILT, trace sand		0.80																	
2																				
3				1	GS															
			30.36																	
			3.50																	
4	End of test pit																			
5																				

Backfilled with excavated material

MH, W, wp, wL

Groundwater not observed upon completion of test pit



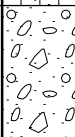


GEO - TESTPIT LOG 904227 - TEST PITS.GPJ GEMTEC 2018.GDT 18/07/09

RECORD OF TEST PIT 18-12

CLIENT: Fundy Regional Service Commission
 PROJECT: Rock and Clay Source Exploration (Test Pits)
 JOB#: 904227
 LOCATION: Yellow Gate Road - PID 00289595

SHEET: 1 OF 1
 DATUM: CGVD28
 BORING DATE: Jun 4 2018

DEPTH SCALE METRES	SOIL PROFILE			SAMPLE NUMBER	SAMPLE TYPE	SHEAR STRENGTH (Cu), kPA + NATURAL ⊕ REMOULDED										WATER CONTENT, % Wp ——— W ——— Wl		ADDITIONAL LAB. TESTING	WATER LEVEL IN OPEN TEST PIT OR STANDPIPE INSTALLATION
	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)			10	20	30	40	50	60	70	80	90					
0	Ground Surface		40.13																
	Brown TOPSOIL with organics		39.98																
	Brown SILTY SAND, trace gravel		0.15																
	Brown SAND and GRAVEL		39.68 0.45																
1	End of test pit		39.23 0.90																Groundwater not observed upon completion of test pit
	Excavator refusal on inferred bedrock																		Backfilled with excavated material
2																			
3																			
4																			
5																			

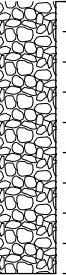
GEO - TESTPIT LOG 904227 - TEST PITS.GPJ GEMTEC 2018.GDT 18/07/09

RECORD OF TEST PIT 18-13

CLIENT: Fundy Regional Service Commission
 PROJECT: Rock and Clay Source Exploration (Test Pits)
 JOB#: 904227
 LOCATION: Yellow Gate Road - PID 00289595

SHEET: 1 OF 1
 DATUM: CGVD28
 BORING DATE: Jun 4 2018

DEPTH SCALE METRES	SOIL PROFILE			SAMPLE NUMBER	SAMPLE TYPE	SHEAR STRENGTH (Cu), kPA + NATURAL ⊕ REMOULDED										WATER CONTENT, % Wp ——— W ——— WL		ADDITIONAL LAB. TESTING	WATER LEVEL IN OPEN TEST PIT OR STANDPIPE INSTALLATION
	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)			10	20	30	40	50	60	70	80	90					
0	Ground Surface		35.88																
	Brown TOPSOIL with organics		35.73																
	Light brown SILTY SAND, some gravel		0.15																
			34.98																
1	End of test pit		0.90															Groundwater not observed upon completion of test pit	
	Excavator refusal on inferred bedrock																		
2																			
3																			
4																			
5																			



Backfilled with excavated material


Groundwater not observed upon completion of test pit

GEO - TESTPIT LOG 904227 - TEST PITS.GPJ GEMTEC 2018.GDT 18/07/09

RECORD OF TEST PIT 18-14

CLIENT: Fundy Regional Service Commission
 PROJECT: Rock and Clay Source Exploration (Test Pits)
 JOB#: 904227
 LOCATION: Yellow Gate Road - PID 00289595

SHEET: 1 OF 1
 DATUM: CGVD28
 BORING DATE: Jun 4 2018

DEPTH SCALE METRES	SOIL PROFILE			SAMPLE NUMBER	SAMPLE TYPE	SHEAR STRENGTH (Cu), kPA + NATURAL ⊕ REMOULDED										WATER CONTENT, % Wp ——— W ——— Wl		ADDITIONAL LAB TESTING	WATER LEVEL IN OPEN TEST PIT OR STANDPIPE INSTALLATION
	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)			10	20	30	40	50	60	70	80	90					
0	Ground Surface		32.34																
	Brown black PEAT with organics		32.04																 Backfilled with excavated material
	Grey SILT and CLAY, with organics		0.30																
	Light brown SILTY SAND, some gravel		31.84																
			0.50																
1																			
			30.54																
	End of test pit		1.80																Groundwater not observed upon completion of test pit
2																			
3																			
4																			
5																			

GEO - TESTPIT LOG 904227 - TEST PITS.GPJ GEMTEC 2018.GDT 18/07/09

RECORD OF TEST PIT 18-15

CLIENT: Fundy Regional Service Commission
 PROJECT: Rock and Clay Source Exploration (Test Pits)
 JOB#: 904227
 LOCATION: Yellow Gate Road - PID 00289595

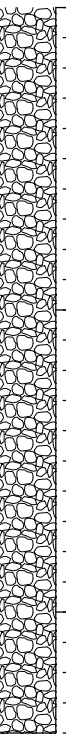
SHEET: 1 OF 1
 DATUM: CGVD28
 BORING DATE: Jun 4 2018

DEPTH SCALE METRES	SOIL PROFILE			SAMPLE NUMBER	SAMPLE TYPE	SHEAR STRENGTH (Cu), kPA + NATURAL ⊕ REMOULDED										WATER CONTENT, % Wp — W — Wl			ADDITIONAL LAB. TESTING	WATER LEVEL IN OPEN TEST PIT OR STANDPIPE INSTALLATION
	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)			10	20	30	40	50	60	70	80	90						
0	Ground Surface	/ / / /	36.65																	
	Brown black PEAT with organics	/ / / /	36.50																	
	Light brown SILTY SAND, some gravel	0.15																	
	Red brown SILT and CLAY, trace sand	/ / / /	35.95																	
1			0.70																	
2				1	GS															
	End of test pit		34.25																	
			2.40																	
3																				
4																				
5																				

Backfilled with excavated material

MH, W, wp, wL

Groundwater not observed upon completion of test pit



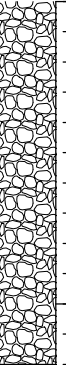


GEO - TESTPIT LOG 904227 - TEST PITS.GPJ GEMTEC 2018.GDT 18/07/09

RECORD OF TEST PIT 18-16

CLIENT: Fundy Regional Service Commission
 PROJECT: Rock and Clay Source Exploration (Test Pits)
 JOB#: 904227
 LOCATION: Yellow Gate Road - PID 00289595

SHEET: 1 OF 1
 DATUM: CGVD28
 BORING DATE: Jun 4 2018

DEPTH SCALE METRES	SOIL PROFILE			SAMPLE NUMBER	SAMPLE TYPE	SHEAR STRENGTH (Cu), kPA + NATURAL ⊕ REMOULDED										WATER CONTENT, % W _p — W — W _L			ADDITIONAL LAB. TESTING	WATER LEVEL IN OPEN TEST PIT OR STANDPIPE INSTALLATION			
	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)			10	20	30	40	50	60	70	80	90	10	20	30	40			50	60	70
0	Ground Surface		53.15																				
	Brown TOPSOIL with organics																						
	Brown SAND and GRAVEL, some cobbles, trace silt		52.85 0.30																				
1				1	GS																	M, W	
	End of test pit		51.95 1.20																				Groundwater level observed in open test pit
2																							
3																							
4																							
5																							

GROUNDWATER OBSERVATIONS		
DATE	DEPTH (m)	ELEV. (m)
18/06/04	1.20	51.95

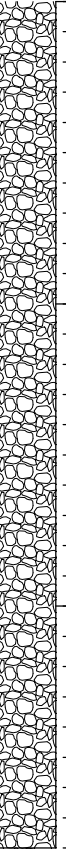
GEO - TESTPIT LOG 904227 - TEST PITS.GPJ GEMTEC 2018.GDT 18/07/09

RECORD OF TEST PIT 18-17

CLIENT: Fundy Regional Service Commission
 PROJECT: Rock and Clay Source Exploration (Test Pits)
 JOB#: 904227
 LOCATION: Yellow Gate Road - PID 00289595

SHEET: 1 OF 1
 DATUM: CGVD28
 BORING DATE: Jun 4 2018

DEPTH SCALE METRES	SOIL PROFILE			SAMPLE NUMBER	SAMPLE TYPE	SHEAR STRENGTH (Cu), kPA + NATURAL ⊕ REMOULDED										WATER CONTENT, % Wp ——— W ——— WL			ADDITIONAL LAB. TESTING	WATER LEVEL IN OPEN TEST PIT OR STANDPIPE INSTALLATION			
	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)			10	20	30	40	50	60	70	80	90	10	20	30	40			50	60	70
0	Ground Surface		37.15																				
	Brown TOPSOIL with organics		37.05																				
	Brown SAND and GRAVEL, some silt		0.10																				
	Red brown silt and clay, some sand, trace gravel (GLACIAL TILL)		36.75																				
1			0.40		1	GS																M, W	
	Brown SANDY GRAVEL, some silt with cobbles/boulders		35.45																				
2			1.70																				
	End of test pit		34.35																				
3			2.80																				
4																							
5																							



GEO - TESTPIT LOG 904227 - TEST PITS.GPJ GEMTEC 2018.GDT 18/07/09



APPENDIX C

VEC: Atmospheric Environment

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1.0 RATIONALE FOR THE VALUED ENVIRONMENTAL COMPONENT (VEC)

The atmospheric environment is impacted by concentrations of various natural and anthropogenic contaminants. Climatological processes can influence the transport or dispersal of airborne contaminants, as well as the deposition of contaminants in terrestrial and aquatic ecosystems. As such, Project related activities (*i.e.*, fuel combustion, particulate matter release, noise, *etc.*) may release contaminants into the atmosphere that could potentially impact human and/or ecosystem health.

In order to assess any potential impacts of the Project on the atmospheric environment, three components have been identified for this valued environmental component (VEC):

- *Climate Conditions* are the long-term weather conditions of an area that are typically influenced by latitude, altitude and proximity to oceans. The climate conditions are measured by assessing the patterns of temperature, wind, precipitation, and other meteorological aspects;
- *Air Quality* is the concentration of naturally occurring or anthropogenic air pollutants that are present in the atmosphere. The concentration of the air pollutants is influenced by source location, meteorological processes (*i.e.*, wind, rain, air temperature) and topographical conditions. The air pollutant particles can be deposited on soil, water, vegetation, and other object surfaces; and
- *Sound Quality* is the type, frequency, intensity, and duration of ambient noise. Sound quality also encompasses any vibration related stress on nearby structures.

2.0 BOUNDARIES FOR THE ENVIRONMENTAL EFFECTS ASSESSMENT

2.1 Spatial Boundaries

The assessment of the atmospheric environment has been completed for three spatial boundaries:

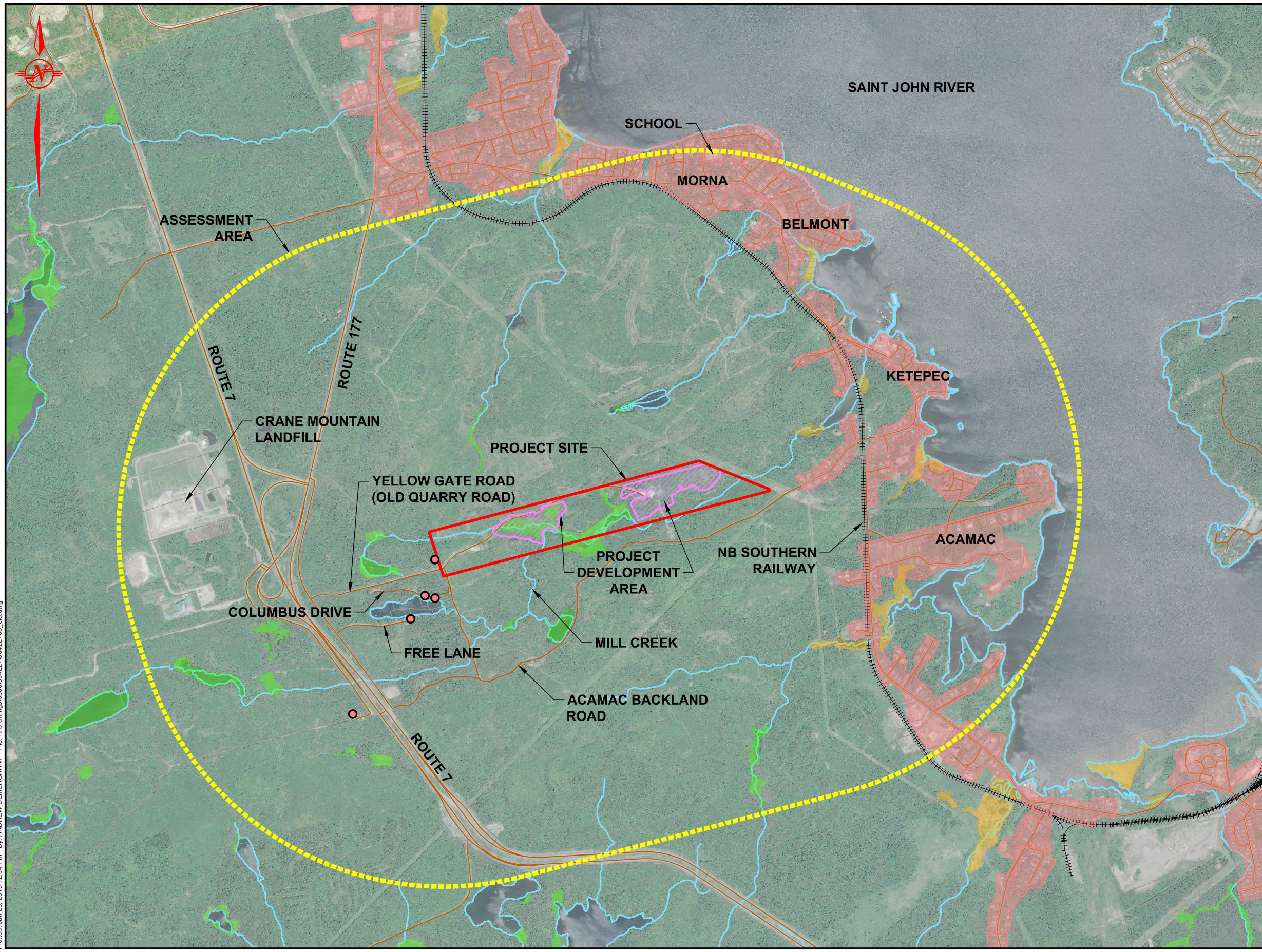
- The Project Development Area (PDA) is defined as the footprint of ground disturbance required for the Project activities (portion of PID 00289595; Figure C-1);
- The Project Site is defined as the southwestern portion of PID 00289595 (Figure C-1) as investigated during the baseline environmental studies; and
- The Assessment Area encompasses nearby sensitive receptors (*i.e.*, neighbouring residential dwellings, environmentally sensitive areas, *etc.*) within a 2 kilometre (km) radius of the Project Site (Figure C-1).

2.2 Temporal Boundaries

The assessment of the atmospheric environment has been completed for the following temporal boundaries:

- The construction phase of the Project;
- The operational phase of the Project; and
- The reclamation phase of the Project.

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LEGEND

- DWELLING
- RESIDENTIAL AREA
- PROVINCIALY SIGNIFICANT WETLAND (GeoNB)
- REGULATED WETLAND (GeoNB)

NOTES:
 1) Residential areas have been adapted from NRCAN Canvec Residential Area mapping.

Drawn By	AGSD	Checked By	JH
Calculations By		Checked By	

Date
JAN, 2019

Project
ENVIRONMENTAL IMPACT ASSESSMENT
CRANE MOUNTAIN LANDFILL CLAY AND AGGREGATE QUARRY

Drawing
ATMOSPHERIC VEC
SPATIAL BOUNDARIES

Scale
1:25000

File No.	Drawing	Revision No.
90422706	C-1	0



3.0 METHODOLOGY

A desktop review of available information relative to climate conditions, air quality and sound quality was carried out to determine the existing atmospheric conditions and any potential interactions with the Project.

Specific to the Environmental Impact Assessment (EIA) document, potential interactions or effects of the Project on the atmospheric environment have been identified and are discussed herein. Where residual effects are anticipated, the proposed methods for mitigating the potential effects have been presented.

3.1 Climate Conditions

The climate conditions of the Assessment Area are based upon Environment and Climate Change Canada (ECCC) climate normals recorded at the Saint John Airport weather station (approximately 45.3181°, -65.8856°), located approximately 24 km east of the Project Site. Due to the proximity to the Assessment Area, the climate conditions measured at this monitoring station are assumed to be comparable to those within the Assessment Area boundaries.

3.2 Air Quality

Air quality is monitored by both provincial and federal agencies across New Brunswick. The air quality monitoring data at the New Brunswick Department of Environment and Local Government (NBDELG) monitoring station closest to the Project Site (Saint John - West, located approximately 7.5 km southeast of the Project Site, outside the Assessment Area) were reviewed for this VEC. This station monitors ozone, fine particulate matter, sulfur dioxide, total reduced sulfur, and nitrogen dioxide. This station is located at 476 Lancaster Avenue in Saint John, New Brunswick and is considered to be representative of an urban community with industrial influences (*i.e.*, nearby pulp and paper mill). Due to the more rural setting of the Project Site, air quality at this monitoring location is expected to be comparable or poorer than that observed within the Project Site.

3.3 Sound Quality

A desktop review of the existing noise and vibrational emitters within the Assessment Area was conducted. Nearby noise and vibrational receptors (*i.e.*, residential dwellings, schools, environmental sensitive areas, *etc.*) that may be impacted by the Project were also identified.

4.0 DESCRIPTION OF EXISTING ENVIRONMENT

4.1 Climate Conditions

The Canadian Climate Normals (1981 to 2010) recorded from the Saint John Airport climate station indicate an annual daily average temperature of 5.2 degree Celsius (°C), with a daily maximum temperature of 22.6°C (July) and daily minimum temperature of -2.5°C (January). An extreme maximum temperature was recorded in August 1976 (34.4°C) and an extreme minimum temperature was recorded in February 1948 (-36.7°C). According to the climate normals, January is typically the coldest month with a daily average temperature of -7.9°C and July is the warmest month with a daily average temperature of 17.1°C (ECCC, 2018).

Average annual precipitation in the Saint John Airport area is 1295.5 millimetres (mm); the average rainfall is 1076.0 mm and the average snowfall is 239.6 centimetres (cm). An extreme daily rainfall event was recorded in November 1975 (154.4 mm) and an extreme daily snowfall event was recorded in December 1960 (58.2 cm). On average, November is the rainiest month and January is the snowiest (ECCC, 2018).

The prevailing winds are generally from the south between May and August and from the northwest between November and February. The average annual wind speed is 15.2 km per hour (km/hr). March is typically the windiest month with an average wind speed of 17.2 km/hr and August is typically the least windy month with an average wind speed of 11.3 km/hr. (ECCC, 2018).

4.2 Air Quality

The Province of New Brunswick has Air Quality Objectives (Table C-1) for regulated air contaminants under the *Air Quality Regulation* of the *New Brunswick Clean Air Act*.

Table C-1 New Brunswick Air Quality Objectives

Pollutant	Averaging Period			
	1 Hour	8 Hours	24 Hours	1 Year
Carbon Monoxide (CO)	35,000 µg/m ³ (30 ppm)	15,000 µg/m ³ (13 ppm)	-	-
Hydrogen Sulphide (H ₂ S)	15 µg/m ³ (11 ppb)	-	5 µg/m ³ (3.5 ppb)	-
Nitrogen Dioxide (NO ₂)	400 µg/m ³ (210 ppb)	-	200 µg/m ³ (105 ppb)	100 µg/m ³ (52 ppb)
Sulphur Dioxide (SO ₂)*	900 µg/m ³ (339 ppb)	-	300 µg/m ³ (113 ppb)	60 µg/m ³ (23 ppb)
Total Suspended Particulate (PM _{2.5})	-	-	120 µg/m ³	70 µg/m ³
Notes: µg/m ³ = micrograms per cubic metre ppm = parts per million ppb = parts per billion * the standard for Sulphur Dioxide is 50 percent (%) lower in Saint John, New Brunswick				

In 2014, eight exceedances of the 24-hour objective (3.5 ppb) for hydrogen sulphide, as Total Reduced Sulphur, were recorded over a cumulative duration of 50-hours at two air quality monitoring stations that are both owned by Irving Pulp & Paper Limited. These two stations are located at Milford and Sherbrook (NBDELG, 2012). Irving Pulp & Paper Limited operates the Kraft and Tissue Mill Complex (herein referred to as “Irving Pulp and Paper Mill”) which is located within the monitoring stations receiving area. Additionally, the 24-hour objective for hydrogen sulphide, as Total Reduced Sulphur, was exceeded on nine occasions at these two stations in 2015 (NBDELG, 2017). No other exceedances of the air quality objectives were logged at these monitoring stations between 2010 and 2015 (NBDELG, 2012 and NBDELG, 2016).

The Canadian Council of Ministers of Environment (CCME) approved Canadian Ambient Air Quality Standards (CAAQs) for particulate matter and ground level ozone (O₃) for two target years; 2015, and a more stringent target in 2020, as presented in Table C-2.

Table C-2 CCME CAAQs for Fine Particulate Matter and Ozone

Pollutant	Averaging Period	Target Year	
		2015	2020
Fine Particulate Matter (PM _{2.5})	24-Hour	28 µg/m ³	27 µg/m ³
	Annual	10 µg/m ³	8.8 µg/m ³
Ozone (O ₃)	8-Hour	63 ppb	62 ppb
Notes: µg/m ³ = micrograms per cubic metre ppb = parts per billion			

The average air quality data collected in 2013, 2014 and 2015 at the Saint John - West station (and all of New Brunswick) were within the 2015 and 2020 CAAQs 24-hour and annual standards for fine particulate matter (15 µg/m³ (24-hour) and 6.0 µg/m³ (annual), respectively) and the 8-hour standard for ozone (45 ppb; NBDELG, 2015).

4.2.1 Emission Sources

There are no major industrial sources of emissions located in the Project Site or the Assessment Area.

The Crane Mountain Landfill (herein referred to as the “Landfill”) is located within the Assessment Area, approximately 1.5 km west of the Project Site. The Fundy Regional Service Commission (FRSC) operates the Landfill under a NBDELG Class 4 Approval to Operate (I-9959, valid to November 30, 2020). Potential atmospheric emissions as a result of the Landfill operations include:

- fugitive dust emissions from truck traffic and other on-site activities;
- elevated odour and/or noise emissions;
- accidental release of an ozone depleting substance;
- accidental release of a household hazardous waste;
- accidental release of landfill gas (*i.e.*, methane); and/or
- fire.

Currently, Landfill gas (methane) is collected and converted via an on-site electric generator. Any excess gas is sent to the on-site gas flare for burn-off to reduce the release of greenhouse gases.

The Irving Pulp and Paper Mill is considered to be a Class 1 major industry and is located approximately 6.2 km southeast of the Project Site. The NBDELG requires the Mill to comply with the *Air Quality Regulation* under the *New Brunswick Clean Air Act* and the terms outlined in their Approval to Operate (I-9509, valid to May 31, 2022).

4.3 Sound Quality

4.3.1 Noise and Vibration Sources

Within the Assessment Area, there are three main noise and vibration sources. The Landfill is located approximately 1.5 km west of the Project Site (Figure C-1) and operational activities include industrial and heavy equipment traffic, public traffic, dumping, excavating, and compaction activities. Noise emissions from the Landfill are approved, with conditions, in an NBDELG Approval to Operate (I-9959, valid to November 30, 2020).

There are several major roadways located to the west of the Project Site (Figure C-1). These are the Route 7 right-of-way (ROW), the Route 7/Route 177 interchange and Route 177 ROW; all experience high traffic volumes, especially during commuter intervals.

The Southern Railway ROW is an active rail line and is located in the eastern portion of the Assessment Area, approximately 0.9 km east of the Project Site.

The remaining area within the Assessment Area is generally undeveloped forested land, residential communities and the Saint John River.

4.3.2 Noise and Vibration Receptors

The sound and vibrational receptors identified in the Assessment Area include the residential areas of Morna, Belmont, Ketepec, and Acamac, with special consideration to residential dwellings along the eastern portion of Acamac Backland Road, which are located approximately 0.25 km to 0.65 km east of the Project Site (Figure C-1). There are also several seasonal dwellings on Yellow Gate Road (herein referred to, and locally known as “Old Quarry Road”), Columbus Drive, and Free Lane (Figure C-1).

There are also a number of environmentally sensitive areas located within the Assessment Area, including; lakes and regulated wetland areas that are important for wildlife and wildlife habitat.

5.0 SUMMARY OF POTENTIAL EFFECTS

5.1 Climate Conditions

It is not expected that the Project will affect climate conditions such as ambient temperatures, precipitation amounts and wind patterns; therefore, climate change is not discussed further in this VEC assessment. The potential effects of climate conditions on the Project are discussed in Appendix J.

5.2 Air Quality

There are a number of potential effects to ambient air quality during all phases of the Project. During construction, potential adverse effects include a short-term increase of particulate matter and dust within the PDA during ground disturbing activities such as vegetation clearing, blasting for the aggregate quarry, and excavating. During operation, there will be a release of particulate matter along hauling routes in the PDA, the Project Site and along Acamac Backland Road.

During all phases, it is anticipated that there will be an increase in gaseous emissions within the PDA from Project machinery and equipment (*i.e.*, excavator, crusher, dump/rock trucks, generators, personnel trucks, *etc.*). Currently, clay and aggregate materials are trucked to the Landfill for cell construction from various off-site locations. The close proximity of the Project Site to the Landfill will reduce hauling distances; thus, may result in a reduction of emissions from hauling trucks. Also, there will be a short-term increase in gaseous emissions within the Quarry PDA during blasting activities. It is expected that a maximum of one to five blasting events at the aggregate quarry will be required on an annual basis, during peak construction periods.

Potential adverse effects to air quality may occur during active construction and operational periods for the Project, and for short periods during reclamation activities. During periods of little or no construction at the Landfill, on-site activities will be intermittent and there may be periods of several years where no work is completed at the Project Site.

5.3 Sound Quality

Potential adverse effects to sound quality at nearby receptor sites (*i.e.*, nearby residential dwellings, seasonal dwellings, and environmental sensitive areas), as a result of Project activities include;

- increased ambient noise and vibrations from on-site equipment;
- blasting events for the aggregate quarry; and
- haul traffic.

Sound pressure levels of commonly used construction and operation equipment are outlined in Table C-3 and it should be noted that not all equipment required for the Project will be in operation at once, nor will on-site activities be continuous; there may be periods of several years where no work is completed at the Project Site. The on-site equipment will be limited to the Project Site and the proposed hauling routes and all roadways will be maintained in good condition to minimize any noise or vibrational impacts. A vegetated buffer may also be maintained around the PDA to reduce noise and vibration impacts to nearby residential receptor sites. Additional mitigations are proposed to reduce impacts to the wetland and watercourses contained within the Project Site and these are described in Section 6.0.

Table C-3 Typical Construction and Operation Equipment Noise Levels

Equipment	Sound Level (dBA) at 15 metres distance (USDOT, 2017)
Blasting	94
Chain Saw	84
Drill Rig Truck	84
Dozer	82
Dump Truck	76
Excavator	81
Front End Loader	79
Generator	81
Pickup Truck	75
Rock Drill	81

Notes:
dBA = Decibels on an “L_{max}” weighted scale. L_{max} is the highest value measured on a sound meter over a given period of time.

Blasting and excavating activities during operations will be completed on an as-needed basis for clay and aggregate requirements at the Landfill. It is anticipated that blasting events at the aggregate quarry will be conducted infrequently (*i.e.*, likely less than five events per year) until the end of the lifetime of the Landfill, estimated to be in 2048. During periods of little or no construction at the Landfill, blasting events will be reduced or non-existent.

Prior to blasting events, the FRSC may complete a pre-blast program at nearby residences, as required. This may include a third-party visual and video/photography inspection and water quality testing (*i.e.*, general chemistry, trace metals, and/or bacteria) for residences serviced by a potable groundwater well. If complaints from nearby landowners are received, FRSC will notify NBDELG and will engage the concerned citizens for resolution.

Currently, clay and aggregate materials are trucked to the Landfill for cell construction. An increase in truck traffic into the Landfill is not expected as the quantity of material is not expected to increase from required current volumes. However, an increase in truck traffic is expected on Old Quarry Road, the western portion of Acamac Backland Road and Route 177 between the PDA and the Landfill entrance. One seasonal dwelling is located on the Old Quarry Road and the Landfill will engage that landowner prior to the commencement of the Project for consultation and resolution, as required.

It is not anticipated that there will be significant adverse impacts to sound quality as a result of the hauling activities, above the baseline conditions. Therefore, this will not be discussed further in this VEC assessment.

5.4 Accidents, Malfunctions and Unplanned Events

There is a potential for accidents to occur during all phases of the Project. Accidents that may impact the atmospheric environment include:

- Fire, which could result in a reduction of air quality via smoke emissions;
- Accidental release or spills of chemicals or hazardous materials (e.g., evaporation/volatilization of chemicals); and
- Vehicle mishaps.

6.0 PROPOSED MITIGATION MEASURES

The potential effects and proposed mitigation measures to minimize the potential adverse effects to the atmospheric environment during all phases of the Project are summarized in Table C-4. An Environmental Management Plan (EMP) will be developed prior to the commencement of the Project.

Table C-4 Summary of Mitigation Measures for the Atmospheric Environment

Project Component	Summary of Potential Interaction	Mitigation Measures
All Project Phases (Construction, Operational, Reclamation)		
Air Quality	Increased potential for particulate matter and dust.	<ul style="list-style-type: none"> • Dust suppressants may be used during periods of dry weather; • Dry materials/stockpiles may be covered or windrowed to prevent blowing dust or debris. Similarly, dusty material may be transported in covered haulage vehicles; • Dust generating activities will be limited during periods of dry or windy conditions; and • Wind prone areas will be stabilized in a timely manner.
	Increased potential for gaseous emissions from equipment and truck traffic.	<ul style="list-style-type: none"> • Any non-essential internal combustion engines will be shut off when not in use, and heavy equipment will not remain idling for periods exceeding 10 continuous minutes as a best management practice; and • Equipment will be maintained according to emission standards and in good working order.
Sound Quality	Increased noise levels and vibration from equipment and truck traffic.	<ul style="list-style-type: none"> • Equipment will be maintained according to emission standards and in good working order; • Equipment will be muffled, when feasible; • A vegetated buffer may be maintained around the PDA to reduce sound impacts to the surrounding receptors; • On-site activities will be limited to day-time hours (<i>i.e.</i>, maximum 12 hours per day); and • If concerns from nearby landowners are received, FRSC will notify NBDELG and will engage citizens for resolution, as required.

Table C-4 Summary of Mitigation Measures for the Atmospheric Environment

Project Component	Summary of Potential Interaction	Mitigation Measures
Operational Phase Only		
Air Quality	Increased potential for the release of particulate matter and gaseous emissions during blasting events at the aggregate quarry.	<ul style="list-style-type: none"> • Blasting activities will be infrequent, when feasible; and • All blasting activities will be conducted by a certified contractor in accordance with an Approval to Operate from NBDELG.
Sound Quality	Increased noise levels and vibration from blasting events at the aggregate quarry, with attention to receptors within the Assessment Area (<i>i.e.</i> , residential properties, wetlands and watercourses).	<ul style="list-style-type: none"> • All blasting events will be restricted to daylight hours; • Blasting activities will be infrequent, when feasible; • A pre-blast inspection program may be developed and implemented, as required. If concerns from nearby landowners are received, FRSC will notify NBDELG and will engage citizens for resolution, as required; • The topography of the open pits (<i>i.e.</i>, lower elevation than ground surface) will reduce the sound travel from the blast site; and • All blasting activities will be conducted by a certified contractor in accordance with an Approval to Operate from NBDELG.
Accidents, Malfunctions and Unplanned Events		
Air Quality	Increased potential of fire.	<ul style="list-style-type: none"> • Emergency procedures will be in place prior to construction as outlined in an EMP.
	Vehicle Mishaps.	<ul style="list-style-type: none"> • Vehicles will travel at appropriate speeds within the Project Site and along haul routes; • Vehicles will kept in good working order; and • Emergency and spill response procedures will be in place prior to construction as outlined in an EMP.

Table C-4 Summary of Mitigation Measures for the Atmospheric Environment

Project Component	Summary of Potential Interaction	Mitigation Measures
Air Quality	Increased potential of accidental release of emissions of chemical and fuel vapors to reduce air quality.	<ul style="list-style-type: none"> • No chemical or petroleum storage will occur within 30-metres of an environmental sensitive area (<i>i.e.</i>, wetland, watercourse); • Equipment will be kept in good working order; and • Emergency and spill response procedures will be in place prior to construction as outlined in an EMP.

7.0 SUMMARY OF POTENTIAL RESIDUAL EFFECTS

A significant residual effect to the atmospheric environment can be defined as a permanent or sustained change in air quality or sound quality such that adverse impacts are observed within the PDA, Project Site and/or the Assessment Area.

The Project is expected to temporarily affect the air quality within the PDA by the presence of increased particulate matter and exhaust fumes from heavy machinery and equipment required for the construction, operational and reclamation activities. However, the increase in airborne contaminants within the PDA, Project Site and/or Assessment Area is expected to be localized and will not exceed regulatory limits and/or the New Brunswick Air Quality Objectives. Furthermore, the proposed mitigation measures will reduce the risk of any residual effects to air quality.

Increased noise levels within the PDA, Project Site and/or Assessment Area are likely during all phases of the Project as a result of the use of heavy equipment for site preparation, as well as during operations and reclamation activities. These noise impacts will be of short duration and intermittent as not all equipment will be operating at the same time. During the operational phase of the Project, increased noise levels will also be observed during blasting events at the aggregate quarry. These events will be infrequent as the Landfill will only undertake quarrying when required to construct disposal cells at the Landfill. With the implementation of the proposed mitigation measures, significant residual effects to noise receptors are not anticipated.

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APPENDIX D

VEC: Groundwater Resources

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1.0 RATIONALE FOR THE VALUED ENVIRONMENTAL COMPONENT (VEC)

Thousands of residents in New Brunswick rely on groundwater resources for their domestic water supply. Groundwater can be impacted by concentrations of naturally occurring and anthropogenic sourced contaminants such as mineral deposits surrounding the aquifer or from an accidental release of pollutants. Project related activities (e.g., ground disturbance, wastewater and petroleum product use and storage, etc.) may release contaminants into the groundwater that could potentially adversely impact human and/or ecosystem health.

In order to assess any potential impacts of the Project on the groundwater resources, three components have been identified for this valued environmental component (VEC):

- *Physiography and Drainage* patterns that describe the physical geography of the landscape;
- *Bedrock and Surficial Geology* that describe the availability of groundwater; and
- *Known Groundwater Quality and Quantity* data that provide baseline conditions for the project area.

2.0 BOUNDARIES FOR THE ENVIRONMENTAL EFFECTS ASSESSMENT

2.1 Spatial Boundaries

The assessment of the groundwater resources has been completed for three spatial boundaries:

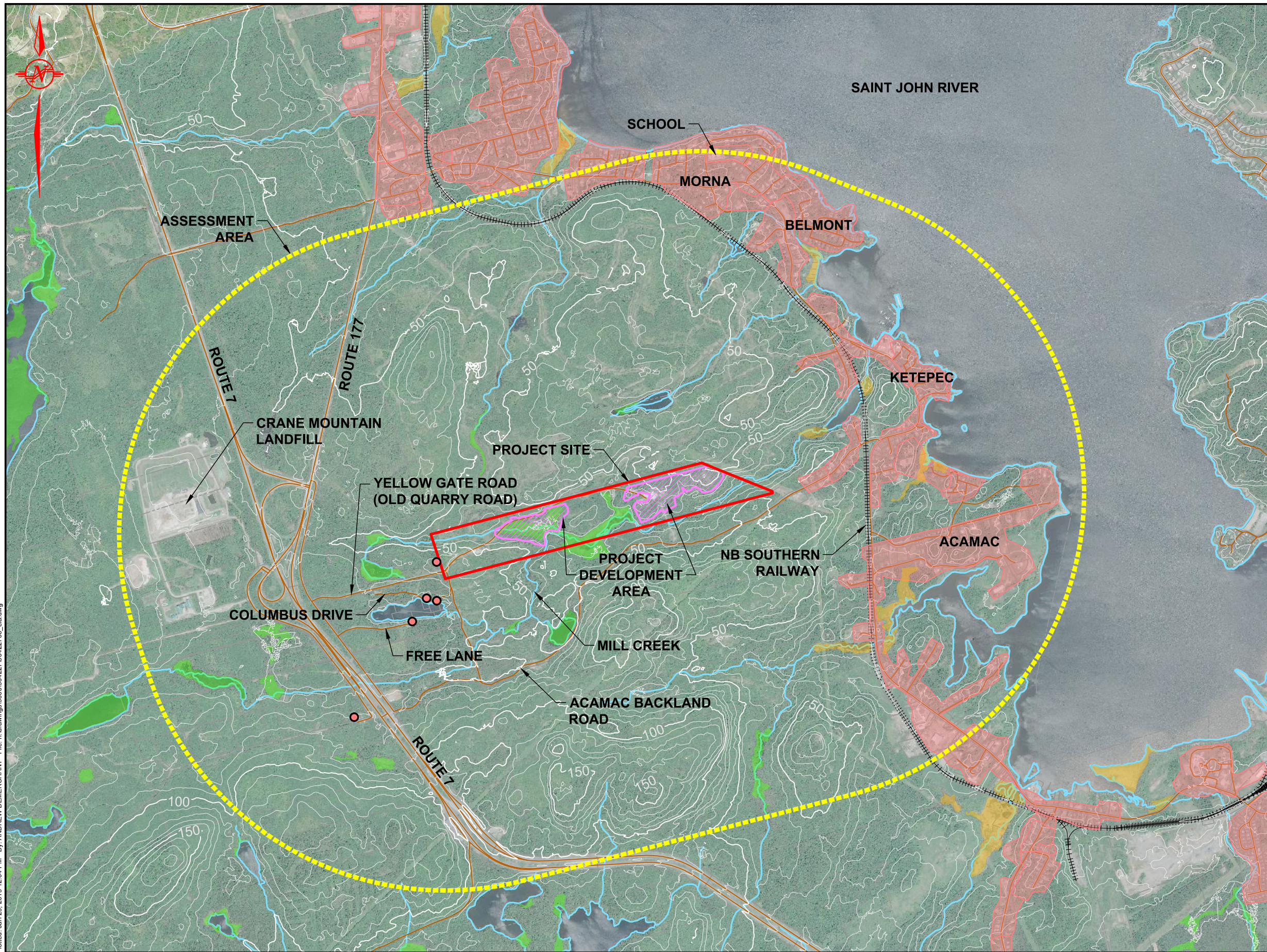
- The Project Development Area (PDA) is defined as the footprint of ground disturbance required for the Project activities (portion of PID 00289595; Figure D-1);
- The Project Site is defined at the southwestern portion of PID 00289595 as investigated during the baseline environmental studies (Figure D-1); and
- The Assessment Area encompasses the area where Project activities may interact with nearby receptors (*i.e.*, residential dwellings and groundwater wells). For the groundwater resources VEC, the Assessment Area is limited to a 2 kilometre (km) radius of the Project Site (Figure D-1).

2.2 Temporal Boundaries

The assessment of the groundwater resources has been completed for the following temporal boundaries:

- The construction phase of the Project;
- The operational phase of the Project; and
- The reclamation phase of the Project.

Printed: Jan 29, 2019 12:04 PM - By: ANDREW DEMERCHANT - File: n:\drawings\90422706\90422706_eia.dwg



LEGEND

- DWELLING
- RESIDENTIAL AREA
- PROVINCIALLY SIGNIFICANT WETLAND (GeoNB)
- REGULATED WETLAND (GeoNB)

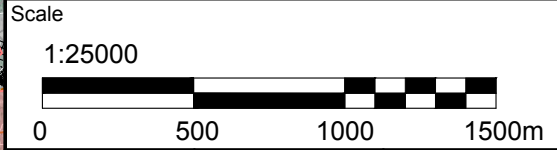
- NOTES:**
- 1) Residential areas have been adapted from NRCAN Canvec Residential Area mapping.
 - 2) Contours from GeoNB (NBDEM) and are shown in metres (CGVD2013).

Drawn By AGSD	Checked By JH
Calculations By	Checked By

Date
JAN, 2019

Project
**ENVIRONMENTAL IMPACT ASSESSMENT
CRANE MOUNTAIN LANDFILL CLAY AND
AGGREGATE QUARRY**

Drawing
**GROUNDWATER VEC
SPATIAL BOUNDARIES**



File No. 90422706	Drawing D-1	Revision No. 0
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3.0 METHODOLOGY

A desktop review of available information relative to groundwater resources was undertaken to determine the prevailing VEC conditions and any potential interaction with the Project.

Specific to the Environmental Impact Assessment (EIA) document, potential interactions or effects of the Project on the groundwater resources have been identified and are discussed below. Where residual effects are anticipated, the proposed methods for mitigating the potential effects have been presented.

3.1 Physiography and Drainage

Natural Resources Canada provides an interactive mapping service, The Atlas of Canada – Toporama, which was reviewed to determine the general topography of the Project Site and the Assessment Area.

3.2 Bedrock and Surficial Geology

The New Brunswick Department of Energy Resources Development (NBDERD) online mapping was reviewed to determine the bedrock and surficial geology conditions within the Project Site.

3.3 Groundwater Quality and Quantity

The New Brunswick Department of Environment and Local Government (NBDELG) Online Well Log System (OWLS) was accessed to identify groundwater extraction wells located within a 2 km radius of 45.26885°, -66.18160°, a central location of the Project Site (*i.e.*, the Assessment Area). The OWLS database is maintained by NBDELG and contains information on water wells constructed since 1994. The NBDELG takes no responsibility and makes no guarantee as to the completeness, accuracy or timeliness of the data provided in this database. The 2 km radius was the smallest radius possible to generate both well construction and water quality data from the database. Available water chemistry data from the NBDELG database were compared to the Canadian Drinking Water Quality Guidelines (CDWQG; Health Canada, February, 2017).

4.0 DESCRIPTION OF THE EXISTING ENVIRONMENT

4.1 Physiography and Drainage

A review of contour mapping indicates that the general gradient of the Project Site is sloping into the centre of the site, towards Mill Creek. The central portion (Mill Creek) of the Project Site is situated at the lowest local elevation, with steep slopes to the north and south, influencing drainage pattern towards Mill Creek. Topography varies from 20 to 60 metres above mean sea level throughout the Project Site. The Project Site topography (Natural Resources Canada mapping) is presented in Attachment D-1.

Regionally, the Assessment Area is located within the Saint John River Valley, near the convergence of the Saint John River and the Kennebecasis River in Grand Bay-Westfield, which ultimately outlets into the Saint John Harbour. Topography of the regional area is sloping south/southeast towards the Saint John Harbour.

4.2 Bedrock and Surficial Geology

Surficial geology mapping indicates that the Project Site is covered with blankets and veneer of Late Wisconsinan morainal sediments, generally 0.5 to 3.0 metres thick. The morainal sediments consist of mainly stoney till (lodgement till, ablation till and associated sand and gravel) with more than 35 percent (%) of clast pebble size and larger, deposited directly by ice or minor re-working by water (Rampton, 1984).

New Brunswick geology maps classify the bedrock in the Project Site as being from the Green Head Group and a part of either the Martinon Formation or the Ashburn Formation. The Martinon Formation is described as greenish to black turbiditic siltstone, fine-grained feldspathic wacke and siliceous siltstone: minor marble breccia and conglomerate marble and calcareous quartzite. The Ashburn Formation is described as white to grey and light green, generally banded and locally stromatolitic marble, black to brown pelite, massive spotted hornfels and white to grey, fine-grained quartzite: minor marble-pebble conglomerate and mica schist (White, C.E. and Barr, S.M., 2001).

4.3 Groundwater Quality and Quantity

There were 17 groundwater wells, drilled between 1996 and 2011, identified in the NBDELG database within the Assessment Area. Well driller reports are presented in Attachment D-2 and well construction details for these wells are summarized in Table D-1.

Table D-1 Construction Details for Wells Reported within 2 km of the Project Site

Well Construction Component	Minimum	Maximum	Average
Total Well Depth (m)	18.3	213	106
Casing Depth (m)	6.1	24.7	8.20
Casing Diameter (centimetres)	15.3	15.3	15.3
Estimated Safe Yield (L/min (igpm))	0 (0)	688 (182)	78.7 (20.8)
Water Bearing Fracture Zones (m)	15.2	198	85.3
Depth to Bedrock (m)	0	48.8	6.19
Bedrock Type	Limerock, rock, granite, clay and boulders, and limestone		
Notes: m = Metres L/min = Litres per minute igpm = Imperial gallons per minute			

Based on the available data (*i.e.*, 12 groundwater chemistry records), exceedances of the Canadian Drinking Water Quality Guidelines (CDWQG) were noted in one or more wells for the following: aluminium, arsenic, e.Coli, iron, manganese, antimony, total coliforms, turbidity, and uranium. Table 1 in Attachment D-2 summarizes the analytical data from the 12 records.

There are no known federal contaminated sites within the Assessment Area (FCSI, 2018). Based on Service New Brunswick (SNB) land gazette records, the Project Site and all adjoining properties are not known to be contaminated nor do they have records of contamination remediation (SNB, 2018). The federal contaminated site mapping and SNB information for the Project Site are presented in Attachment D-3.

5.0 SUMMARY OF POTENTIAL EFFECTS

5.1 Physiography and Drainage

Potential effects to regional physiography as a result of Project activities are not expected. Some localized changes in topography within the PDA as a result of the aggregate/clay extraction are expected during the construction, operational and reclamation phases.

The aggregate resource will be extracted from an existing quarry face within the Project Site and will progress in an easterly direction. Overland surface water flow is expected to remain similar to pre-Project conditions (*i.e.*, local topography sloping towards Mill Creek). Mitigations to prevent adverse effects to Mill Creek will be implemented during all Project phases.

Extraction within the clay source open pit will result in impacts to a regulated wetland that may alter drainage patterns and water storage within the Clay PDA. The effects assessment for wetlands is presented in Appendix G.

The re-alignment of the tributary to Delaney Lake (herein referred to as the “Tributary”) will alter drainage patterns within the Clay PDA, specifically the water input into the regulated wetland (as described above); however, the re-aligned watercourse will ultimately discharge into Mill Creek, as per pre-Project conditions.

The overall drainage patterns will remain consistent or similar to existing conditions (*i.e.*, flow patterns continuing to be directed toward Mill Creek). The minor changes to drainage patterns are not expected to interact with groundwater resources within the Assessment Area; therefore, physiography and drainage are not discussed further in this VEC assessment.

5.2 Bedrock and Surficial Geology Potential Effects

Potential effects to surficial geology as a result of Project activities include ground disturbance, excavation and the placement of fill. These activities are not expected to interact with groundwater resources and are therefore not discussed further in this VEC assessment.

5.3 Groundwater Quality and Quantity Potential Effects

Potential effects to groundwater quality as a result of Project activities include the potential for contaminants to be released through spills of fuels and lubricants from on-site equipment and the subsequent infiltration into a groundwater resource.

During the operational phase of the Project when the aggregate and/or clay source PDAs are being excavated, encountered groundwater may drain via gravity, or through seepage from the surrounding bedrock, into the excavation/quarry areas. The pooling and seepage of groundwater could cause a localized lowering or redirection of the groundwater table, which could impact groundwater dependent features in the PDA such as wetlands and watercourses.

A constructed sedimentation pond will collect pumped, pooled and seeping groundwater from the clay source open pit. Any surface water discharge from de-watering or sedimentation pond will ultimately outlet into Mill Creek, as per the pre-Project drainage patterns, minimizing the downgradient effects outside the Project Site.

Additionally, blasting for the aggregate quarry could impact groundwater availability and flow patterns through vibrational bedrock fractures. Based on the distances to nearby residential dwellings (*i.e.*, 1 km), negative effects to potable groundwater quality and availability are not expected. Prior to blasting events, the Fundy Regional Service Commission (FRSC) may complete a pre-blast program at nearby residences, as required. The pre-blast program may include a third-party visual and video/photography inspection and water quality testing (*e.g.*, general chemistry, trace metals, and/or bacteria) for residences serviced by a potable groundwater well. The Landfill will notify nearby landowners and work to determine any concerns, as required.

All blasting will be conducted by a certified contractor in accordance to an Approval to Operate from NBDELG. All blasting events will be restricted to daylight hours. It is expected that a maximum of one to five blasting events at the aggregate quarry will be required on an annual basis, during peak construction periods. During periods of little or no construction at the Landfill, on-site activities will be intermittent and there may be periods of several years where no work is completed at the Project Site.

Based on the local geology of the Assessment Area and results from exploratory boreholes within the PDA, acid rock drainage is not considered to be a potential concern for this Project, as limestone is naturally basic.

5.4 Accidents, Malfunctions and Unplanned Events

There is a potential for accidents to occur during all phases of the Project. Accidents that may impact the groundwater resources within the Project Site include the accidental release or spill of contaminants (*i.e.*, chemicals, petroleum products, *etc.*) and subsequent infiltration into a groundwater resources (*i.e.*, into an aquifer).

6.0 PROPOSED MITIGATION MEASURES

The potential effects and the proposed mitigation measures to minimize the potential adverse effects to groundwater resources during all phases of the Project are summarized in Table D-2. An Environmental Management Plan (EMP) will be developed prior to the commencement of the Project.

Table D-2 Summary of Mitigation Measures for Groundwater Resources

Project Component	Summary of Potential Interaction	Mitigation Measures
Groundwater Quality and Quantity	All Project Phases (Construction, Operational, Reclamation) and Accidents, Malfunctions and Unplanned Events	<ul style="list-style-type: none"> • No chemical or petroleum storage will occur within 100-metres of a private groundwater well; • No chemical or petroleum storage will occur within 30-metres of an environmental sensitive area (<i>i.e.</i>, wetland, watercourses, <i>etc.</i>); • Equipment will be kept in good working order; and • Emergency and spill response procedures will be in place prior to construction activities.
	Operational Phase Only	
	Blasting for the aggregate quarry could impact nearby residential wells by changing groundwater availability/quality.	<ul style="list-style-type: none"> • Blasting activities will be conducted by a certified contractor in accordance to an Approval to Operate from NBDELG; • The number of blasting events will be reduced, if possible; and • A pre-blast inspection program may be implemented, as required.

7.0 SUMMARY OF POTENTIAL RESIDUAL EFFECTS

A significant residual effect to groundwater resources can be defined as a depletion or contamination of an aquifer that results in a permanent change to human and/or ecosystem use of that aquifer.

Based on the distance to nearby residential wells, and the average depth of these wells, effects (*i.e.*, any changes in private groundwater quality and/or quantity) are expected to be negligible. The FRSC may implement a pre-blast inspection program that may include water quality sampling.

It is expected that the drainage patterns will remain consistent with the existing conditions (*i.e.*, flow direction toward Mill Creek) and any surface/groundwater encountered or ponded within the PDA will be discharged into Mill Creek, following appropriate sedimentation management mitigation (*i.e.*, sedimentation settling pond).

The Project is not expected to result in significant residual effects to groundwater resources within the Assessment Area. The implementation of the proposed mitigation measures in Table D-2 will minimize the risk of any impacts to groundwater quality and quantity.

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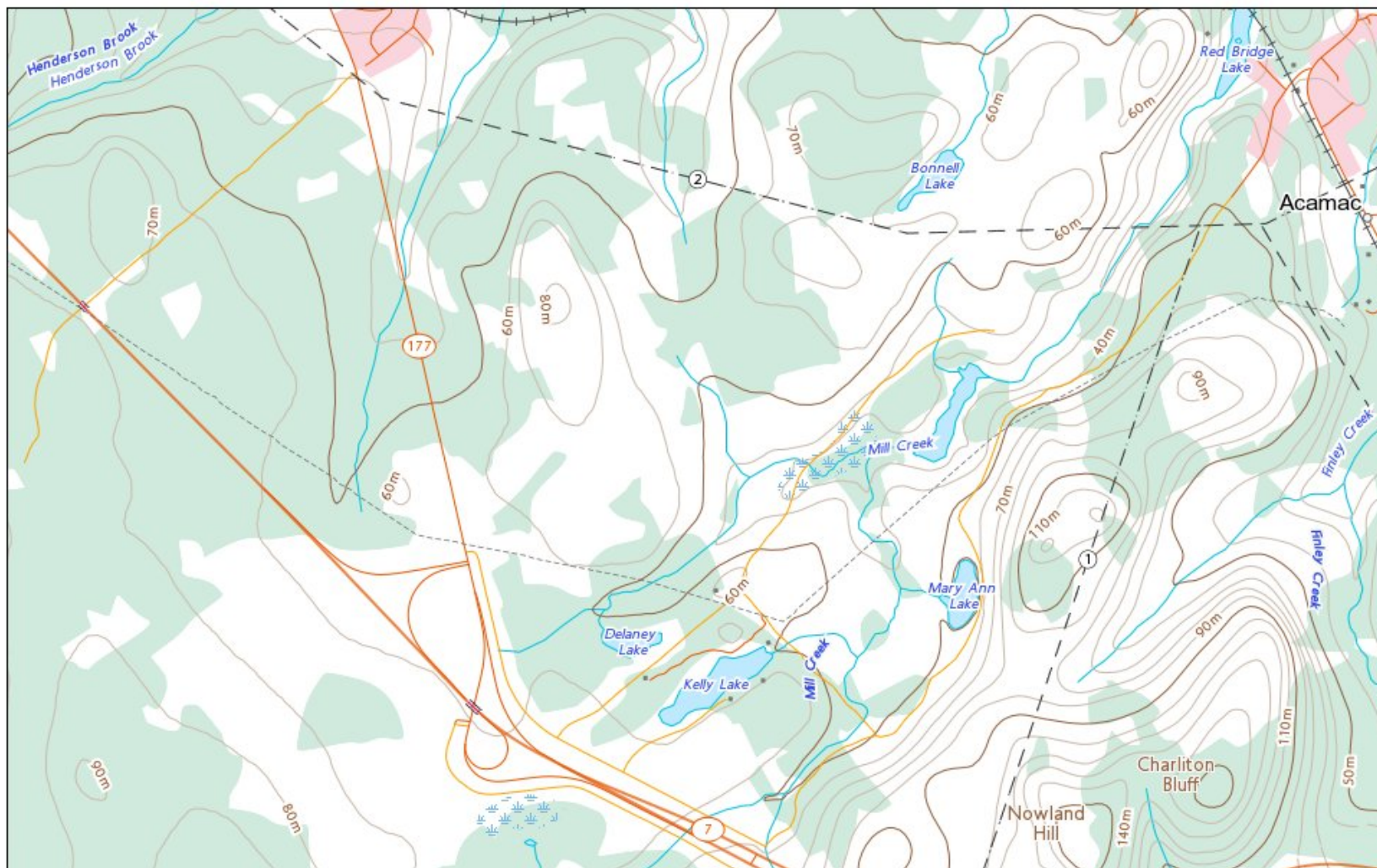
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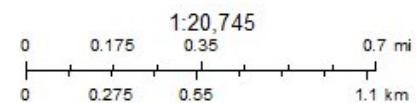
ATTACHMENTS

D1 - Topographical Map

Toporama



November 8, 2018



Natural Resources Canada / Ressources naturelles Canada

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D2 - Well Drillers Reports and Table 1 - Water Quality

Well Driller's Report

Date printed 2018/09/27

Drilled by	Work Type	Drill Method	Work Completed
Well Use	New Well	Rotary	08/10/2004
Drinking Water, Domestic			

Casing Information	Casing above ground	Drive Shoe Used?
There is no casing information.		

Aquifer Test/Yield							
Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
Air	0m <i>(BTC - Below top of casina)</i>	0 lpm	0hr	0m	18 lpm	No	0 lpm

Well Grouting There is no Grout information.	Drilling Fluids Used	Disinfectant	Pump Installed
	None	N/A	Submersible Intake Setting (BTC)
		Qty 0L	1.83m

Driller's Log					Overall Well Depth
Well Log	From	End	Colour	Rock Type	
10834	0m	1.83m	Brown	Sand and Mud	91.44m
10834	1.83m	91.44m	Grey and white	Limerock	Bedrock Level 1.83m

Water Bearing Fracture Zone
There is no water bearing fracture zone information.

Setbacks
There is no Setback information.

Well Driller's Report

Date printed 2018/09/27

Drilled by	Well Use	Work Type	Drill Method	Work Completed
	Drinking Water, Domestic	New Well	Rotary	05/10/2005

Casing Information		Casing above ground			Drive Shoe Used?
Well Log	Casing Type	Diameter	From	End	Slotted?
11364	Steel	15.24cm	0m	6.10m	

Aquifer Test/Yield							
Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
Air	1.52m	0 lpm	0hr	0m	9 lpm	No	0 lpm
<i>(BTC - Below top of casing)</i>							

Well Grouting
There is no Grout information.

Drilling Fluids Used	Disinfectant	Pump Installed
None	Bleach (Javex)	Submersible
	Qty 0L	Intake Setting (BTC)
		12.19m

Driller's Log				
Well Log	From	End	Colour	Rock Type
11364	0m	3.05m	Brown	Gravel
11364	3.05m	4.57m	EMPTY VALUE	Clay
11364	4.57m	85.34m	Grey	Rock

Overall Well Depth
85.34m
Bedrock Level
4.57m

Water Bearing Fracture Zone		
Well Log	Depth	Rate
11364	82.30m	9.1 lpm

Setbacks		
Well Log	Distance	Setback From
11364	16.76m	Septic Tank
11364	24.38m	Leach Field

Well Driller's Report

Date printed 2018/09/27

Drilled by	Well Use	Work Type	Drill Method	Work Completed
	Drinking Water, Domestic	New Well	Rotary	11/17/2005

Casing Information		Casing above ground			Drive Shoe Used?
Well Log	Casing Type	Diameter	From	End	Slotted?
12944	Steel	15.24cm	0m	6.10m	

Aquifer Test/Yield							
Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
Air	2.44m	18.2 lpm	1hr 30min	42.67m	18 lpm	No	0 lpm
<i>(BTC - Below top of casing)</i>							

Well Grouting
There is no Grout information.

Drilling Fluids Used	Disinfectant	Pump Installed
None	Bleach (Javex)	Submersible
	Qty 0L	Intake Setting (BTC)
		121.92m

Driller's Log				
Well Log	From	End	Colour	Rock Type
12944	0m	0.30m	Brown	Soil
12944	0.30m	137.16m	Dark grey	Limerock

Overall Well Depth
137.16m
Bedrock Level
0m

Water Bearing Fracture Zone		
Well Log	Depth	Rate
12944	115.82m	2.28 lpm

Setbacks		
Well Log	Distance	Setback From
12944	20.12m	Septic Tank
12944	23.77m	Leach Field
12944	33.53m	Right of any Public Way Road

Well Driller's Report

Date printed 2018/09/27

Drilled by	Well Use	Work Type	Drill Method	Work Completed
	Drinking Water, Domestic	New Well	Rotary	07/18/2006

Casing Information		Casing above ground			Drive Shoe Used?
Well Log	Casing Type	Diameter	From	End	Slotted?
13490	Steel	15.24cm	0m	6.10m	

Aquifer Test/Yield							
Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
Air	152.40m	2.28 lpm	0hr 30min	0m	2 lpm	No	0 lpm
<i>(BTC - Below top of casing)</i>							

Well Grouting
There is no Grout information.

Drilling Fluids Used	Disinfectant	Pump Installed
None	Bleach (Javex)	N/A
	Qty 0L	Intake Setting (BTC) 0m

Driller's Log				
Well Log	From	End	Colour	Rock Type
13490	0m	1.83m	Brown	Clay
13490	1.83m	21.34m	Grey	Granite
13490	21.34m	106.68m	Grey and white	Gravel
13490	106.68m	152.40m	Grey	Granite

Overall Well Depth
152.40m
Bedrock Level
1.83m

Water Bearing Fracture Zone		
Well Log	Depth	Rate
13490	114.30m	0.46 lpm
13490	152.40m	2.28 lpm

Setbacks		
Well Log	Distance	Setback From
13490	18.29m	Septic Tank
13490	24.38m	Leach Field
13490	22.25m	Right of any Public Way Road

Well Driller's Report

Date printed 2018/09/27

Drilled by	Well Use	Work Type	Drill Method	Work Completed
	Drinking Water, Domestic	New Well	Rotary	07/19/2006

Casing Information		Casing above ground			Drive Shoe Used?
Well Log	Casing Type	Diameter	From	End	Slotted?
13491	Steel	15.24cm	0m	6.10m	

Aquifer Test/Yield							
Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
Air	121.92m	3.41 lpm	0hr 30min	0m	3 lpm	No	0 lpm
<i>(BTC - Below top of casing)</i>							

Well Grouting
There is no Grout information.

Drilling Fluids Used	Disinfectant	Pump Installed
None	Bleach (Javex)	N/A
	Qty 0L	Intake Setting (BTC)
		0m

Driller's Log				
Well Log	From	End	Colour	Rock Type
13491	0m	2.44m	Brown	Clay and Gravel
13491	2.44m	24.38m	Grey	Granite
13491	24.38m	103.63m	Grey and white	Gravel
13491	103.63m	121.92m	Grey	Granite

Overall Well Depth
121.92m
Bedrock Level
2.44m

Water Bearing Fracture Zone		
Well Log	Depth	Rate
13491	60.96m	1.14 lpm
13491	121.92m	3.41 lpm

Setbacks		
Well Log	Distance	Setback From
13491	21.34m	Septic Tank
13491	28.96m	Leach Field
13491	23.77m	Right of any Public Way Road

Well Driller's Report

Date printed 2018/09/27

Drilled by	Well Use	Work Type	Drill Method	Work Completed
	Drinking Water, Domestic	New Well	Rotary	11/11/2010

Casing Information		Casing above ground			Drive Shoe Used?
Well Log	Casing Type	Diameter	From	End	Slotted?
24700	Steel	15.24cm	0m	6.10m	

Aquifer Test/Yield							
Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
	98.15m	13.65 lpm	1hr 30min	5.49m	3 lpm	Yes	0 lpm
<i>(BTC - Below top of casing)</i>							

Well Grouting
There is no Grout information.

Drilling Fluids Used	Disinfectant	Pump Installed
None	Bleach (Javex)	N/A
	Qty 0L	Intake Setting (BTC)
		91.44m

Driller's Log				
Well Log	From	End	Colour	Rock Type
24700	0m	0.91m	Brown	Clay
24700	0.91m	98.15m	Grey	Rock

Overall Well Depth
98.15m
Bedrock Level
0.91m

Water Bearing Fracture Zone		
Well Log	Depth	Rate
24700	80.77m	3.41 lpm

Setbacks		
Well Log	Distance	Setback From
24700	26.52m	Septic Tank
24700	28.35m	Leach Field
24700	57.00m	Right of any Public Way Road

Well Driller's Report

Date printed 2018/09/27

Drilled by	Well Use	Work Type	Drill Method	Work Completed
	Drinking Water, Domestic	Deepened	Rotary	08/25/2011

Casing Information	Casing above ground	Drive Shoe Used?
There is no casing information.		

Aquifer Test/Yield							
Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
Air	76.20m	9.1 lpm	0hr 30min	1.83m	9 lpm	No	0 lpm
<i>(BTC - Below top of casing)</i>							

Well Grouting	Drilling Fluids Used	Disinfectant	Pump Installed
	None	Bleach (Javex)	Submersible
There is no Grout information.		Qty 0L	Intake Setting (BTC) 71.63m

Driller's Log					Overall Well Depth 76.20m
Well Log	From	End	Colour	Rock Type	
26511	48.77m	76.20m	Grey	Granite	Bedrock Level 48.77m

Water Bearing Fracture Zone		
Well Log	Depth	Rate
26511	48.77m	1.14 lpm
26511	73.15m	7.96 lpm

Setbacks		
Well Log	Distance	Setback From
26511	15.24m	Septic Tank
26511	22.86m	Leach Field
26511	25.91m	Right of any Public Way Road

Well Driller's Report

Date printed 2018/09/27

Drilled by	Well Use	Work Type	Drill Method	Work Completed
	Drinking Water, Domestic	New Well	Rotary	12/14/2011

Casing Information		Casing above ground			Drive Shoe Used?
Well Log	Casing Type	Diameter	From	End	Slotted?
26676	Steel	15.24cm	0m	6.10m	

Aquifer Test/Yield							
Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
Air	213.36m	3.41 lpm	1hr 30min	18.29m	3 lpm	No	0 lpm
<i>(BTC - Below top of casing)</i>							

Well Grouting
There is no Grout information.

Drilling Fluids Used	Disinfectant	Pump Installed
None	Bleach (Javex)	Submersible
	Qty 0L	Intake Setting (BTC)
		182.88m

Driller's Log				
Well Log	From	End	Colour	Rock Type
26676	0m	4.57m	Brown	Clay and Gravel
26676	4.57m	22.86m	Grey	Granite
26676	22.86m	53.34m	White	Limestone
26676	53.34m	213.36m	Grey	Granite

Overall Well Depth
213.36m
Bedrock Level
4.57m

Water Bearing Fracture Zone		
Well Log	Depth	Rate
26676	198.12m	4.55 lpm

Setbacks		
Well Log	Distance	Setback From
26676	22.86m	Septic Tank
26676	25.91m	Leach Field
26676	24.38m	Right of any Public Way Road

Well Driller's Report

Date printed 2018/09/27

Drilled by	Well Use	Work Type	Drill Method	Work Completed
	Drinking Water, Domestic	New Well	Rotary	10/22/2009

Casing Information		Casing above ground			Drive Shoe Used?
Well Log	Casing Type	Diameter	From	End	Slotted?
26805	Steel	15.24cm	0m	7.32m	

Aquifer Test/Yield							
Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
Air	76.20m	6.82 lpm	1hr 01min	0m	7 lpm	No	0 lpm
<i>(BTC - Below top of casing)</i>							

Well Grouting
There is no Grout information.

Drilling Fluids Used	Disinfectant	Pump Installed
None	Bleach (Javex)	N/A
	Qty 0L	Intake Setting (BTC) 0m

Driller's Log				
Well Log	From	End	Colour	Rock Type
26805	0m	0.91m	Brown	Clay
26805	0.91m	76.20m	Grey	Granite

Overall Well Depth
76.20m
Bedrock Level
0.91m

Water Bearing Fracture Zone		
Well Log	Depth	Rate
26805	30.48m	2.28 lpm
26805	69.19m	4.55 lpm

Setbacks		
Well Log	Distance	Setback From
26805	21.34m	Septic Tank
26805	27.43m	Leach Field
26805	44.20m	Right of any Public Way Road

Well Driller's Report

Date printed 2018/09/27

Drilled by	Well Use	Work Type	Drill Method	Work Completed
	Drinking Water, Domestic	Deepened	Rotary	01/23/2009

Casing Information	Casing above ground	Drive Shoe Used?
There is no casing information.		

Aquifer Test/Yield							
Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
Air	182.88m	0.55 lpm	0hr 30min	27.43m	1 lpm	No	0 lpm
<i>(BTC - Below top of casina)</i>							

Well Grouting	Drilling Fluids Used	Disinfectant	Pump Installed
There is no Grout information.	None	Bleach (Javex)	N/A
		Qty 0L	Intake Setting (BTC) 0m

Driller's Log					Overall Well Depth
Well Log	From	End	Colour	Rock Type	182.88m
28039	85.34m	182.88m	Grey	Granite	Bedrock Level 0m

Water Bearing Fracture Zone		
Well Log	Depth	Rate
28039	182.88m	1.14 lpm

Setbacks		
Well Log	Distance	Setback From
28039	35.05m	Right of any Public Way Road

Well Driller's Report

Date printed 2018/09/27

Drilled by	Well Use	Work Type	Drill Method	Work Completed
	Drinking Water, Domestic	New Well	Rotary	07/28/2009

Casing Information		Casing above ground			Drive Shoe Used?
Well Log	Casing Type	Diameter	From	End	Slotted?
28259	Steel	15.24cm	0m	6.10m	

Aquifer Test/Yield							
Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
Air	60.96m	6.82 lpm	0hr 30min	6.10m	7 lpm	No	0 lpm
<i>(BTC - Below top of casing)</i>							

Well Grouting
There is no Grout information.

Drilling Fluids Used	Disinfectant	Pump Installed
None	Bleach (Javex)	N/A
	Qty 0L	Intake Setting (BTC)
		0m

Driller's Log				
Well Log	From	End	Colour	Rock Type
28259	0m	1.52m	Brown	Clay
28259	1.52m	60.96m	Grey	Granite

Overall Well Depth
60.96m
Bedrock Level
1.52m

Water Bearing Fracture Zone		
Well Log	Depth	Rate
28259	15.24m	6.82 lpm

Setbacks		
Well Log	Distance	Setback From
28259	30.48m	Septic Tank
28259	35.05m	Leach Field
28259	60.96m	Right of any Public Way Road

Well Driller's Report

Date printed 2018/09/27

Drilled by	Work Type	Drill Method	Work Completed
Well Use	New Well (NEW WELL)	Cable Tool (CABLE TOOL)	05/01/1996
Drinking Water, Domestic			

Casing Information		Casing above ground			Drive Shoe Used?
Well Log	Casing Type	Diameter	From	End	Slotted?
90058600	Steel	15.24cm	0m	6.10m	

Aquifer Test/Yield							
Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
	0m	0 lpm	0hr	0m	46 lpm	No	0 lpm
<i>(BTC - Below top of casing)</i>							

Well Grouting	Drilling Fluids Used	Disinfectant	Pump Installed
There is no Grout information.	None	N/A	N/A
		Qty 0L	Intake Setting (BTC) 0m

Driller's Log					Overall Well Depth
Well Log	From	End	Colour	Rock Type	
90058600	0m	1.83m	Brown	Mud and Rock	18.29m
90058600	1.83m	18.29m	Grey	Rock	Bedrock Level 1.83m

Water Bearing Fracture Zone
There is no water bearing fracture zone information.

Setbacks
There is no Setback information.

Well Driller's Report

Date printed 2018/09/27

Drilled by	Well Use	Work Type	Drill Method	Work Completed
	Drinking Water, Municipal	New Well (NEW WELL)	Rotary (ROTARY)	12/17/1997

Casing Information		Casing above ground			Drive Shoe Used?
Well Log	Casing Type	Diameter	From	End	Slotted?
91095900	Steel	15.24cm	0m	24.69m	

Aquifer Test/Yield							
Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
Air	0m	0 lpm	0hr	0m	32 lpm	No	0 lpm
<i>(BTC - Below top of casing)</i>							

Well Grouting	Drilling Fluids Used	Disinfectant	Pump Installed
There is no Grout information.	None	N/A	N/A
		Qty 13.65L	Intake Setting (BTC) 0m

Driller's Log				
Well Log	From	End	Colour	Rock Type
91095900	0m	21.34m	Brown	Mud and Till
91095900	21.34m	51.82m	Black	Slate
91095900	51.82m	91.44m	Grey	Granite

Overall Well Depth
91.44m
Bedrock Level
21.34m

Water Bearing Fracture Zone		
Well Log	Depth	Rate
91095900	53.34m	1.36 lpm
91095900	60.96m	2.28 lpm
91095900	76.20m	4.55 lpm
91095900	86.87m	24.12 lpm

Setbacks
There is no Setback information.

Well Driller's Report

Date printed 2018/09/27

Drilled by	Work Type	Drill Method	Work Completed
Well Use	New Well (NEW WELL)	Rotary (ROTARY)	07/03/1998
Non-Drinking Water, Industrial			

Casing Information		Casing above ground			Drive Shoe Used?
Well Log	Casing Type	Diameter	From	End	Slotted?
91127400	Steel	15.24cm	0m	7.62m	

Aquifer Test/Yield							
Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
Air	0m	0 lpm	0hr	6.10m	9 lpm	No	0 lpm
<i>(BTC - Below top of casing)</i>							

Well Grouting	Drilling Fluids Used	Disinfectant	Pump Installed
There is no Grout information.	None	N/A	N/A
		Qty 0L	Intake Setting (BTC) 0m

Driller's Log					Overall Well Depth
Well Log	From	End	Colour	Rock Type	
91127400	0m	3.66m	Brown	Mud and Rock	91.44m
91127400	3.66m	5.49m	Brown	Clay and Rock	Bedrock Level
91127400	5.49m	91.44m	Grey	Rock	5.49m

Water Bearing Fracture Zone
There is no water bearing fracture zone information.

Setbacks
There is no Setback information.

Well Driller's Report

Date printed 2018/09/27

Drilled by	Work Type	Drill Method	Work Completed
Well Use	New Well (NEW WELL)	Rotary (ROTARY)	06/30/1999
Drinking Water, Domestic			

Casing Information		Casing above ground			Drive Shoe Used?
Well Log	Casing Type	Diameter	From	End	Slotted?
91335900	Steel	15.24cm	0m	6.10m	

Aquifer Test/Yield							
Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
Air	0m	0 lpm	0hr	0m	0 lpm	No	0 lpm
<i>(BTC - Below top of casing)</i>							

Well Grouting	Drilling Fluids Used	Disinfectant	Pump Installed
There is no Grout information.	None	N/A	N/A
		Qty	Intake Setting (BTC)
		0L	0m

Driller's Log					Overall Well Depth
Well Log	From	End	Colour	Rock Type	
91335900	0m	3.05m	Brown	Mud and Gravel	91.44m
91335900	3.05m	91.44m	EMPTY VALUE	Clay and boulders	Bedrock Level 3.05m

Water Bearing Fracture Zone		
Well Log	Depth	Rate
91335900	60.96m	1.36 lpm
91335900	68.58m	6.82 lpm
91335900	82.30m	4.55 lpm
91335900	88.39m	4.55 lpm

Setbacks
There is no Setback information.

Well Driller's Report

Date printed 2018/09/27

Drilled by	Work Type	Drill Method	Work Completed
Well Use	New Well (NEW WELL)	Rotary (ROTARY)	01/19/1999
Drinking Water, Domestic			

Casing Information		Casing above ground			Drive Shoe Used?
Well Log	Casing Type	Diameter	From	End	Slotted?
91441600	Steel	15.24cm	0m	12.19m	

Aquifer Test/Yield							
Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
Air	0m	0 lpm	0hr	0m	5 lpm	No	0 lpm
<i>(BTC - Below top of casing)</i>							

Well Grouting	Drilling Fluids Used	Disinfectant	Pump Installed
There is no Grout information.	None	N/A	N/A
		Qty 13.65L	Intake Setting (BTC) 0m

Driller's Log				
Well Log	From	End	Colour	Rock Type
91441600	0m	1.22m	Brown	Mud and Fill
91441600	1.22m	6.10m	Grey	Broken Rock
91441600	6.10m	98.15m	Grey	Limestone

Overall Well Depth
98.15m
Bedrock Level
6.10m

Water Bearing Fracture Zone		
Well Log	Depth	Rate
91441600	60.96m	2.28 lpm
91441600	85.34m	3.64 lpm

Setbacks
There is no Setback information.

Well Driller's Report

Date printed 2018/09/27

Drilled by	Well Use	Work Type	Drill Method	Work Completed
	Non-Drinking Water, Industrial	New Well	Cable Tool	07/18/2001

Casing Information	Casing above ground	Drive Shoe Used?
There is no casing information.		

Aquifer Test/Yield							
Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
Air	0m <i>(BTC - Below top of casina)</i>	0 lpm	0hr	0m	182 lpm	No	0 lpm

Well Grouting	Drilling Fluids Used	Disinfectant	Pump Installed
There is no Grout information.	None	N/A	Submersible
		Qty 0L	Intake Setting (BTC) 1.83m

Driller's Log					Overall Well Depth 121.92m
Well Log	From	End	Colour	Rock Type	
92207800	0m	5.49m	Brown	Gravel and Rock	Bedrock Level 0m
92207800	5.49m	9.14m	Brown	Clay and Sand	
92207800	9.14m	121.92m	Red	Granite	

Water Bearing Fracture Zone		
Well Log	Depth	Rate
92207800	80.77m	22.75 lpm
92207800	67.06m	9.1 lpm
92207800	85.34m	104.65 lpm

Setbacks
There is no Setback information.

Table 1 - Well Log Water Quality

Parameter	Units	CDWQG ¹		Analytical Results (NBDELG OWLS, 2018)											
		MAC ²	AO ³	Result 1	Result 2	Result 3	Result 4	Result 5	Result 6	Result 7	Result 8	Result 9	Result 10	Result 11	Result 12
Total Alkalinity	mg/L	-	-	113	117	102	166	190	257	73.6	196	125	127	133	60.9
Aluminium	mg/L	-	0.1 / 0.2⁴	0.047	0.075	0.07	0.074	0.043	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	0.375	< 0.025
Arsenic	µg/L	10	-	7.5	35	12	62	15	26	< 1.5	6.8	< 1.5	2.7	2.3	< 1.5
Boron	mg/L	5	-	0.072	0.102	0.021	0.036	0.056	< 0.01	0.072	0.039	< 0.01	< 0.2	< 0.2	< 0.01
Barium	mg/L	1.0	-	< 0.01	< 0.01	< 0.01	0.011	0.141	0.151	< 0.01	0.079	< 0.01	0.05	0.027	< 0.01
Bromium	mg/L	-	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Conductivity	µSIE/cm	-	-	273	277	255	509	778	842	207	636	256	387	437	177
Calcium	mg/L	-	-	6.15	15.3	26.8	51.9	62.8	82.4	10.7	55	42	63.7	40	23.9
Cadmium	µg/L	5	-	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Chloride	mg/L	-	≤ 250	7.66	6.83	10	41.3	120	114	9.89	69.9	2.03	27.1	46	4.55
Chromium	µg/L	50	-	13	< 10	< 10	19	13	23	< 10	< 10	< 10	20	15	< 10
Copper	µg/L	-	≤ 1000	< 10	11	15	70	< 10	96	< 10	< 10	140	< 10	33	< 10
E.coli	Present (Pr) / Absent (Ab)	0 (Ab)	-	Ab	Pr	Ab	Ab	Ab	Ab	Ab	Ab	-	-	Ab	Ab
Fluoride	mg/L	1.5	-	0.121	0.301	< 0.1	0.156	0.285	< 0.1	0.134	0.141	< 0.1	0.179	< 0.1	< 0.1
Iron	mg/L	-	≤ 0.3	0.119	0.062	0.072	0.204	0.124	1.42	0.017	0.167	0.02	1.08	0.279	< 0.01
Hardness	mg/L	-	-	23.2	55.4	94.2	173	258	341	31.5	267	138	171.3	157.9	67.4
Potassium	mg/L	-	-	0.6	0.4	0.7	0.8	1.4	1.2	0.2	1.6	0.2	1.5	1	0.283
Magnesium	mg/L	-	-	1.9	4.16	6.6	10.7	24.5	32.8	1.15	31.4	7.94	2.98	14.1	1.9
Manganese	mg/L	-	≤ 0.05	< 0.005	< 0.005	0.007	0.006	0.006	0.75	0.008	0.013	< 0.005	0.14	0.013	< 0.005
Nitrite (NO ₂)	mg/L	3	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.06	< 0.05	< 0.05
Nitrate (NO ₃)	mg/L	45	-	< 0.05	0.26	0.57	1.6	0.13	0.49	< 0.05	< 0.05	0.15	0.8	0.63	< 0.05
Nitrogen Oxides (NO _x)	mg/L	-	-	< 0.05	0.31	0.62	1.7	0.18	0.54	< 0.05	0.1	0.2	0.86	0.68	< 0.05
Sodium	mg/L	-	≤ 200	50.2	46.3	16.1	45	60	46.6	34.6	28.2	1.2	13.7	25.7	8.67
Lead	µg/L	10	-	6.4	< 1	< 1	6.1	2.7	5.8	< 1	1.2	2.9	2.3	1.1	< 1
Sulphate	mg/L	-	≤ 500	16.6	15.1	10.4	29.5	14.1	11.5	13.3	11.4	4.59	25.8	16	16.2
Antimony	µg/L	6	-	5.7	18	12	104	26	6.2	< 1	13	< 1	2.3	6.2	< 1
Selenium	µg/L	50	-	< 1.5	< 1.5	< 1.5	5.4	3.4	9.3	< 1.5	< 1.5	< 1.5	< 1	< 1.5	< 1.5
Total Coliform	Present (Pr) / Absent (Ab)	0 (Ab)	-	Ab	Ab	Pr	Ab	Ab	Ab	Ab	Ab	Pr	-	-	Ab
Turbidity	NTU	1	-	6.42	1.17	1.7	4.2	1.4	11	0.2	1.4	0.2	9.9	7.8	0.4
Titanium	µg/L	-	-	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Uranium	µg/L	20	-	1	0.6	0.6	13	18	92	1.2	6	0.6	-	-	1.38
Zinc	µg/L	-	≤ 5000	130	< 5	280	36	10	160	< 5	11	19	< 10	9	< 5
pH	unitless	-	7.0-10.5	8.67	8.7	8.06	8.01	7.98	7.76	8.64	8.09	8.05	7.22	8.13	8.22
Total Dissolved Solids	mg/L	-	≤ 500	151.570	160.223	135.192	286.983	398.178	447.749	114.521	316.011	134.258	-	-	92.421

Notes:

Guidelines:

1. Health Canada. February 2017. Guidelines for Canadian Drinking Water Quality
2. MAC - Maximum Acceptable Concentrations (health-based)
3. AO - Aesthetic Objectives (based on aesthetic considerations)
4. Operational Guideline (OG) for: conventional treatment / other treatment types

"-" None Established

Results that exceed the AO guideline are in bold.

Results that exceed the MAC guideline are in bold and shaded.

Results that exceed the OG are italicized.



**D3 - Federal Contaminated Site Mapping and
SNB Property Information**

Treasury Board of Canada Secretariat

Home > [OCG](#) > [Real Property Management](#) > [FCSI](#) > DFRP/FCSI - Map Navigator

DFRP/FCSI - Map Navigator







Area: Saint John, Kings Content: 0 Federal Property, 0 Federal Building, 0 Federal Contaminated Site



Treasury Board of Canada Secretariat | Maps by [DBx GEOMATICS inc.](#)

Layers

- Contaminated Sites from active query
- Federal Properties
- Federal Buildings
- Federal Contaminated Sites

-  Economic Region
-  Census Divisions
-  Census Subdivisions
-  Metropolitan Areas
-  Federal Electoral Districts
-  Treaty Areas

¹ This layer is visible only when the map scale is smaller than 1:3,000,000.

²  Suspected  Active  Closed

³ Google base maps are only available when the map scale is smaller than 1:60,000.

IMPORTANT NOTE: The tables below are currently not synchronized with the map content.
Please click on the following button if you want to update the tables content: [UPDATE TABLES](#)

Federal Properties

Federal Properties

Page(s):

Select the number of rows per page

Federal Buildings

Federal Contaminated Sites



Parcel Information

PID:	00289595	County:	Saint John
Status:	Active	Active Date/Time:	
Land Related Description:	Land	Management Unit:	NB1101
Area:	122.63	Area Unit:	Hectares
Date Last Updated:	2016-07-14 15:38:21	Harmonization Status:	Harmonized
Land Titles Status:	Not Land Titles	Land Titles Date/Time:	
Date of Last CRO:		Manner of Tenure:	Not Applicable
Land Gazette Information:	No		

Description of Tenure:

Public Comments:

MAP / CARTE 06N48, 06NB3, 06NB4, 06NC3

[View Map](#)
[PID Report](#)
[Land Gazette](#)

Parcel Interest Holders

Name	Qualifier	Interest Type
John Law Corp		Owner

Assessment Reference

PAN	PAN Type	Taxing Authority Code	Taxing Authority
06052631		550	City of/Cité de Saint John

Parcel Locations

Civic Number	Street Name	Street Type	Street Direction	Place Name
	Reserve	Road		Saint John

County Parish

County	Parish
Saint John	City of/Ville de Saint John

Documents

Number	Registration Date	Book	Page	Code	Description
36194455	2016-08-04			6610	Postponement Agreement
36125368	2016-07-14			2200	Easement
28597053	2010-04-16			6700	Partial Discharge or Release
13214763	2001-11-09	2187	480	6600	Change of Terms
11979649	2001-04-23	2174	470	3710	Order in Council (TAC)
421745	1998-04-14	1964	120	103	Debenture, Voluntary Charge
421744	1998-04-14	1964	109	101	Deed
400374	1995-05-26	1768	267	101	Deed
265831	1976-01-01	803	458	101	Deed
255594	1975-01-01	757	440	114	Agreement
116538	1931-01-01	204	334	101	Deed

Plans

Number	Suffix	Registration Date	Code	Description	Lot Information	Orientation
--------	--------	-------------------	------	-------------	-----------------	-------------

28343342	2010-02-04	9050	Subdivision & Amalgamations	Provincial Grid
18515826	2004-06-14	9050	Subdivision & Amalgamations	Provincial Grid
13801601	2002-03-11	9050	Subdivision & Amalgamations	Provincial Grid

Parcel Relations

Related PID	Type of Relation	Lot Information
55158190	Infant	Lot Part 'A'
55169049	Infant	Lot 03-01
55169056	Infant	Lot 03-02
55169064	Infant	Lot 03-03
55204358	Infant	Lot 09-01
55204366	Infant	Lot 09-02

Non-Registered Instruments

No Records returned



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Land Gazette Information for PID: 289595

The Land Gazette is a repository of permanent and temporary land related notices and associated information.

No Records returned

[Land Gazette](#) - View the list of notices currently available in the Land Gazette.

[PDF Report](#)

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APPENDIX E

VEC: Aquatic Environment

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E-3	Stream Habitat Assessment Forms

1.0 RATIONALE FOR THE VALUED ENVIRONMENTAL COMPONENT (VEC)

Two watercourses are situated in proximity to the Project, Mill Creek and an unnamed tributary of Delaney Lake (herein referred to as the “Tributary”). Several drainage channels and a man-made impoundment (herein referred to as the “Pond”) flow into Mill Creek. Project related activities such as watercourse re-alignment, excavating, and ground disturbance work within 30-metres of the watercourses and the Pond will interact with physical and ecological components of these waterbodies.

In order to assess any influence of the Project on the aquatic environment, four components have been identified for the valued environmental component (VEC):

- *Fish Habitat* - Fisheries and Oceans Canada (DFO) defines fish habitat as the spawning grounds and any other areas including nursery, rearing, food supply, and migration areas, on which fish depend directly or indirectly in order to carry out their life process;
- *Fish Survey* - work that investigates the known and potential presence of fish species;
- *Aquatic Species at Risk and Species of Conservation Concern* - for purposes of this assessment, aquatic species at risk (SAR) are any fish species that have protective status under Schedule 1 of the federal *Species at Risk Act (SARA)*, or the provincial *New Brunswick Species at Risk Act (NBSAR)*. Species of conservation concern (SOCC) are considered aquatic species that are not SAR but are considered Special Concern under SARA or are considered rare by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) or the Atlantic Canada Conservation Data Centre (ACCDC); and
- *Commercial, Recreational and Aboriginal (CRA) Fisheries* - as defined under the *Fisheries Act* and the functions of these fisheries that may be impacted by the Project activities.

2.0 BOUNDARIES FOR THE ENVIRONMENTAL EFFECTS ASSESSMENT

2.1 Spatial Boundaries

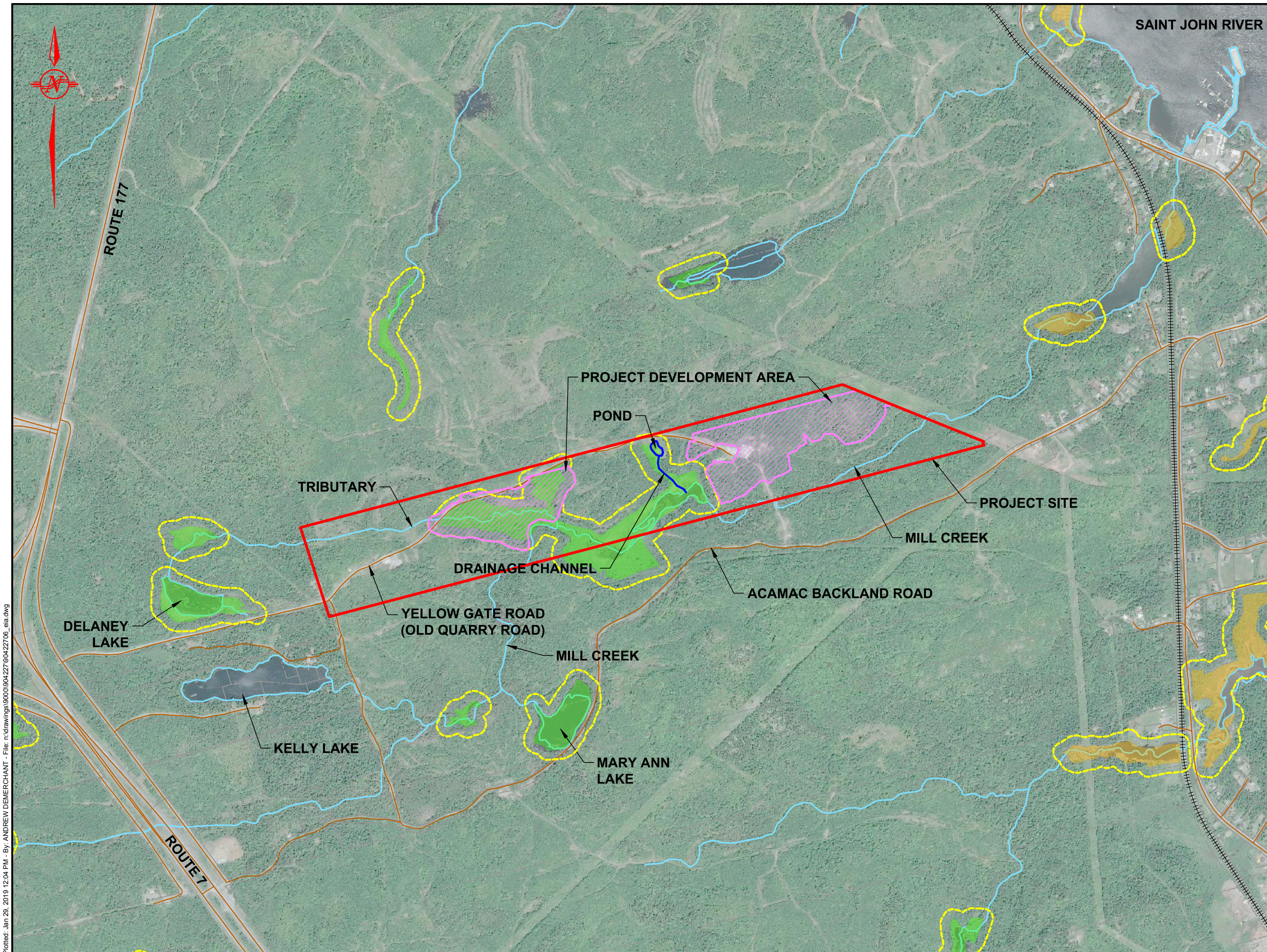
The assessment of the aquatic environment has been completed for three spatial boundaries:

- The Project Development Area (PDA) is defined as the footprint of ground disturbance required for the Project activities (portion of PID 00289595; Figure E-1);
- The Project Site is defined as the southwestern portion of PID 00289595 as investigated during the baseline environmental studies (Figure E-1); and
- The Assessment Area encompasses a 5 kilometre (km) radius of the PDA where aquatic SAR and SOCC have been recorded by ACCDC.

2.2 Temporal Boundaries

The assessment of the aquatic environment has been completed for the following temporal boundaries:

- The construction phase of the Project;
- The operational phase of the Project; and
- The reclamation phase of the Project.



LEGEND

	PROVINCIALY SIGNIFICANT WETLAND (GeoNB)
	REGULATED WETLAND (GeoNB)
	30m WETLAND BUFFER

Drawn By	AGSD	Checked By	JH
Calculations By		Checked By	

Date
JAN, 2019

Project
ENVIRONMENTAL IMPACT ASSESSMENT
CRANE MOUNTAIN LANDFILL CLAY AND
AGGREGATE QUARRY

Drawing
AQUATIC ENVIRONMENT VEC
SPATIAL BOUNDARIES

Scale
1:12500

File No.	Drawing	Revision No.
90422706	E-1	0



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3.0 METHODOLOGY

There are two New Brunswick Hydrological Network (NBHN) mapped watercourses within the PDA; Mill Creek and the Tributary. Several other drainage features and the Pond are also present within the Project Site (Figure E-1).

A two-phased approach was used to determine the existing aquatic habitat conditions and any potential interaction with the Project, including:

- A desktop review of all existing information relative to fish SAR, SOCC and CRA fisheries; and
- Field investigations were completed to determine the existing physical characteristics of waterbodies in the PDA. A fish survey was also completed to investigate fish presence in a portion of Mill Creek, the Tributary and the Pond.

Specific to the Environmental Impact Assessment (EIA) document, potential interactions or effects of the Project on the aquatic environment have been identified and are discussed. Where residual effects are anticipated, the proposed mitigation methods for mitigating the potential effects have been presented.

3.1 Fish Habitat

A GEMTEC biologist determined if the watercourses located within the Project Site contained fish habitat and/or had the potential to be fish-bearing via field surveys carried out in September and October, 2018. The presence of suitable fish habitat was determined by assessing each waterbody to determine the presence, or seasonal possibility of:

- Sufficient water depths to accommodate fish;
- Adequate water quality (e.g., field measurements of temperature, dissolved oxygen, conductivity, and pH);
- Nutrient inputs for feeding (e.g., overhanging vegetation, surface water influx, woody debris, etc.); and/or
- Fish passage from Mill Creek, the Tributary, or the Pond.

A stream habitat assessment was also completed along Mill Creek and the Tributary to determine the baseline (*i.e.*, pre-Project) conditions within these watercourses. The stream habitat assessment was limited to areas where potential Project interactions could be experienced within the Project Site. The stream habitat assessment was completed as per the Department of Natural Resources & Environment (DNR&E)/DFO - New Brunswick Stream Habitat Inventory forms.

Temperature (°C), conductivity (microSiemens per centimetre (µS/cm)), dissolved oxygen (milligrams per litre (mg/L)), and pH (unitless) were measured using a calibrated YSI-556 multi-meter during the stream habitat assessment.

3.2 Fish Survey

A fish survey was completed in discrete locations within the Project Site on September 25, 2018 to confirm the presence or absence of fish. An LR-24 Smith-Root backpack electrofisher powered by a 24-volt battery was used to live capture fish and all captured fish were species identified, visually measured, and then released back into the same waterbody.

The fish survey did not include quantifying fish populations, removing the fish from the Project Site, nor did it include obtaining specimen samples for laboratory analysis (e.g., tissue sampling).

3.3 Fish Species at Risk and Species of Conservation Concern

The ACCDC report provides previously identified locations of fauna SAR, SOCC and any location sensitive species within a 5 km radius of the Project Site. The ACCDC report was reviewed prior to completing any field investigations to determine the potential for any aquatic fauna SAR and/or SOCC to occur within the Project Site. Upon completion of field investigations, habitat comparisons were completed for any SAR or SOCC that were recorded within the 5 km radius to the observed conditions within the Project Site. The ACCDC report is included in Attachment E-1.

Any incidental sightings of fish SAR or SOCC were recorded and any critical habitat was identified. For the purposes of this assessment, critical habitat is defined as per the federal SARA.

Information from the New Brunswick Department of Energy Resources Development (NBDERD) and DFO was reviewed to determine the extent of aquatic SAR and SOCC not identified in the ACCDC report that may frequent the Project Site.

3.4 Commercial, Recreational and Aboriginal (CRA) Fisheries

CRA fisheries are regulated under the federal *Fisheries Act* which is administered by DFO. CRA fisheries are defined by the *Fisheries Act* as follows:

- Commercial fisheries refer to fish harvested under the authority of a license for the purpose of sale, trade, or barter;
- Recreational fisheries refers to fish harvested under the authority of a license for personal use of the fish or for sport; and
- Aboriginal fisheries refers to fish harvested by an Aboriginal organization or any of its members for the purpose of using the fish as food, for social or ceremonial purposes or for purposes set out in an agreement entered into between DFO and the Aboriginal organization.

The *Fisheries Act* restricts work, undertakings or activities that result in “serious harm” to fish that are part of a CRA fishery, or to fish that support such a fishery. Serious harm is defined under section 2(2) of the *Fisheries Act* as “the death of fish or the permanent alteration to, or destruction of, fish habitat”.

4.0 DESCRIPTION OF EXISTING ENVIRONMENT

4.1 Fish Habitat

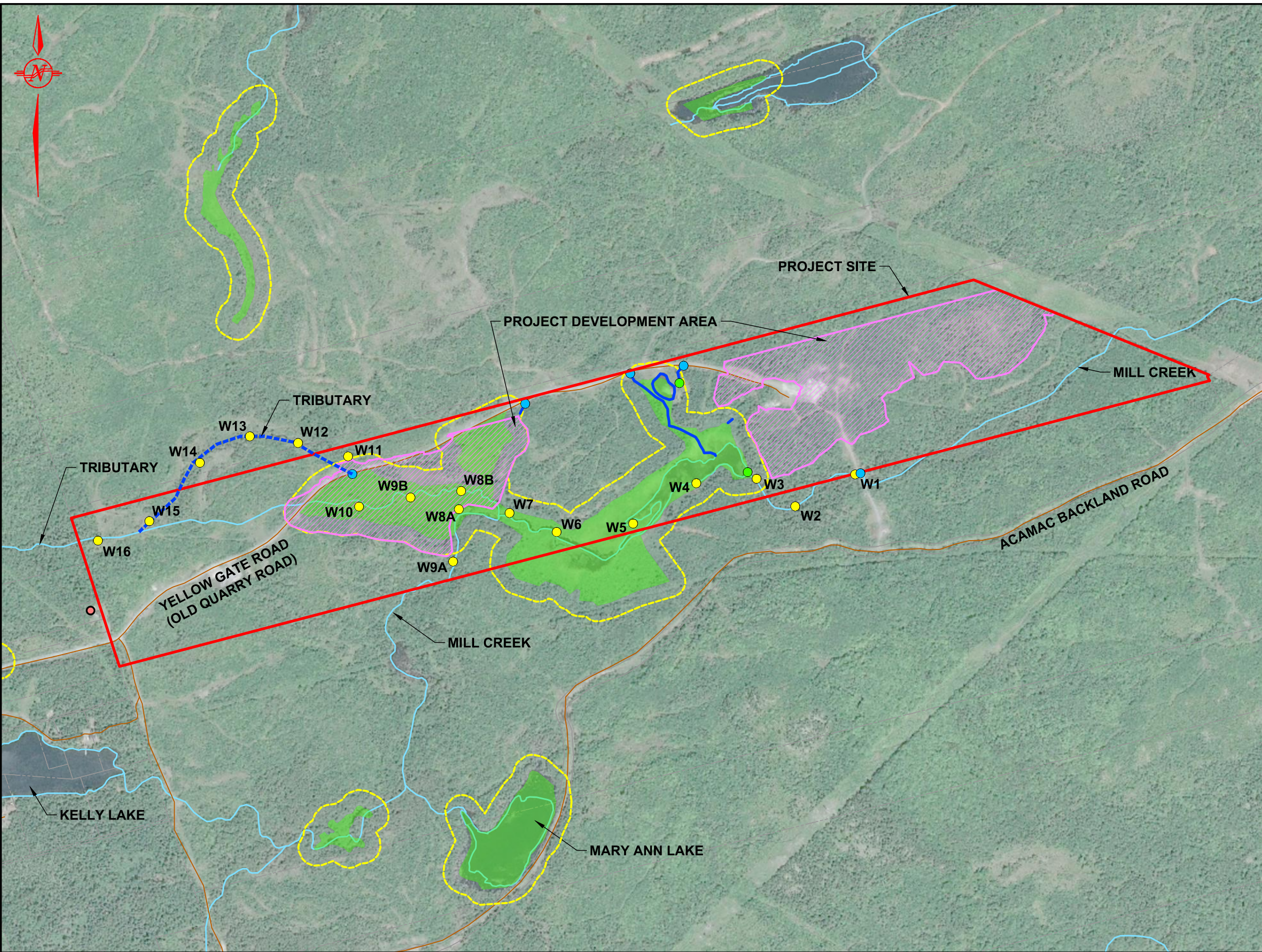
It was determined by GEMTEC biologists that both Mill Creek and the Tributary are fish-bearing via incidental sightings of Blacknose Dace (*Rhinichthys atratulu*) and Brook Trout (*Salvelinus fontinalis*) during field investigations. The Pond and associated drainage channel were also determined to be fish-bearing via electrofishing activities. Two Blacknose Shiners (*Notropis heterolepis*) and one Blacknose Dace were captured in the Pond.

A general description of the various aquatic features located within the PDA is presented below.

The headwaters of Mill Creek originate off-site at an open water wetland and flow west to east through a rural, forested area. The watercourse crosses the four-lane section of Route 7 approximately 1 km southwest of the Project Site. An unnamed tributary to Kelly Lake and an unnamed tributary to Mary Ann Lake converge with Mill Creek, approximately 0.55 km and 0.40 km south of the Project Site, respectively. Mill Creek enters the southern Project Site boundary and flows over a bedrock outcrop in a falls/chute structure (Photo 1, Attachment E-2; Figure E-1). Mill Creek is not situated within the Clay or Quarry PDA.

The Tributary originates near Delaney Lake, in forested wetlands west of the Project Site and flows west to east. The Tributary collects overland flows from the steep topography in the western portion of the Project Site and flows under Yellow Gate Road (herein referred to, and locally known as “Old Quarry Road”) via a concrete culvert into the Clay PDA (Photo 2 and Photo 3, Attachment E-2; Figure E-1). During the field investigation, the Tributary channel alignment was delineated using a hand-held global positioning system (GPS) because the mapped (GeoNB) channel alignment differed significantly from the on-site conditions. The mapped section of the Tributary channel in the northwest portion of the Project Site does not exist, rather the channel flows north off the Project Site, then south onto the Project Site, then under Old Quarry Road (Figure E-2).

Mill Creek connects with the Tributary in the central portion of the Project Site, outside the Clay PDA (Figure E-1) and flows east into an open water wetland (Photo 4, Attachment E-2). A beaver dam and remnants of a historic man-made dam are located at the eastern portion of the wetland, creating the impoundment (Photo 5 and Photo 6, Attachment E-2). Downstream of the beaver dam and man-made dam, the channel flows through a mature forest with bedrock outcrops and abundant downed and submerged woody debris (Photo 7 and Photo 8, Attachment E-2; Figure E-1).



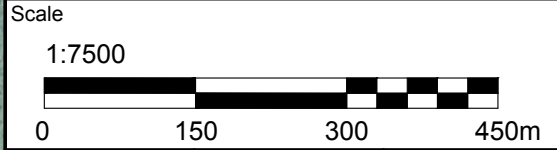
- LEGEND**
- REGULATED WETLAND (GeoNB)
 - 30m WETLAND BUFFER
 - CULVERT LOCATION
 - BEAVERDAM LOCATION
 - STREAM ASSESSMENT LOCATION
 - SEASONAL DWELLING
 - FIELD DELINEATED DRAINAGE CHANNEL
 - FIELD DELINEATED WATERCOURSE
 - MAPPED WATERCOURSE

Drawn By AGSD	Checked By JH
Calculations By	Checked By

Date
JAN, 2019

Project
ENVIRONMENTAL IMPACT ASSESSMENT
CRANE MOUNTAIN LANDFILL CLAY AND
AGGREGATE QUARRY

Drawing
AQUATIC ENVIRONMENT STREAM
ASSESSMENT LOCATIONS



File No. 90422706	Drawing E-2	Revision No. 0
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The Pond is a man-made impoundment and is the result of historic clay extraction on the Project Site (Photo 9, Attachment E-2). Drainage channels originating from roadside ditching are facilitated south, under Old Quarry Road via two culverts and outlet into the Pond (Figure E-2). A small drainage channel flows southeast from the Pond to outlet into Mill Creek (Figure E-1). At the time of the field investigations in September and October, 2018, significant beaver activity was observed in the drainage channel adjoining the Pond to the east (Photo 10, Attachment E-2).

Shallow waters in Mill Creek and the Tributary allowed for the visual observation of streambed characteristics in-situ during the stream assessment activities conducted on October 26, 2018. Site photos are included in Attachment E-2 and detailed stream habitat inventory forms for Mill Creek and the Tributary are presented in Attachment E-3. The stream assessment was conducted on October 26, 2018 between 09:00 and 16:00.

4.1.1 Surface Water Quality

The recorded field parameters are presented in Table E-1. The stream assessment locations are presented on Figure E-2.

Table E-1 Summary of Field Parameters

Sampling Site	Temperature (°C)	pH	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)
CCME FWAL¹	NA ²	6.5 - 9.0	NA ²	NA ²	> 5.5 ³
Mill Creek					
W1	2.83	5.43	0.176	1.0	14.04
W2	2.99	6.10	0.165	1.2	10.21
W3	2.75	6.60	0.162	1.6	11.34
W4⁴	-	-	-	-	-
W5⁴	-	-	-	-	-
W6	3.38	7.50	0.178	2.3	9.40
W7	3.34	7.63	0.161	1.8	10.08
W8A	3.32	7.80	0.187	0.9	10.48
W9A	3.28	7.79	0.187	0.7	11.88
Tributary					
W8B	3.71	7.79	0.151	0.8	11.34
W9B	3.23	7.76	0.127	0.5	11.49
W10	3.25	7.72	0.127	0.4	10.86
W11	3.21	7.73	0.123	2.4	9.24
W12	3.01	7.76	0.126	1.8	11.50
W13	3.14	7.66	0.128	2.2	7.30
W14	3.00	7.67	0.128	1.2	8.70
W15	2.95	7.68	0.136	0.5	11.49
W16	3.00	7.68	0.138	0.5	8.88

Notes:

1. Canadian Council of Ministers of the Environment Freshwater Quality Guidelines for the Protection of Aquatic Life;
2. NA = Not Applicable;
3. The most conservative guideline (> 5.5 mg/L) is presented (the lowest acceptable dissolved oxygen concentration for warm water biota). The guideline ranges to > 9.5 mg/L (the lowest acceptable dissolved oxygen concentration for cold water biota; early stages); and
4. Water quality parameters could not be obtained due to unsafe accessibility to the open water wetland.

Based on a review of habitat information obtained from NBDERD and DFO, the likelihood of other fish species frequenting the Project Site is presented in Table E-2.

Table E-2 Likelihood of Other Fish Species Frequenting the Project Site

Fish Species	Likelihood
Alewife (<i>Alosa pseudoharengus</i>)	Moderate
American Eel (<i>Anguilla rostrata</i>)	High
American Shad (<i>Alosa sapidissima</i>)	Low
Atlantic Salmon (<i>Salmo salar</i>)	Low
Atlantic Sturgeon (<i>Acipenser oxyrinchus</i>)	Low
Atlantic Tomcod (<i>Microgadus tomcod</i>)	Low
Banded Killifish (<i>Fundulus diaphanus</i>)	Low
Brook Stickleback (<i>Culaea inconstans</i>)	Low
Brown Bullhead (<i>Ameiurus nebulosus</i>);	Low
Brown Trout (<i>Salmo Trutta</i>)	Moderate
Burbot (<i>Lota lota</i>)	Low
Chain Pickerel (<i>Esox niger</i>)	Low
Common Shiner (<i>Notropis cornutus</i>)	High
Creek Chub (<i>Semotilus atromaculatus</i>)	High
Fallfish (<i>Semotilus corporalis</i>)	Moderate
Fourspine Stickleback (<i>Apeltes quadracus</i>)	Moderate
Golden Shiner (<i>Notemigonus crysoleucas</i>)	Low
Lake Chub (<i>Couesius plumbeus</i>)	Moderate
Lake Whitefish (<i>Coregonus clupeaformis</i>)	Low
Mummichog (<i>Fundulus heteroclitus</i>)	Low
Muskellunge (<i>Esox masquiningy</i>)	Low
Ninespine Stickleback (<i>Pungitius pungitius</i>)	Moderate
Northern Redbelly Dace (<i>Chrosomus eos</i>)	Moderate
Pearl Dace (<i>Semotilus margarita</i>)	Moderate
Pumpkin Seed (<i>Lepomis gibbosus</i>)	Low
Rainbow Smelt (<i>Osmerus mordax</i>);	Low
Rainbow Trout (<i>Oncorhynchus mykiss</i>)	Moderate
Redbreast Sunfish (<i>Lepomis auritus</i>)	Low
Round Whitefish (<i>Prosopium cylindraceum</i>)	Low
Sea Lamprey (<i>Petromyzon marinus</i>)	Low
Slimy Sculpin (<i>Cottus cognatus</i>)	Low
Striped Bass (<i>Morone saxatilis</i>)	Low
Smallmouth Bass (<i>Micropterus dolomieu</i>)	Low
Threespine Stickleback (<i>Gasterosteus aculeatus</i>)	Moderate
White Perch (<i>Morone americana</i>)	Low
White Sucker (<i>Catostomus commersonii</i>)	High
Yellow Perch (<i>Perca flavescens</i>)	Low

4.2 Fish Species at Risk

DFO maintains aquatic SAR maps to provide a general overview of aquatic SAR distribution in New Brunswick and their critical habitat. No critical habitat is identified within the Project Site (DFO, 2018) but the DFO maps do identify three freshwater SAR that could potentially be found within the DFO Maritime region:

- Atlantic Salmon, Inner Bay of Fundy Population (*Salmo salar*);
- Atlantic Whitefish (*Coregonus huntsmani*); and
- Lake Utopia Rainbow Smelt (*Osmerus mordax*).

Based on the habitat conditions observed during the September and October, 2018 field investigations, these species have a low potential for occurring within the Project Site.

Table E-3 summarizes the freshwater SAR identified as occurring within the DFO Maritime region, and indicates the probability of their presence within the Project Site based on their known and preferred habitats.

Table E-3 Aquatic Species at Risk and Potential Use of Project Site

Common Name	Population	Scientific Name	SARA Status	Habitat ¹	Probability of Frequenting the Project Site
Atlantic Salmon	Inner Bay of Fundy	<i>Salmo salar</i>	Endangered	Freshwater habitat includes clean, cool and flowing water with rapids and pools. The marine habitat includes the Bay of Fundy.	Low
Atlantic Whitefish	-	<i>Coregonus huntsmani</i>	Endangered	Only in the Tusket and Petite Riviere watersheds in southern Nova Scotia.	Low
Lake Utopia Rainbow Smelt	Small bodied population	<i>Osmerus mordax</i>	Threatened	Only found in Lake Utopia and three of its tributaries: Second Brook; an Unnamed Brook; and Smelt Brook.	Low

1. Aquatic Species at Risk (DFO, 2018).

4.3 Fish Species of Conservation Concern

The DFO aquatic SAR maps indicate that the Shortnose Sturgeon (*Acipenser brevirostrum*), may be found, or could potentially occur within the Project Site (*i.e.*, Mill Creek and the Tributary). The ACCDC report (Attachment E-1), which provides locations of known records of SAR and SOCC within the Assessment Area, also identified the Shortnose Sturgeon as occurring within 5 km of the Project Site. The Shortnose Sturgeon is considered to be a SOCC under this EIA assessment (*i.e.*, not protected federally or provincially) as it has a COSEWIC designation and Schedule 1 SARA status of Special Concern. Based on the habitat conditions observed during the field investigations in September and October, 2018, and in consideration of the preferred habitat of this species, the Shortnose Sturgeon has a low potential for occurring within the Project Site.

Table E-4 summarizes the freshwater SOCC fish identified as occurring within the DFO Maritime region and indicates the probability of their presence within the Project Site, based on their known and preferred habitats.

Table E-4 Aquatic Species of Conservation Concern and Potential Use of the Project Site

Common Name	Population	Scientific Name	SARA Status	Habitat ¹	Probability of Frequenting the Project Site
Atlantic Salmon	Gaspé - Southern Gulf of St. Lawrence population -DU12	<i>Salmo salar</i>	No Status	Reproduces in the St. Lawrence River and tributaries of the Gulf of St. Lawrence.	Low
Brook Floater	-	<i>Alasmidonta varicosa</i>	Special Concern	A freshwater mussel found in rivers, streams, and lakes. Prefer watercourses with a moderate to high flow with rocks, cobble and sand-pocket areas.	Low
Shortnose Sturgeon	-	<i>Acipenser brevirostrum</i>	Special Concern	Occurs primarily in the freshwater and tidal areas of the lower Saint John River and its tributaries.	Low
Striped Bass	Bay of Fundy	<i>Morone saxatilis</i>	No Status	Historically, this anadromous species spawned in the Saint John River and its tributaries. The typically habitat is associated with estuaries and coastal waters.	Low
Yellow Lampmussel	-	<i>Lampsilis cariosa</i>	Special Concern	A freshwater species found below the head-of-tide in the main Saint John River, including five of its large tributaries and several large lakes.	Low

1. Aquatic Species at Risk (DFO, 2018).

4.4 Commercial, Recreational and Aboriginal (CRA) Fisheries

DFO was unable to provide commentary at the time of this EIA registration. Any information received from DFO subsequent to this EIA registration will be submitted as an addendum to this document.

4.4.1 Commercial Fisheries

There are no known licensed commercial fisheries within the Assessment Area.

4.4.2 Recreational Fisheries

The Project Site is contained within the NBDERD Recreational Fishery Area (RFA) 6 (Lower Saint John). The watercourses within the Project Site (Mill Creek and the Tributary) are tributaries to the Saint John River. The NBDERD issues an annual report (Fish, 2018) that details the recreational fishing seasons for each region of New Brunswick.

4.4.3 Aboriginal Fisheries

There are no known Aboriginal fisheries within the Assessment Area. Appropriate First Nations will be consulted as part of the public consultation process of this EIA.

5.0 SUMMARY OF POTENTIAL EFFECTS

In general, the potential effects to the aquatic environment are limited to the construction and operational phases of the Project. During the construction phase of the Project, work associated with site preparation, roadway enhancement along Old Quarry Road, construction of access roadways to the Clay PDA, and the re-alignment of the Tributary will be the main activities undertaken. When appropriate mitigations are employed, none of these activities are anticipated to adversely affect the aquatic environment.

With regulatory approval, a diversion channel for the Tributary will be constructed to facilitate flow away from the Clay PDA. Although the exact location has not yet been finalized, the proposed channel diversion will re-align the Tributary channel outside the Clay PDA and will ultimately discharge into Mill Creek, as per the pre-Project drainage regime. The diversion channel is expected to be a permanent re-alignment of the Tributary and any required culverts along the re-alignment will be designed and constructed to provide fish passage from Mill Creek into the upstream portion of the Tributary. Following the construction of the diversion channel, the original channel will be permanently blocked and removed.

During the operational phase of the Project, blasting will be undertaken within the Quarry PDA. No blasting will be undertaken within the Clay PDA nor any watercourses. The blasting events are expected to be infrequent and on an as-needed basis for construction projects at the Crane Mountain Landfill (herein referred to as the "Landfill"). It is expected that during the operational phase of the Project (*i.e.*, 2020 to 2048), up to five annual blasting events may occur within the Quarry PDA.

Activities to be carried out during the reclamation phase of the Project will require similar equipment as outlined for the construction phase. Disturbed ground will be re-graded and stabilized, re-vegetation efforts may be undertaken and equipment will demobilize the Project Site. Based on the 30 year life expectancy of the Project, it is not expected that the Tributary channel will be reclaimed to the original alignment. This will ensure that no further and unnecessary disturbance will be made to an established watercourse channel and nearby landward areas.

5.1 Fish and Fish Habitat Potential Effects

The potential effects to fish and fish habitat as a result of Project activities are detailed below:

- The extraction of the clay within the PDA will result in the direct loss of fish habitat within the Tributary channel. However, this loss is expected to be offset by the construction of a re-aligned channel to provide fish passage through the Project Site. The re-alignment process has an increased potential of fish mortality during any in-channel work and during de-watering activities. In addition, in-channel work required for the re-alignment of the Tributary may disturb fish migration through the Clay PDA;
- Ground disturbance and watercourse re-alignment work may increase the potential for sediment release into the water column in the Clay PDA;
- An accidental release or overtopping from the proposed sediment pond may result in an increased sediment load into the receiving watercourse. Monitoring of the sediment pond (water levels and sedimentation load) will be conducted to ensure that no water is released (or overtopped) from the sediment pond in exceedance of 25 mg/L total suspended solid (TSS) above the baseline conditions (measured via grab samples). The treated water will be released at a rate that does not overwhelm the capacity of the receiving watercourse;
- The loss of wetland habitat and function in the Clay PDA may change the hydrological regime and surface water quantity and quality in the downgradient aquatic environment. The environmental assessment of impacts to wetlands is discussed in Appendix G;
- Vibration and noise from blasting for the quarry and excavation work may disrupt and/or cause physical harm to fish species within the Project Site. Effects near the source will dissipate to produce lesser impacts (e.g., vibrations, noise) at distances away from the active work site (the closest watercourse is approximately 200 metres from the Quarry PDA), and as such, the effects of vibration and noise on fish will likely be minimal;
- The change in local topography from blasting and excavating activities may affect the quantity and frequency of water and nutrient inputs into Mill Creek, the Tributary and the Pond. However, based on a review of the existing topography and the proposed Project activities, the drainage conditions are expected to remain similar to those currently observed on-site. The environmental assessment for physiography and drainage is discussed in Appendix D; and
- There is also a potential for contaminants to be released into water and/or soil through spills of fuels and lubricants from on-site equipment. Accidental contaminant spills may result in injury and death to fish species and/or destruction to habitat or foraging areas.

Since no Project related work is proposed to be carried out within the Mill Creek channel, it is expected that fish will be able to utilize (*i.e.*, forage, spawn, migration, *etc.*) this watercourse as per pre-Project conditions throughout the Project timeline. Although no serious harm to fish is expected as a result of any Project activities, DFO may be consulted through a NBDELG Watercourse and Wetland Alteration (WAWA) permit application to determine if a *Fisheries Act Authorization* and compensation activities will be required for the Project.

5.2 Fish Species at Risk and Species of Conservation Concern

Fish SAR or SOCC are not expected to frequent the Project Site and downgradient impacts in the Saint John River are not anticipated. Aquatic SAR and SOCC are not discussed further in this VEC assessment.

5.3 Commercial, Recreational and Aboriginal (CRA) Fisheries Potential Effects

There are no known or long-term effects to CRA fisheries as a result of the Project. There is a potential for limited access on a temporary basis to recreational fishing areas within the Project Site due to the presence of Project components and active work zones. Although no recreational fisheries are known to occur within the Project Site, it is expected that approximately 1 km of Mill Creek and 500 metres of the Tributary will be inaccessible (within the Project Site) during the Projects' lifetime. This removal of access will be temporary and localized to on-going operational zones. Potential effects to CRA fisheries are therefore expected to be negligible and are not discussed further in this VEC assessment.

5.4 Accidents, Malfunctions and Unplanned Events

There is a potential for accidents to occur during all phases of the Project. Accidents that may impact the aquatic environment within the Project Area include:

- Failure of sedimentation and erosion controls structures; and
- Accidental release of chemicals or petroleum products into the aquatic environment.

6.0 PROPOSED MITIGATION MEASURES

The potential effects and proposed mitigation measures to minimize the potential adverse effects to the aquatic environment during all phases of the Project are summarized in Table E-5. An Environmental Management Plan (EMP) will be developed prior to the commencement of the Project.

Table E-5 Summary of Mitigation Measures for Aquatic Environment

Project Component	Summary of Potential Interaction	Mitigation Measures
Fish and Fish Habitat	All Project Phases (Construction, Operational, Reclamation) and Accidents, Malfunctions and Unplanned Events	
	<p>Increased potential for contaminants to be released into water and/or soil through spills of fuels and lubricants from construction equipment.</p> <p>Accidental contaminant spills may result in aquatic life injury, death and/or destruction to habitat or foraging areas.</p>	<ul style="list-style-type: none"> • No chemical or petroleum storage will occur within 30-metres of a regulated watercourse; • Equipment will be kept in good working order; and • Emergency and spill response procedures will be in place prior to Project activities as outlined in an EMP.
	<p>Ground disturbing work, including: vegetation clearing/grubbing; site preparation; and road bed enhancement; excavating; <i>etc.</i> may increase the potential for erosion and sediment release into the aquatic environment.</p> <p>Increased sedimentation may result in aquatic life injury, death and/or destruction to habitat or foraging areas.</p>	<ul style="list-style-type: none"> • Erosion and sediment control (ESC) structures will be properly installed prior to commencement of the Project. All structures will be inspected regularly to ensure that they are functioning as intended; • At the first evidence that sedimentation is starting to occur, Project work will temporarily cease. All ESC devices shall be inspected and monitored; repairs will be made such that they accomplish their intended function prior to work commencing; • On-site water may be treated in a sedimentation pond, as required, prior to discharge into the surrounding environment; • Once the Project work is complete, all exposed soil will be permanently stabilized against erosion; • Existing vegetation will be retained whenever possible; and • Grab samples will be collected to monitor that TSS does not exceed 25 mg/L above baseline conditions.

Table E-5 Summary of Mitigation Measures for Aquatic Environment

Project Component	Summary of Potential Interaction	Mitigation Measures
Fish and Fish Habitat	Construction Phase Only	
	<p>Watercourse re-alignment (the Tributary) work may increase the potential for sediment release into the water column.</p>	<ul style="list-style-type: none"> • Any fill material that is excavated from the watercourse channel or proposed re-aligned channel will be stockpiled in a manner to mitigate against re-release into the aquatic environment; • ESC structures will be installed around all areas to be excavated, as required; • A WAWA permit may be obtained prior to work conducted within 30-metres of regulated watercourses; and • Any turbid water from the de-watering operations may be routed into existing vegetation of sufficient expanse or to the sedimentation pond to reduce the level of suspended solids in Mill Creek.
	<p>In-channel work required for the re-alignment of the Tributary may disturb fish migration through the Project Site.</p>	<ul style="list-style-type: none"> • The existing Tributary channel will be maintained during the construction of the re-aligned channel to provide uninterrupted fish passage during the construction phase of the Project; • Fish rescue activities may be conducted, as required, during the channel re-alignment process; • The re-aligned Tributary channel will be constructed using industry standards for fish habitat and passage (<i>i.e.</i>, low gradients, fish gravel, re-vegetation efforts, <i>etc.</i>), as required by DFO, and • DFO will be consulted to determine appropriate in-channel work windows with regards to fish migration through the Project Site.

Table E-5 Summary of Mitigation Measures for Aquatic Environment

Project Component	Summary of Potential Interaction	Mitigation Measures
Fish and Fish Habitat	Operational Phase Only	
	<p>Excavation activities may impact surface water quality through erosion and sedimentation in the PDA.</p> <p>Vibration and noise from nearby blasting and excavation work may disrupt and/or cause physical harm to fish species within the Project Site.</p>	<ul style="list-style-type: none"> • Blasting activities for the aggregate quarry will be infrequent; • Efforts will be taken to minimize blasting events during periods of heavy precipitation or period of high winds with the potential to deposit fugitive dust in the aquatic environment; • ESC structures will be installed around all areas to be blasted and/or excavated, as required; • Blasting activities will be conducted by a certified contractor in accordance with an Approval to Operate from NBDELG; • Blasting will be conducted in accordance to the <i>DFO Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters</i>.
	<p>An accidental release from the sedimentation pond may result in an increased sediment load into the receiving watercourse.</p>	<ul style="list-style-type: none"> • The sedimentation pond will be designed using current engineering standards and practices; and • ESC structures will be installed, as required, around the sedimentation pond.

7.0 SUMMARY OF POTENTIAL SIGNIFICANT RESIDUAL EFFECTS

A significant residual effect to the aquatic environment VEC is considered to be an unauthorized or unmitigated loss of fish or habitat productivity which results in:

- Persistent or permanent degradation of surface water quality that exceeds regulatory limits beyond the background conditions;
- The alteration of fish habitat to the extent that the ecological function of the habitat is adversely impacted; and/or
- A change in the distribution or abundance of a species or community to the extent that the population is unable to re-establish within one generation.

The construction phase of the Project is expected to temporarily affect the aquatic environment within the Project Site via the re-alignment of the Tributary. Based on the short duration of the construction phase (*i.e.*, several months) and the implementation of the proposed mitigation measures, no significant effects are expected. A WAWA permit may be obtained prior to the start of any work within 30-metres of a regulated watercourse, and this permit may include approval by both NBDELG and DFO.

The operational phase of the Project is not expected to interact adversely with the aquatic environment. Although, there is an increased potential for sedimentation into the aquatic environment, an increased potential for the release of a hazardous substance into the water/soil, and the potential for vibrational effects on fish from blasting activities - appropriate mitigations will be implemented to ensure that these effects do not occur. All blasting will be conducted as per regulatory approval(s) and applicable guidelines and it is anticipated that blasting events will be infrequent.

The Project will not significantly alter the aquatic environmental conditions that are currently observed on-site, with the exception of the Tributary channel re-alignment; however, the new channel will be constructed to provide suitable fish habitat and a fish migration route. It is not expected that the Tributary channel will be re-instated to the pre-Project location during the reclamation phase of the Project. Based on the estimated 30 year life of the Project, it is expected that the re-aligned channel will be established and functioning as suitable fish habitat in 2048. The implementation of the proposed mitigation measures will minimize risks of adverse effects to the aquatic environment; therefore, Project interactions are considered to be non-significant.

8.0 REFERENCES

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ATTACHMENTS

E-1 - ACCDC Report

DATA REPORT 6203: Saint John, NB

Prepared 17 September 2018
by J. Churchill, Data Manager

CONTENTS OF REPORT

1.0 Preface

- 1.1 Data List
- 1.2 Restrictions
- 1.3 Additional Information
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2.0 Rare and Endangered Species

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- 2.2 Fauna
- Map 2: Flora and Fauna

3.0 Special Areas

- 3.1 Managed Areas
- 3.2 Significant Areas
- Map 3: Special Areas

4.0 Rare Species Lists

- 4.1 Fauna
- 4.2 Flora
- 4.3 Location Sensitive Species
- 4.4 Source Bibliography

5.0 Rare Species within 100 km

- 5.1 Source Bibliography



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
StJohnNB_6203ob.xls	All Rare and legally protected <i>Flora and Fauna</i> in your study area
StJohnNB_6203ob100km.xls	A list of Rare and legally protected <i>Flora and Fauna</i> within 100 km of your study area
StJohnNB_6203ma.xls	All <i>Managed Areas</i> in your study area
StJohnNB_6203ff.xls	Rare and common <i>Freshwater Fish</i> in your study area (DFO database)

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

Tel: (506) 364-2658

sean.blaney@accdc.ca

Animals (Fauna)

John Klymko, Zoologist

Tel: (506) 364-2660

john.klymko@accdc.ca

Plant Communities

Sarah Robinson, Community Ecologist

Tel: (506) 364-2664

sarah.robinson@accdc.ca

Data Management, GIS

James Churchill, Data Manager

Tel: (902) 679-6146

james.churchill@accdc.ca

Billing

Jean Breau

Tel: (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: Duncan Bayne
(902) 648-3536
Duncan.Bayne@novascotia.ca

Western: Sarah Spencer
(902) 634-7555
Sarah.Spencer@novascotia.ca

Central: Shavonne Meyer
(902) 893-6350
Shavonne.Meyer@novascotia.ca

Central: Kimberly George
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Eastern: Lisa Doucette
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Eastern: Terry Power
(902) 563-3370
Terrance.Power@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

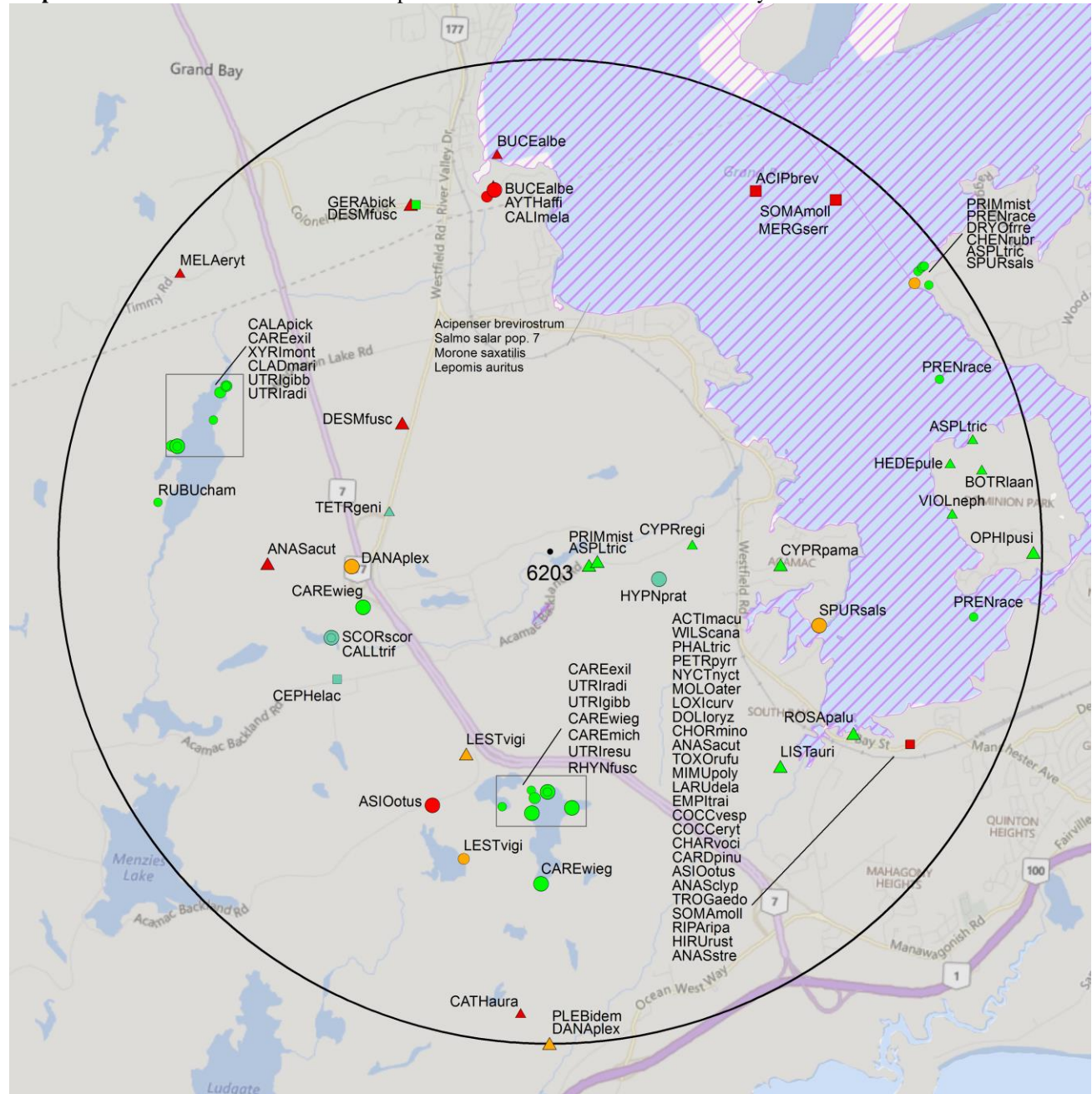
2.1 FLORA

The study area contains 45 records of 26 vascular, 5 records of 5 nonvascular flora (Map 2 and attached: *ob.xls).

2.2 FAUNA

The study area contains 67 records of 33 vertebrate, 9 records of 4 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.



- RESOLUTION**
- 4.7 within 50s of kilometers
 - 4.0 within 10s of kilometers
 - 3.7 within 5s of kilometers
 - △ 3.0 within kilometers
 - △ 2.7 within 500s of meters
 - ⊙ 2.0 within 100s of meters
 - ⊙ 1.7 within 10s of meters

- HIGHER TAXON**
- vertebrate fauna
 - invertebrate fauna
 - vascular flora
 - nonvascular flora

3.0 SPECIAL AREAS

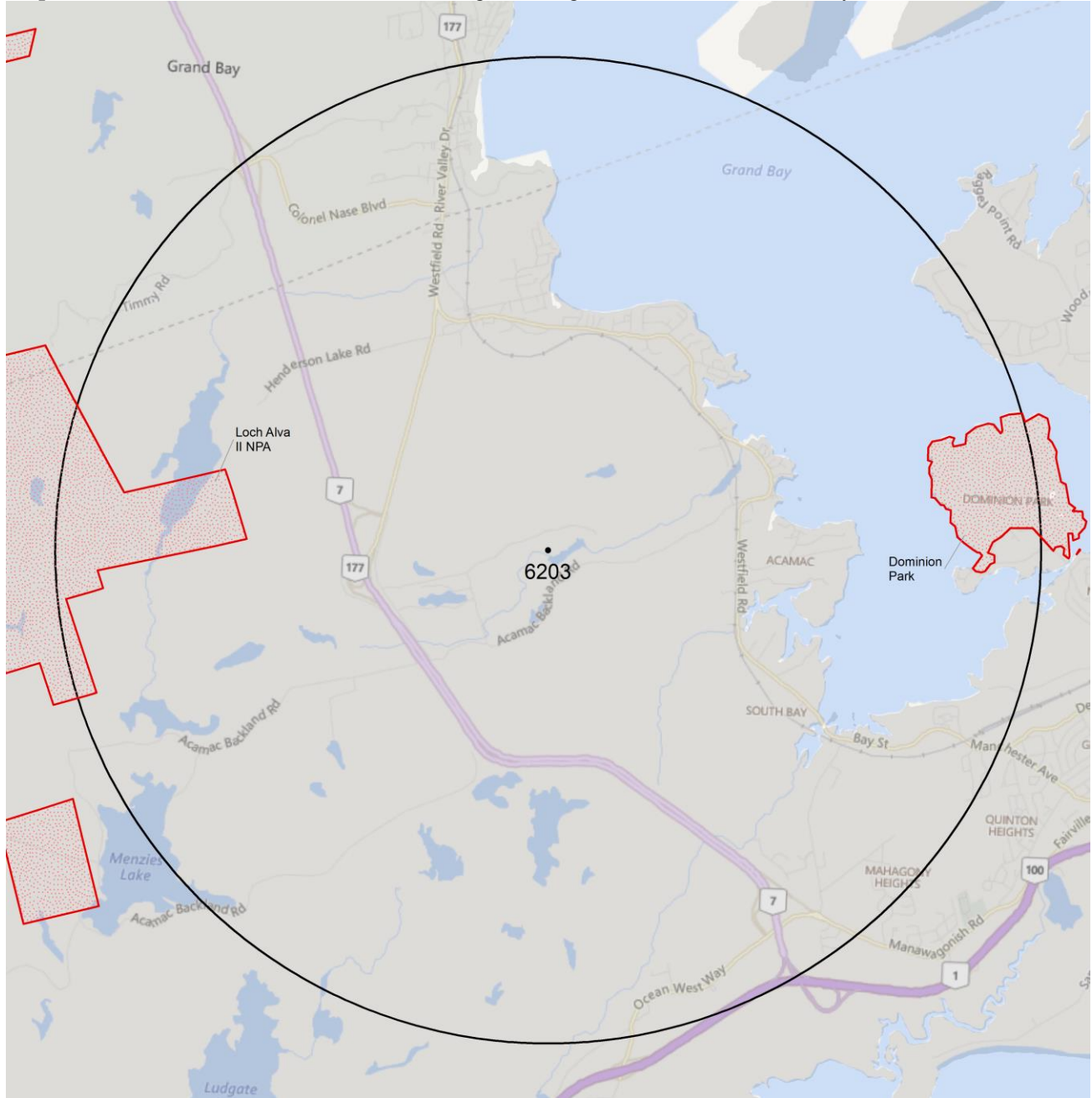
3.1 MANAGED AREAS

The GIS scan identified 2 managed areas in the vicinity of the study area (Map 3 and attached file: *ma*.xls).

3.2 SIGNIFICANT AREAS

The GIS scan identified no biologically significant sites in the vicinity of the study area (Map 3).

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



MANAGED AREAS SIGNIFIANT AREAS



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 (\pm 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	Prov GS Rank	# recs	Distance (km)
N	<i>Calliergon trifarium</i>	Three-ranked Moss				S1?	2 May Be At Risk	1	2.4 \pm 0.0
N	<i>Cephaloziella elachista</i>	Spurred Threadwort				S1S3	6 Not Assessed	1	2.5 \pm 5.0
N	<i>Hypnum pratense</i>	Meadow Plait Moss				S2	3 Sensitive	1	1.1 \pm 0.0
N	<i>Scorpidium scorpioides</i>	Hooked Scorpion Moss				S2S3	3 Sensitive	1	2.4 \pm 0.0
N	<i>Tetraphis geniculata</i>	Geniculate Four-tooth Moss				S3S4	4 Secure	1	1.7 \pm 0.0
P	<i>Chenopodium rubrum</i>	Red Pigweed				S2	3 Sensitive	1	4.7 \pm 0.0
P	<i>Hedeoma pulegioides</i>	American False Pennyroyal				S2	4 Secure	1	4.2 \pm 0.0
P	<i>Cypripedium parviflorum var. makasin</i>	Small Yellow Lady's-Slipper				S2	2 May Be At Risk	1	2.3 \pm 1.0
P	<i>Asplenium trichomanes</i>	Maidenhair Spleenwort				S2	3 Sensitive	2	4.7 \pm 0.0
P	<i>Listera auriculata</i>	Auricled Twayblade				S2S3	3 Sensitive	1	3.2 \pm 1.0
P	<i>Ophioglossum pusillum</i>	Northern Adder's-tongue				S2S3	3 Sensitive	1	4.9 \pm 1.0
P	<i>Prenanthes racemosa</i>	Glaucous Rattlesnakeroot				S3	4 Secure	3	4.3 \pm 0.0
P	<i>Geranium bicknellii</i>	Bicknell's Crane's-bill				S3	4 Secure	1	3.8 \pm 5.0
P	<i>Utricularia radiata</i>	Little Floating Bladderwort				S3	4 Secure	3	2.4 \pm 0.0
P	<i>Primula mistassinica</i>	Mistassini Primrose				S3	4 Secure	2	0.4 \pm 1.0
P	<i>Rosa palustris</i>	Swamp Rose				S3	4 Secure	1	3.6 \pm 1.0
P	<i>Viola nephrophylla</i>	Northern Bog Violet				S3	4 Secure	1	4.1 \pm 0.0
P	<i>Carex exilis</i>	Coastal Sedge				S3	4 Secure	4	2.4 \pm 0.0
P	<i>Carex michauxiana</i>	Michaux's Sedge				S3	4 Secure	1	2.5 \pm 0.0
P	<i>Carex wiegandii</i>	Wiegand's Sedge				S3	4 Secure	3	2.0 \pm 0.0
P	<i>Rhynchospora fusca</i>	Brown Beakrush				S3	4 Secure	4	2.4 \pm 0.0
P	<i>Cypripedium reginae</i>	Showy Lady's-Slipper				S3	3 Sensitive	1	1.4 \pm 0.0
P	<i>Calamagrostis pickingeringii</i>	Pickering's Reed Grass				S3	4 Secure	1	3.7 \pm 0.0
P	<i>Xyris montana</i>	Northern Yellow-Eyed-Grass				S3	4 Secure	1	3.7 \pm 0.0
P	<i>Asplenium trichomanes-ramosum</i>	Green Spleenwort				S3	4 Secure	3	0.5 \pm 1.0
P	<i>Dryopteris fragrans var. remotiuscula</i>	Fragrant Wood Fern				S3	4 Secure	2	4.7 \pm 0.0
P	<i>Botrychium lanceolatum var. angustisegmentum</i>	Lance-Leaf Grape-Fern				S3	3 Sensitive	1	4.5 \pm 0.0
P	<i>Utricularia resupinata</i>	Inverted Bladderwort				S3?	4 Secure	1	2.6 \pm 0.0
P	<i>Utricularia gibba</i>	Humped Bladderwort				S3S4	4 Secure	2	2.4 \pm 0.0
P	<i>Rubus chamaemorus</i>	Cloudberry				S3S4	4 Secure	1	4.0 \pm 0.0
P	<i>Cladium mariscoides</i>	Smooth Twigrush				S3S4	4 Secure	2	3.7 \pm 0.0

4.2 FAUNA

	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)
A	<i>Melanerpes erythrocephalus</i>	Red-headed Woodpecker	Endangered	Threatened		SNA	8 Accidental	1	4.7 \pm 0.0
A	<i>Hirundo rustica</i>	Barn Swallow	Threatened	Threatened	Threatened	S2B,S2M	3 Sensitive	3	4.1 \pm 7.0
A	<i>Riparia riparia</i>	Bank Swallow	Threatened	Threatened		S2S3B,S2S3M	3 Sensitive	2	4.1 \pm 7.0
A	<i>Wilsonia canadensis</i>	Canada Warbler	Threatened	Threatened	Threatened	S3B,S3M	1 At Risk	1	4.2 \pm 7.0
A	<i>Dolichonyx oryzivorus</i>	Bobolink	Threatened	Threatened	Threatened	S3B,S3M	3 Sensitive	2	4.2 \pm 7.0
A	<i>Acipenser brevirostrum</i>	Shortnose Sturgeon	Special Concern	Special Concern	Special Concern	S3	3 Sensitive	1	4.2 \pm 10.0
A	<i>Coccythraustes vespertinus</i>	Evening Grosbeak	Special Concern			S3B,S3S4N,SUM	3 Sensitive	1	4.2 \pm 7.0
A	<i>Chordeiles minor</i>	Common Nighthawk	Special Concern	Threatened	Threatened	S3B,S4M	1 At Risk	3	4.2 \pm 7.0
A	<i>Desmognathus fuscus</i>	Northern Dusky Salamander	Not At Risk			S3	3 Sensitive	2	2.0 \pm 1.0
A	<i>Phalaropus tricolor</i>	Wilson's Phalarope				S1B,S1M	3 Sensitive	1	4.2 \pm 7.0

	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)
A	<i>Aythya affinis</i>	Lesser Scaup				S1B,S4M	4 Secure	1	3.7 ± 0.0
A	<i>Nycticorax nycticorax</i>	Black-crowned Night-heron				S1S2B,S1S2M	3 Sensitive	1	4.2 ± 7.0
A	<i>Empidonax traillii</i>	Willow Flycatcher				S1S2B,S1S2M	3 Sensitive	1	4.2 ± 7.0
A	<i>Troglodytes aedon</i>	House Wren				S1S2B,S1S2M	5 Undetermined	2	4.1 ± 7.0
A	<i>Mimus polyglottos</i>	Northern Mockingbird				S2B,S2M	3 Sensitive	4	4.2 ± 7.0
A	<i>Toxostoma rufum</i>	Brown Thrasher				S2B,S2M	3 Sensitive	1	4.2 ± 7.0
A	<i>Anas strepera</i>	Gadwall				S2B,S3M	4 Secure	3	4.1 ± 7.0
A	<i>Asio otus</i>	Long-eared Owl				S2S3	5 Undetermined	2	2.8 ± 0.0
A	<i>Anas clypeata</i>	Northern Shoveler				S2S3B,S2S3M	4 Secure	2	4.2 ± 7.0
A	<i>Petrochelidon pyrrhonota</i>	Cliff Swallow				S2S3B,S2S3M	3 Sensitive	3	4.2 ± 7.0
A	<i>Loxia curvirostra</i>	Red Crossbill				S3	4 Secure	1	4.2 ± 7.0
A	<i>Carduelis pinus</i>	Pine Siskin				S3	4 Secure	2	4.2 ± 7.0
A	<i>Cathartes aura</i>	Turkey Vulture				S3B,S3M	4 Secure	1	4.7 ± 0.0
A	<i>Charadrius vociferus</i>	Killdeer				S3B,S3M	3 Sensitive	3	4.2 ± 7.0
A	<i>Coccyzus erythrophthalmus</i>	Black-billed Cuckoo				S3B,S3M	4 Secure	1	4.2 ± 7.0
A	<i>Molothrus ater</i>	Brown-headed Cowbird				S3B,S3M	2 May Be At Risk	1	4.2 ± 7.0
A	<i>Somateria mollissima</i>	Common Eider				S3B,S4M,S3N	4 Secure	7	4.1 ± 7.0
A	<i>Anas acuta</i>	Northern Pintail				S3B,S5M	3 Sensitive	2	2.9 ± 1.0
A	<i>Mergus serrator</i>	Red-breasted Merganser				S3B,S5M,S4S5N	4 Secure	1	4.6 ± 8.0
A	<i>Bucephala albeola</i>	Bufflehead				S3M,S2N	3 Sensitive	6	3.7 ± 0.0
A	<i>Actitis macularius</i>	Spotted Sandpiper				S3S4B,S5M	4 Secure	3	4.1 ± 7.0
A	<i>Larus delawarensis</i>	Ring-billed Gull				S3S4B,S5M	4 Secure	1	4.2 ± 7.0
A	<i>Calidris melanotos</i>	Pectoral Sandpiper				S3S4M	4 Secure	1	3.7 ± 0.0
I	<i>Danaus plexippus</i>	Monarch	Endangered	Special Concern	Special Concern	S3B,S3M	3 Sensitive	2	2.0 ± 0.0
I	<i>Plebejus idas empetri</i>	Crowberry Blue				S3	4 Secure	1	5.0 ± 1.0
I	<i>Lestes vigilax</i>	Swamp Spreadwing				S3	3 Sensitive	3	2.2 ± 1.0
I	<i>Spurwinkia salsa</i>	Saltmarsh Hydrobe				S3		3	2.8 ± 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?
<i>Chrysemys picta picta</i>	Eastern Painted Turtle			YES
<i>Chelydra serpentina</i>	Snapping Turtle	Special Concern	Special Concern	No
<i>Glyptemys insculpta</i>	Wood Turtle	Threatened	Threatened	YES
<i>Haliaeetus leucocephalus</i>	Bald Eagle		Endangered	YES
<i>Falco peregrinus pop. 1</i>	Peregrine Falcon - anatum/tundrius pop.	Special Concern	Endangered	YES
<i>Cicindela marginipennis</i>	Cobblestone Tiger Beetle	Endangered	Endangered	No
<i>Coenonympha nipsisquit</i>	Maritime Ringlet	Endangered	Endangered	No
<i>Bat Hibernaculum</i>		[Endangered] ¹	[Endangered] ¹	YES

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.

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5.0 RARE SPECIES WITHIN 100 KM

A 100 km buffer around the study area contains 34348 records of 148 vertebrate and 1214 records of 74 invertebrate fauna; 6668 records of 361 vascular, 617 records of 178 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 (\pm the precision, in km, of the record).

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)	Prov
A	<i>Myotis lucifugus</i>	Little Brown Myotis	Endangered	Endangered	Endangered	S1	1 At Risk	60	1.9 \pm 1.0	NB
A	<i>Myotis septentrionalis</i>	Northern Long-eared Myotis	Endangered	Endangered	Endangered	S1	1 At Risk	17	4.0 \pm 0.0	NB
A	<i>Perimyotis subflavus</i>	Eastern Pipistrelle	Endangered	Endangered	Endangered	S1	1 At Risk	8	4.0 \pm 0.0	NB
A	<i>Eubalaena glacialis</i>	North Atlantic Right Whale	Endangered	Endangered	Endangered	S1		7	67.9 \pm 1.0	NB
A	<i>Sterna dougallii</i>	Roseate Tern	Endangered	Endangered	Endangered	S1?B,S1?M	1 At Risk	3	53.0 \pm 0.0	NB
A	<i>Charadrius melodus melodus</i>	Piping Plover melodus ssp	Endangered	Endangered	Endangered	S1B,S1M	1 At Risk	23	6.6 \pm 0.0	NB
A	<i>Dermochelys coriacea</i> (Atlantic pop.)	Leatherback Sea Turtle - Atlantic pop.	Endangered	Endangered	Endangered	S1S2N	1 At Risk	4	11.9 \pm 0.0	NB
A	<i>Salmo salar pop. 1</i>	Atlantic Salmon - Inner Bay of Fundy pop.	Endangered	Endangered	Endangered	S2	2 May Be At Risk	53	28.5 \pm 1.0	NB
A	<i>Calidris canutus rufa</i>	Red Knot rufa ssp	Endangered		Endangered	S2M	1 At Risk	377	6.6 \pm 0.0	NB
A	<i>Rangifer tarandus pop. 2</i>	Woodland Caribou (Atlantic-Gasp [r-sie pop.]	Endangered	Endangered	Extirpated	SX	0.1 Extirpated	4	25.1 \pm 5.0	NB
A	<i>Sturnella magna</i>	Eastern Meadowlark	Threatened	Threatened	Threatened	S1B,S1M	2 May Be At Risk	45	29.3 \pm 7.0	NB
A	<i>Ixobrychus exilis</i>	Least Bittern	Threatened	Threatened	Threatened	S1S2B,S1S2M	1 At Risk	29	11.6 \pm 7.0	NB
A	<i>Hylocichla mustelina</i>	Wood Thrush	Threatened	Threatened	Threatened	S1S2B,S1S2M	2 May Be At Risk	189	6.4 \pm 7.0	NB
A	<i>Caprimulgus vociferus</i>	Whip-Poor-Will	Threatened	Threatened	Threatened	S2B,S2M	1 At Risk	86	7.8 \pm 7.0	NB
A	<i>Hirundo rustica</i>	Barn Swallow	Threatened	Threatened	Threatened	S2B,S2M	3 Sensitive	1362	4.1 \pm 7.0	NB
A	<i>Catharus bicknelli</i>	Bicknell's Thrush	Threatened	Special Concern	Threatened	S2B,S2M	1 At Risk	24	7.2 \pm 1.0	NB
A	<i>Glyptemys insculpta</i>	Wood Turtle	Threatened	Threatened	Threatened	S2S3	1 At Risk	96	0.4 \pm 10.0	NB
A	<i>Chaetura pelagica</i>	Chimney Swift	Threatened	Threatened	Threatened	S2S3B,S2M	1 At Risk	447	10.4 \pm 7.0	NB
A	<i>Riparia riparia</i>	Bank Swallow	Threatened	Threatened	Threatened	S2S3B,S2S3M	3 Sensitive	447	4.1 \pm 7.0	NB
A	<i>Acipenser oxyrinchus</i>	Atlantic Sturgeon	Threatened		Threatened	S3	4 Secure	1	44.5 \pm 1.0	NB
A	<i>Wilsonia canadensis</i>	Canada Warbler	Threatened	Threatened	Threatened	S3B,S3M	1 At Risk	868	4.2 \pm 7.0	NB
A	<i>Dolichonyx oryzivorus</i>	Bobolink	Threatened	Threatened	Threatened	S3B,S3M	3 Sensitive	1042	4.2 \pm 7.0	NB
A	<i>Anguilla rostrata</i>	American Eel	Threatened		Threatened	S4	4 Secure	40	5.5 \pm 0.0	NB
A	<i>Osmerus mordax pop. 2</i>	Lake Utopia Smelt large-bodied pop.	Threatened		Threatened			2	48.6 \pm 10.0	NB
A	<i>Coturnicops noveboracensis</i>	Yellow Rail	Special Concern	Special Concern	Special Concern	S1?B,SUM	2 May Be At Risk	3	58.5 \pm 7.0	NB
A	<i>Histrionicus histrionicus pop. 1</i>	Harlequin Duck - Eastern pop.	Special Concern	Special Concern	Endangered	S1B,S1S2N,S2M	1 At Risk	159	25.0 \pm 17.0	NB
A	<i>Falco peregrinus pop. 1</i>	Peregrine Falcon - anatum/tundrius	Special Concern	Special Concern	Endangered	S1B,S3M	1 At Risk	625	4.2 \pm 7.0	NB
A	<i>Asio flammeus</i>	Short-eared Owl	Special Concern	Special Concern	Special Concern	S2B,S2M	3 Sensitive	17	38.6 \pm 7.0	NB
A	<i>Bucephala islandica</i> (Eastern pop.)	Barrow's Goldeneye - Eastern pop.	Special Concern	Special Concern	Special Concern	S2M,S2N	3 Sensitive	56	6.9 \pm 0.0	NB
A	<i>Balaenoptera physalus</i>	Fin Whale - Atlantic pop.	Special Concern	Special Concern	Special Concern	S2S3		5	13.8 \pm 1.0	NB
A	<i>Acipenser brevirostrum</i>	Shortnose Sturgeon	Special Concern	Special Concern	Special Concern	S3	3 Sensitive	7	4.2 \pm 10.0	NB
A	<i>Chelydra serpentina</i>	Snapping Turtle	Special Concern	Special Concern	Special Concern	S3	3 Sensitive	33	26.2 \pm 0.0	NB
A	<i>Euphagus carolinus</i>	Rusty Blackbird	Special Concern	Special Concern	Special Concern	S3B,S3M	2 May Be At Risk	123	7.2 \pm 2.0	NB
A	<i>Contopus cooperi</i>	Olive-sided Flycatcher	Special Concern	Threatened	Threatened	S3B,S3M	1 At Risk	354	6.4 \pm 7.0	NB
A	<i>Coccothraustes vespertinus</i>	Evening Grosbeak	Special Concern			S3B,S3S4N,SUM	3 Sensitive	286	4.2 \pm 7.0	NB
A	<i>Chordeiles minor</i>	Common Nighthawk	Special Concern	Threatened	Threatened	S3B,S4M	1 At Risk	331	4.2 \pm 7.0	NB

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)	Prov
A	<i>Phalaropus lobatus</i>	Red-necked Phalarope	Special Concern			S3M	3 Sensitive	216	6.6 ± 0.0	NB
A	<i>Phocoena phocoena</i> (NW Atlantic pop.)	Harbour Porpoise - Northwest Atlantic pop.	Special Concern	Threatened		S4		231	10.2 ± 0.0	NB
A	<i>Contopus virens</i>	Eastern Wood-Pewee	Special Concern	Special Concern	Special Concern	S4B,S4M	4 Secure	637	6.4 ± 7.0	NB
A	<i>Podiceps auritus</i>	Horned Grebe	Special Concern		Special Concern	S4N,S4M	4 Secure	270	6.3 ± 0.0	NB
A	<i>Odobenus rosmarus rosmarus</i>	Atlantic Walrus	Special Concern		Extirpated	SX		1	77.3 ± 5.0	NS
A	<i>Hemidactylium scutatum</i>	Four-toed Salamander	Not At Risk			S1?	5 Undetermined	11	80.8 ± 0.0	NS
A	<i>Bubo scandiacus</i>	Snowy Owl	Not At Risk			S1N,S2S3M	4 Secure	30	7.5 ± 3.0	NB
A	<i>Accipiter cooperii</i>	Cooper's Hawk	Not At Risk			S1S2B,S1S2M	2 May Be At Risk	18	38.5 ± 7.0	NB
A	<i>Fulica americana</i>	American Coot	Not At Risk			S1S2B,S1S2M	3 Sensitive	8	38.8 ± 7.0	NB
A	<i>Aegolius funereus</i>	Boreal Owl	Not At Risk			S1S2B,SUM	2 May Be At Risk	5	34.6 ± 7.0	NB
A	<i>Sorex dispar</i>	Long-tailed Shrew	Not At Risk	Special Concern		S2	3 Sensitive	2	25.8 ± 1.0	NB
A	<i>Buteo lineatus</i>	Red-shouldered Hawk	Not At Risk	Special Concern		S2B,S2M	2 May Be At Risk	50	24.4 ± 1.0	NB
A	<i>Chlidonias niger</i>	Black Tern	Not At Risk			S2B,S2M	3 Sensitive	136	30.3 ± 7.0	NB
A	<i>Globicephala melas</i>	Long-finned Pilot Whale	Not At Risk			S2S3	3	13.0 ± 1.0	NB	
A	<i>Lynx canadensis</i>	Canadian Lynx	Not At Risk		Endangered	S3	1 At Risk	13	26.2 ± 1.0	NB
A	<i>Desmognathus fuscus</i>	Northern Dusky Salamander	Not At Risk			S3	3 Sensitive	58	2.0 ± 1.0	NB
A	<i>Megaptera novaeangliae</i>	Humpback Whale (NW Atlantic pop.)	Not At Risk	Special Concern		S3		4	67.9 ± 5.0	NB
A	<i>Sterna hirundo</i>	Common Tern	Not At Risk			S3B,SUM	3 Sensitive	280	5.4 ± 10.0	NB
A	<i>Podiceps grisegena</i>	Red-necked Grebe	Not At Risk			S3M,S2N	3 Sensitive	679	7.1 ± 0.0	NB
A	<i>Lagenorhynchus acutus</i>	Atlantic White-sided Dolphin	Not At Risk			S3S4		1	13.0 ± 1.0	NB
A	<i>Haliaeetus leucocephalus</i>	Bald Eagle	Not At Risk		Endangered	S4	1 At Risk	1437	4.2 ± 7.0	NB
A	<i>Canis lupus</i>	Gray Wolf	Not At Risk		Extirpated	SX	0.1 Extirpated	4	5.8 ± 1.0	NB
A	<i>Puma concolor pop. 1</i>	Eastern Cougar	Data Deficient		Endangered	SNA	5 Undetermined	82	17.9 ± 1.0	NB
A	<i>Morone saxatilis</i>	Striped Bass	E,E,SC			S3	2 May Be At Risk	10	9.5 ± 10.0	NB
A	<i>Salvelinus alpinus</i>	Arctic Char				S1	3 Sensitive	3	77.0 ± 0.0	NB
A	<i>Vireo flavifrons</i>	Yellow-throated Vireo				S1?B,S1?M	8 Accidental	16	7.2 ± 1.0	NB
A	<i>Tringa melanoleuca</i>	Greater Yellowlegs				S1?B,S5M	4 Secure	951	6.4 ± 1.0	NB
A	<i>Aythya americana</i>	Redhead				S1B,S1M	8 Accidental	4	10.4 ± 7.0	NB
A	<i>Gallinula chloropus</i>	Common Moorhen				S1B,S1M	3 Sensitive	25	12.8 ± 1.0	NB
A	<i>Grus canadensis</i>	Sandhill Crane				S1B,S1M	8 Accidental	9	30.4 ± 0.0	NB
A	<i>Bartramia longicauda</i>	Upland Sandpiper				S1B,S1M	3 Sensitive	45	34.6 ± 0.0	NB
A	<i>Phalaropus tricolor</i>	Wilson's Phalarope				S1B,S1M	3 Sensitive	58	4.2 ± 7.0	NB
A	<i>Leucophaeus atricilla</i>	Laughing Gull				S1B,S1M	3 Sensitive	83	7.2 ± 1.0	NB
A	<i>Progne subis</i>	Purple Martin				S1B,S1M	2 May Be At Risk	231	10.4 ± 7.0	NB
A	<i>Thryothorus ludovicianus</i>	Carolina Wren				S1B,S1M	8 Accidental	35	10.4 ± 7.0	NB
A	<i>Oxyura jamaicensis</i>	Ruddy Duck				S1B,S2S3M	4 Secure	52	6.3 ± 0.0	NB
A	<i>Uria aalge</i>	Common Murre				S1B,S3N,S3M	4 Secure	122	22.3 ± 15.0	NB
A	<i>Aythya affinis</i>	Lesser Scaup				S1B,S4M	4 Secure	203	3.7 ± 0.0	NB
A	<i>Aythya marila</i>	Greater Scaup				S1B,S4M,S2N	4 Secure	37	6.3 ± 0.0	NB
A	<i>Eremophila alpestris</i>	Horned Lark				S1B,S4N,S5M	2 May Be At Risk	30	6.4 ± 1.0	NB
A	<i>Sterna paradisaea</i>	Arctic Tern				S1B,SUM	2 May Be At Risk	126	27.1 ± 16.0	NB
A	<i>Fratercula arctica</i>	Atlantic Puffin				S1B,SUN,SUM	3 Sensitive	157	22.3 ± 15.0	NB
A	<i>Branta bernicla</i>	Brant				S1N,S2S3M	4 Secure	544	6.3 ± 0.0	NB
A	<i>Chroicocephalus ridibundus</i>	Black-headed Gull				S1N,S2M	3 Sensitive	42	7.2 ± 1.0	NB
A	<i>Butorides virescens</i>	Green Heron				S1S2B,S1S2M	3 Sensitive	22	11.6 ± 7.0	NB
A	<i>Nycticorax nycticorax</i>	Black-crowned Night-heron				S1S2B,S1S2M	3 Sensitive	62	4.2 ± 7.0	NB
A	<i>Empidonax traillii</i>	Willow Flycatcher				S1S2B,S1S2M	3 Sensitive	104	4.2 ± 7.0	NB
A	<i>Stelgidopteryx serripennis</i>	Northern Rough-winged Swallow				S1S2B,S1S2M	2 May Be At Risk	21	9.8 ± 7.0	NB

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)	Prov
A	<i>Troglodytes aedon</i>	House Wren				S1S2B,S1S2M	5 Undetermined	32	4.1 ± 7.0	NB
A	<i>Rissa tridactyla</i>	Black-legged Kittiwake				S1S2B,S4N,S5M	4 Secure	49	34.0 ± 7.0	NB
A	<i>Calidris bairdii</i>	Baird's Sandpiper				S1S2M	3 Sensitive	101	6.3 ± 1.0	NB
A	<i>Cistothorus palustris</i>	Marsh Wren				S2B,S2M	3 Sensitive	89	6.4 ± 7.0	NB
A	<i>Mimus polyglottos</i>	Northern Mockingbird				S2B,S2M	3 Sensitive	155	4.2 ± 7.0	NB
A	<i>Toxostoma rufum</i>	Brown Thrasher				S2B,S2M	3 Sensitive	94	4.2 ± 7.0	NB
A	<i>Pooecetes gramineus</i>	Vesper Sparrow				S2B,S2M	2 May Be At Risk	82	15.4 ± 0.0	NB
A	<i>Anas strepera</i>	Gadwall				S2B,S3M	4 Secure	122	4.1 ± 7.0	NB
A	<i>Alca torda</i>	Razorbill				S2B,S3N,S3M	4 Secure	147	22.3 ± 15.0	NB
A	<i>Pinicola enucleator</i>	Pine Grosbeak				S2B,S4S5N,S4S5M	3 Sensitive	32	37.2 ± 7.0	NB
A	<i>Tringa solitaria</i>	Solitary Sandpiper				S2B,S5M	4 Secure	258	6.3 ± 0.0	NB
A	<i>Oceanodroma leucorhoa</i>	Leach's Storm-Petrel				S2B,SUM	3 Sensitive	125	40.0 ± 0.0	NB
A	<i>Chen caerulescens</i>	Snow Goose				S2M	4 Secure	7	6.3 ± 1.0	NB
A	<i>Phalacrocorax carbo</i>	Great Cormorant				S2N,S2M	4 Secure	312	5.8 ± 3.0	NB
A	<i>Somateria spectabilis</i>	King Eider				S2N,S2M	4 Secure	56	46.0 ± 9.0	NB
A	<i>Larus hyperboreus</i>	Glaucous Gull				S2N,S2M	4 Secure	156	6.3 ± 0.0	NB
A	<i>Asio otus</i>	Long-eared Owl				S2S3	5 Undetermined	19	2.8 ± 0.0	NB
A	<i>Picoides dorsalis</i>	American Three-toed Woodpecker				S2S3	3 Sensitive	10	46.5 ± 7.0	NB
A	<i>Salmo salar</i>	Atlantic Salmon				S2S3	2 May Be At Risk	35	10.8 ± 1.0	NB
A	<i>Anas clypeata</i>	Northern Shoveler				S2S3B,S2S3M	4 Secure	96	4.2 ± 7.0	NB
A	<i>Myiarchus crinitus</i>	Great Crested Flycatcher				S2S3B,S2S3M	3 Sensitive	242	7.2 ± 4.0	NB
A	<i>Petrochelidon pyrrhonota</i>	Cliff Swallow				S2S3B,S2S3M	3 Sensitive	560	4.2 ± 7.0	NB
A	<i>Pluvialis dominica</i>	American Golden-Plover				S2S3M	3 Sensitive	265	6.4 ± 1.0	NB
A	<i>Calcarius lapponicus</i>	Lapland Longspur				S2S3N,SUM	3 Sensitive	38	6.3 ± 1.0	NB
A	<i>Cephus grylle</i>	Black Guillemot				S3	4 Secure	772	6.4 ± 1.0	NB
A	<i>Loxia curvirostra</i>	Red Crossbill				S3	4 Secure	140	4.2 ± 7.0	NB
A	<i>Carduelis pinus</i>	Pine Siskin				S3	4 Secure	310	4.2 ± 7.0	NB
A	<i>Prosopium cylindraceum</i>	Round Whitefish				S3	4 Secure	1	74.9 ± 0.0	NB
A	<i>Salvelinus namaycush</i>	Lake Trout				S3	3 Sensitive	4	11.5 ± 0.0	NB
A	<i>Sorex maritimensis</i>	Maritime Shrew				S3	4 Secure	2	81.2 ± 0.0	NS
A	<i>Eptesicus fuscus</i>	Big Brown Bat				S3	3 Sensitive	48	8.3 ± 1.0	NB
A	<i>Cathartes aura</i>	Turkey Vulture				S3B,S3M	4 Secure	296	4.7 ± 0.0	NB
A	<i>Rallus limicola</i>	Virginia Rail				S3B,S3M	3 Sensitive	119	11.9 ± 7.0	NB
A	<i>Charadrius vociferus</i>	Killdeer				S3B,S3M	3 Sensitive	816	4.2 ± 7.0	NB
A	<i>Tringa semipalmata</i>	Willet				S3B,S3M	3 Sensitive	174	6.6 ± 0.0	NB
A	<i>Coccyzus erythrophthalmus</i>	Black-billed Cuckoo				S3B,S3M	4 Secure	184	4.2 ± 7.0	NB
A	<i>Vireo gilvus</i>	Warbling Vireo				S3B,S3M	4 Secure	232	9.1 ± 7.0	NB
A	<i>Piranga olivacea</i>	Scarlet Tanager				S3B,S3M	4 Secure	130	10.4 ± 7.0	NB
A	<i>Passerina cyanea</i>	Indigo Bunting				S3B,S3M	4 Secure	110	10.1 ± 7.0	NB
A	<i>Molothrus ater</i>	Brown-headed Cowbird				S3B,S3M	2 May Be At Risk	292	4.2 ± 7.0	NB
A	<i>Icterus galbula</i>	Baltimore Oriole				S3B,S3M	4 Secure	196	5.8 ± 2.0	NB
A	<i>Somateria mollissima</i>	Common Eider				S3B,S4M,S3N	4 Secure	1930	4.1 ± 7.0	NB
A	<i>Dendroica tigrina</i>	Cape May Warbler				S3B,S4S5M	4 Secure	143	9.1 ± 7.0	NB
A	<i>Anas acuta</i>	Northern Pintail				S3B,S5M	3 Sensitive	54	2.9 ± 1.0	NB
A	<i>Mergus serrator</i>	Red-breasted Merganser				S3B,S5M,S4S5N	4 Secure	382	4.6 ± 8.0	NB
A	<i>Arenaria interpres</i>	Ruddy Turnstone				S3M	4 Secure	697	6.4 ± 1.0	NB
A	<i>Phalaropus fulicarius</i>	Red Phalarope				S3M	3 Sensitive	120	40.0 ± 0.0	NB
A	<i>Melanitta nigra</i>	Black Scoter				S3M,S1S2N	3 Sensitive	810	6.5 ± 0.0	NB
A	<i>Bucephala albeola</i>	Bufflehead				S3M,S2N	3 Sensitive	1116	3.7 ± 0.0	NB
A	<i>Calidris maritima</i>	Purple Sandpiper				S3M,S3N	4 Secure	251	6.6 ± 0.0	NB
A	<i>Uria lomvia</i>	Thick-billed Murre				S3N,S3M	5 Undetermined	67	18.5 ± 8.0	NB
A	<i>Synaptomys cooperi</i>	Southern Bog Lemming				S3S4	4 Secure	79	29.7 ± 1.0	NB

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)	Prov
A	<i>Tyrannus tyrannus</i>	Eastern Kingbird				S3S4B,S3S4M	3 Sensitive	527	7.0 ± 2.0	NB
A	<i>Actitis macularius</i>	Spotted Sandpiper				S3S4B,S5M	4 Secure	900	4.1 ± 7.0	NB
A	<i>Gallinago delicata</i>	Wilson's Snipe				S3S4B,S5M	4 Secure	683	6.6 ± 0.0	NB
A	<i>Larus delawarensis</i>	Ring-billed Gull				S3S4B,S5M	4 Secure	245	4.2 ± 7.0	NB
A	<i>Dendroica striata</i>	Blackpoll Warbler				S3S4B,S5M	4 Secure	88	11.4 ± 0.0	NB
A	<i>Pluvialis squatarola</i>	Black-bellied Plover				S3S4M	4 Secure	841	6.6 ± 0.0	NB
A	<i>Limosa haemastica</i>	Hudsonian Godwit				S3S4M	4 Secure	92	6.6 ± 0.0	NB
A	<i>Calidris pusilla</i>	Semipalmated Sandpiper				S3S4M	4 Secure	2032	5.7 ± 3.0	NB
A	<i>Calidris melanotos</i>	Pectoral Sandpiper				S3S4M	4 Secure	306	3.7 ± 0.0	NB
A	<i>Calidris alba</i>	Sanderling				S3S4M,S1N	3 Sensitive	846	6.3 ± 1.0	NB
A	<i>Morus bassanus</i>	Northern Gannet				SHB,S5M	4 Secure	829	5.7 ± 0.0	NB
A	<i>Lanius ludovicianus</i>	Loggerhead Shrike				SXB,SXM	1 At Risk	1	85.2 ± 1.0	NB
C	<i>Quercus macrocarpa</i> - <i>Acer rubrum</i> / <i>Onoclea sensibilis</i> - <i>Carex arcta</i> Forest	Bur Oak - Red Maple / Sensitive Fern - Northern Clustered Sedge Forest				S2		1	67.7 ± 0.0	
C	<i>Acer saccharinum</i> / <i>Onoclea sensibilis</i> - <i>Lysimachia terrestris</i> Forest	Silver Maple / Sensitive Fern - Swamp Yellow Loosestrife Forest				S3		1	54.9 ± 0.0	NB
C	<i>Acer saccharum</i> - <i>Fraxinus americana</i> / <i>Polystichum</i> <i>acrostichoides</i> Forest	Sugar Maple - White Ash / Christmas Fern Forest				S3S4		1	31.5 ± 0.0	NB
I	<i>Cicindela marginipennis</i>	Cobblestone Tiger Beetle	Endangered	Endangered	Endangered	S1	1 At Risk	42	71.0 ± 0.0	NB
I	<i>Gomphus ventricosus</i>	Skillet Clubtail	Endangered		Endangered	S1S2	2 May Be At Risk	48	55.8 ± 0.0	NB
I	<i>Danaus plexippus</i>	Monarch	Endangered	Special Concern	Special Concern	S3B,S3M	3 Sensitive	115	2.0 ± 0.0	NB
I	<i>Ophiogomphus howei</i>	Pygmy Snaketail	Special Concern	Special Concern	Special Concern	S2	2 May Be At Risk	14	48.8 ± 0.0	NB
I	<i>Alasmidonta varicosa</i>	Brook Floater	Special Concern		Special Concern	S2	3 Sensitive	1	86.3 ± 0.0	NB
I	<i>Lampsilis cariosa</i>	Yellow Lampmussel	Special Concern	Special Concern	Special Concern	S2	3 Sensitive	100	32.2 ± 1.0	NB
I	<i>Bombus terricola</i>	Yellow-banded Bumblebee	Special Concern		Special Concern	S3?	3 Sensitive	22	45.2 ± 0.0	NB
I	<i>Appalachina sayana</i>	Spike-lip Crater	Not At Risk			S3?		1	14.7 ± 1.0	NB
I	<i>Haematopota rara</i>	Shy Cleg				S1	5 Undetermined	1	83.7 ± 1.0	NB
I	<i>Lycaena dorcas</i>	Dorcas Copper				S1	2 May Be At Risk	1	69.6 ± 0.0	NB
I	<i>Erora laeta</i>	Early Hairstreak				S1	2 May Be At Risk	4	76.1 ± 1.0	NS
I	<i>Arigomphus furcifer</i>	Lilypad Clubtail				S1	5 Undetermined	8	62.0 ± 0.0	NB
I	<i>Polites origenes</i>	Crossline Skipper				S1?	5 Undetermined	5	49.8 ± 0.0	NB
I	<i>Plebejus saepiolus</i>	Greenish Blue				S1S2	4 Secure	3	46.4 ± 0.0	NB
I	<i>Ophiogomphus colubrinus</i>	Boreal Snaketail				S1S2	2 May Be At Risk	36	26.1 ± 1.0	NB
I	<i>Brachyleptura circumdata</i>	a Longhorned Beetle				S2		6	70.0 ± 0.0	NB
I	<i>Satyrrium calanus falacer</i>	Banded Hairstreak				S2	4 Secure	19	77.9 ± 1.0	NS
I	<i>Strymon melinus</i>	Grey Hairstreak				S2	4 Secure	6	13.9 ± 0.0	NB
I	<i>Aeshna clepsydra</i>	Mottled Darner				S2	3 Sensitive	13	10.4 ± 1.0	NB
I	<i>Somatochlora tenebrosa</i>	Clamp-Tipped Emerald				S2	5 Undetermined	7	78.2 ± 0.0	NB
I	<i>Ladona exusta</i>	White Corporal				S2	5 Undetermined	12	37.1 ± 0.0	NB
I	<i>Hetaerina americana</i>	American Rubyspot				S2	3 Sensitive	2	85.6 ± 0.0	NB
I	<i>Ischnura posita</i>	Fragile Forktail				S2	2 May Be At Risk	22	53.2 ± 0.0	NB
I	<i>Callophrys henrici</i>	Henry's Elfin				S2S3	4 Secure	15	76.1 ± 1.0	NS
I	<i>Celithemis martha</i>	Martha's Pennant				S2S3	5 Undetermined	4	5.2 ± 0.0	NB
I	<i>Sphaeroderus nitidicollis</i>	a Ground Beetle				S3	4 Secure	1	70.1 ± 0.0	NB
I	<i>Lepturoopsis biforis</i>	a Longhorned Beetle				S3		1	11.1 ± 1.0	NB

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I	<i>Orthosoma brunneum</i>	a Longhorned Beetle				S3		1	70.2 ± 5.0	NB
I	<i>Elaphrus americanus</i>	a Ground Beetle				S3	4 Secure	1	72.7 ± 0.0	NB
I	<i>Desmocerus palliatus</i>	Elderberry Borer				S3		4	11.1 ± 1.0	NB
I	<i>Agonum excavatum</i>	a Ground Beetle				S3	4 Secure	1	72.7 ± 0.0	NB
I	<i>Clivina americana</i>	a Ground Beetle				S3	4 Secure	1	72.7 ± 0.0	NB
I	<i>Olisthopus parmatus</i>	a Ground Beetle				S3	4 Secure	1	70.1 ± 0.0	NB
I	<i>Paratachys scitulus</i>	a Ground Beetle				S3	5 Undetermined	1	72.7 ± 0.0	NB
I	<i>Coccinella hieroglyphica kirbyi</i>	a Ladybird Beetle				S3	4 Secure	1	11.1 ± 1.0	NB
I	<i>Hippodamia parenthesis</i>	Parenthesis Lady Beetle				S3	4 Secure	2	11.1 ± 1.0	NB
I	<i>Stenocorus vittigera</i>	a Longhorned Beetle				S3		1	72.6 ± 0.0	NB
I	<i>Gnathacmaeops pratensis</i>	a Longhorned Beetle				S3		5	11.1 ± 1.0	NB
I	<i>Pogonocherus mixtus</i>	a Longhorned Beetle				S3		1	11.1 ± 1.0	NB
I	<i>Badister neopulchellus</i>	a Ground Beetle				S3	4 Secure	1	72.7 ± 0.0	NB
I	<i>Calathus gregarius</i>	a Ground Beetle				S3	4 Secure	1	97.0 ± 1.0	NB
I	<i>Saperda lateralis</i>	a Longhorned Beetle				S3		2	9.9 ± 0.0	NB
I	<i>Hesperia sassacus</i>	Indian Skipper				S3	4 Secure	9	76.9 ± 0.0	NB
I	<i>Euphyes bimaculata</i>	Two-spotted Skipper				S3	4 Secure	12	43.4 ± 0.0	NB
I	<i>Lycaena hyllus</i>	Bronze Copper				S3	3 Sensitive	6	15.1 ± 1.0	NB
I	<i>Satyrium acadica</i>	Acadian Hairstreak				S3	4 Secure	23	11.1 ± 1.0	NB
I	<i>Callophrys polios</i>	Hoary Elfin				S3	4 Secure	15	11.1 ± 1.0	NB
I	<i>Plebejus idas empetri</i>	Crowberry Blue				S3	4 Secure	15	5.0 ± 1.0	NB
I	<i>Speyeria aphrodite</i>	Aphrodite Fritillary				S3	4 Secure	29	5.6 ± 1.0	NB
I	<i>Boloria bellona</i>	Meadow Fritillary				S3	4 Secure	40	41.3 ± 0.0	NB
I	<i>Polygonia satyrus</i>	Satyr Comma				S3	4 Secure	14	16.6 ± 1.0	NB
I	<i>Polygonia gracilis</i>	Hoary Comma				S3	4 Secure	7	12.3 ± 7.0	NB
I	<i>Nymphalis l-album</i>	Compton Tortoiseshell				S3	4 Secure	25	9.7 ± 1.0	NB
I	<i>Gomphus vastus</i>	Cobra Clubtail				S3	3 Sensitive	58	37.7 ± 0.0	NB
I	<i>Gomphus abbreviatus</i>	Spine-crowned Clubtail				S3	4 Secure	25	12.9 ± 0.0	NB
I	<i>Gomphaeschna furcillata</i>	Harlequin Darner				S3	5 Undetermined	19	82.2 ± 1.0	NB
I	<i>Dorocordulia lepida</i>	Petite Emerald				S3	4 Secure	38	10.5 ± 0.0	NB
I	<i>Somatochlora cingulata</i>	Lake Emerald				S3	4 Secure	11	10.5 ± 0.0	NB
I	<i>Somatochlora forcipata</i>	Forcipate Emerald				S3	4 Secure	20	70.1 ± 1.0	NB
I	<i>Williamsonia fletcheri</i>	Ebony Boghaunter				S3	4 Secure	9	62.8 ± 0.0	NB
I	<i>Lestes eurinus</i>	Amber-Winged Spreadwing				S3	4 Secure	8	9.0 ± 1.0	NB
I	<i>Lestes vigilax</i>	Swamp Spreadwing				S3	3 Sensitive	38	2.2 ± 1.0	NB
I	<i>Enallagma geminatum</i>	Skimming Bluet				S3	5 Undetermined	12	12.9 ± 0.0	NB
I	<i>Enallagma signatum</i>	Orange Bluet				S3	4 Secure	16	47.4 ± 0.0	NB
I	<i>Stylurus scudderii</i>	Zebra Clubtail				S3	4 Secure	73	37.7 ± 0.0	NB
I	<i>Alasmidonta undulata</i>	Triangle Floater				S3	3 Sensitive	40	12.5 ± 1.0	NB
I	<i>Leptodea ochracea</i>	Tidewater Mucket				S3	4 Secure	60	7.2 ± 1.0	NB
I	<i>Striatura ferrea</i>	Black Striate				S3		1	83.1 ± 1.0	NB
I	<i>Neohelix albolabris</i>	Whitelip				S3		2	60.2 ± 0.0	NB
I	<i>Spurwinkia salsa</i>	Saltmarsh Hydrobe				S3		34	2.8 ± 0.0	NB
I	<i>Pantala hymenaea</i>	Spot-Winged Glider				S3B,S3M	4 Secure	5	10.0 ± 1.0	NB
I	<i>Satyrium liparops strigosum</i>	Striped Hairstreak				S3S4	4 Secure	7	77.3 ± 7.0	NB
I	<i>Cupido comyntas</i>	Eastern Tailed Blue				S3S4	4 Secure	8	20.9 ± 5.0	NB
I	<i>Coccinella transversoguttata richardsoni</i>	Transverse Lady Beetle				SH	2 May Be At Risk	2	6.6 ± 0.0	NB
N	<i>Erioderma mollissimum</i>	Graceful Felt Lichen	Endangered		Endangered	SH	2 May Be At Risk	1	93.2 ± 1.0	NB
N	<i>Erioderma</i>	Boreal Felt Lichen - Atlantic pop.	Endangered	Endangered	Endangered	SH	1 At Risk	3	72.7 ± 1.0	NB

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)	Prov
	<i>pedicellatum</i> (<i>Atlantic pop.</i>)									
N	<i>Peltigera hydrothyria</i>	Eastern Waterfan	Threatened			S1	5 Undetermined	2	93.0 ± 1.0	NB
N	<i>Anzia colpodes</i>	Black-foam Lichen	Threatened			S1S2	5 Undetermined	1	97.5 ± 1.0	NB
N	<i>Degelia plumbea</i>	BluDegelia plumbeae Felt Lichen	Special Concern	Special Concern	Special Concern	S1	2 May Be At Risk	4	71.5 ± 5.0	NB
N	<i>Pseudevernia cladonia</i>	Ghost Antler Lichen	Not At Risk			S2S3	5 Undetermined	19	20.8 ± 0.0	NB
N	<i>Bryum muehlenbeckii</i>	Muehlenbeck's Bryum Moss				S1	2 May Be At Risk	1	7.3 ± 1.0	NB
N	<i>Didymodon rigidulus</i> var. <i>gracilis</i>	a moss				S1	2 May Be At Risk	1	96.2 ± 1.0	NB
N	<i>Sphagnum macrophyllum</i>	Sphagnum				S1	2 May Be At Risk	2	9.5 ± 0.0	NB
N	<i>Syntrichia ruralis</i>	a Moss				S1	2 May Be At Risk	1	75.0 ± 0.0	NB
N	<i>Coscinodon cribrosus</i>	Sieve-Toothed Moss				S1	2 May Be At Risk	1	8.3 ± 0.0	NB
N	<i>Cladonia metacorallifera</i>	Reptilian Pixie-cup Lichen				S1	5 Undetermined	4	90.2 ± 1.0	NB
N	<i>Peltigera collina</i>	Tree Pelt Lichen				S1	2 May Be At Risk	1	80.8 ± 10.0	NB
N	<i>Peltigera malacea</i>	Veinless Pelt Lichen				S1	5 Undetermined	1	92.7 ± 1.0	NB
N	<i>Bryoria bicolor</i>	Electrified Horsehair Lichen				S1	2 May Be At Risk	1	92.7 ± 1.0	NB
N	<i>Hygrobriella laxifolia</i>	Lax Notchwort				S1?	6 Not Assessed	1	90.3 ± 1.0	NB
N	<i>Atrichum angustatum</i>	Lesser Smoothcap Moss				S1?	2 May Be At Risk	1	88.7 ± 3.0	NS
N	<i>Bartramia ithyphylla</i>	Straight-leaved Apple Moss				S1?	2 May Be At Risk	1	90.3 ± 0.0	NB
N	<i>Calliergon trifarium</i>	Three-ranked Moss				S1?	2 May Be At Risk	1	2.4 ± 0.0	NB
N	<i>Dichelyma falcatum</i>	a Moss				S1?	2 May Be At Risk	2	22.8 ± 1.0	NB
N	<i>Dicranum bonjeanii</i>	Bonjean's Broom Moss				S1?	2 May Be At Risk	1	84.1 ± 1.0	NB
N	<i>Entodon brevisetus</i>	a Moss				S1?	2 May Be At Risk	1	99.8 ± 10.0	NB
N	<i>Eurhynchium hians</i>	Light Beaked Moss				S1?	2 May Be At Risk	3	72.3 ± 0.0	NB
N	<i>Homomallium adnatum</i>	Adnate Hairy-gray Moss				S1?	2 May Be At Risk	2	99.8 ± 10.0	NB
N	<i>Plagiothecium latebricola</i>	Alder Silk Moss				S1?	2 May Be At Risk	2	8.6 ± 0.0	NB
N	<i>Racomitrium ericoides</i>	a Moss				S1?	2 May Be At Risk	1	79.0 ± 3.0	NB
N	<i>Rhytidium rugosum</i>	Wrinkle-leaved Moss				S1?	2 May Be At Risk	2	74.3 ± 0.0	NB
N	<i>Splachnum pennsylvanicum</i>	Southern Dung Moss				S1?	2 May Be At Risk	1	85.8 ± 1.0	NB
N	<i>Platylomella lescurii</i>	a Moss				S1?	5 Undetermined	1	70.9 ± 1.0	NB
N	<i>Cladopodiella francisci</i>	Holt's Notchwort				S1S2	6 Not Assessed	1	96.2 ± 1.0	NB
N	<i>Harpanthus flotovianus</i>	Great Mountain Flapwort				S1S2	6 Not Assessed	1	92.2 ± 1.0	NB
N	<i>Jungermannia obovata</i>	Egg Flapwort				S1S2	6 Not Assessed	1	19.4 ± 0.0	NB
N	<i>Pallavicinia lyellii</i>	Lyell's Ribbonwort				S1S2	6 Not Assessed	2	22.8 ± 1.0	NB
N	<i>Reboulia hemisphaerica</i>	Purple-margined Liverwort				S1S2	6 Not Assessed	1	76.4 ± 1.0	NB
N	<i>Brachythecium acuminatum</i>	Acuminate Ragged Moss				S1S2	5 Undetermined	6	64.7 ± 100.0	NB
N	<i>Bryum salinum</i>	a Moss				S1S2	2 May Be At Risk	2	31.3 ± 1.0	NB
N	<i>Campylium radicale</i>	Long-stalked Fine Wet Moss				S1S2	5 Undetermined	1	85.8 ± 1.0	NB
N	<i>Tortula obtusifolia</i>	a Moss				S1S2	2 May Be At Risk	1	52.5 ± 0.0	NB
N	<i>Distichium inclinatum</i>	Inclined Iris Moss				S1S2	2 May Be At Risk	5	96.0 ± 0.0	NB
N	<i>Ditrichum pallidum</i>	Pale Cow-hair Moss				S1S2	2 May Be At Risk	3	74.2 ± 3.0	NS
N	<i>Drummondia prorepens</i>	a Moss				S1S2	2 May Be At Risk	1	89.0 ± 0.0	NS
N	<i>Hygrohypnum bestii</i>	Best's Brook Moss				S1S2	3 Sensitive	4	81.8 ± 0.0	NB
N	<i>Sphagnum platyphyllum</i>	Flat-leaved Peat Moss				S1S2	5 Undetermined	2	92.8 ± 1.0	NB
N	<i>Timmia norvegica</i>	a moss				S1S2	2 May Be At Risk	3	60.3 ± 0.0	NB
N	<i>Timmia norvegica</i> var. <i>excurrens</i>	a moss				S1S2	2 May Be At Risk	1	96.0 ± 0.0	NB
N	<i>Tomentypnum falcifolium</i>	Sickle-leaved Golden Moss				S1S2	2 May Be At Risk	1	22.9 ± 1.0	NB

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N	<i>Tortella humilis</i>	Small Crisp Moss				S1S2	2 May Be At Risk	4	91.1 ± 0.0	NB
N	<i>Pseudotaxiphyllum distichaceum</i>	a Moss				S1S2	2 May Be At Risk	3	31.3 ± 1.0	NB
N	<i>Hamatocaulis vernicosus</i>	a Moss				S1S2	2 May Be At Risk	1	32.9 ± 100.0	NB
N	<i>Bryohaplocladium microphyllum</i>	Tiny-leaved Haplocladium Moss				S1S2	2 May Be At Risk	1	74.2 ± 3.0	NS
N	<i>Umbilicaria vellea</i>	Grizzled Rocktripe Lichen				S1S2	5 Undetermined	1	96.3 ± 1.0	NB
N	<i>Calypogeia neesiana</i>	Nees' Pouchwort				S1S3	6 Not Assessed	1	30.8 ± 1.0	NB
N	<i>Cephaloziella elachista</i>	Spurred Threadwort				S1S3	6 Not Assessed	1	2.5 ± 5.0	NB
N	<i>Porella pinnata</i>	Pinnate Scalewort				S1S3	6 Not Assessed	2	36.9 ± 1.0	NB
N	<i>Amphidium mougeotii</i>	a Moss				S2	3 Sensitive	10	76.1 ± 8.0	NB
N	<i>Anomodon viticulosus</i>	a Moss				S2	2 May Be At Risk	5	7.9 ± 1.0	NB
N	<i>Cirriphyllum piliferum</i>	Hair-pointed Moss				S2	3 Sensitive	2	76.9 ± 0.0	NB
N	<i>Cynodontium strumiferum</i>	Strumose Dogtooth Moss				S2	3 Sensitive	1	76.1 ± 8.0	NB
N	<i>Dicranella palustris</i>	Drooping-Leaved Fork Moss				S2	3 Sensitive	9	53.4 ± 100.0	NB
N	<i>Didymodon ferrugineus</i>	a moss				S2	3 Sensitive	2	29.6 ± 1.0	NB
N	<i>Anomodon tristis</i>	a Moss				S2	2 May Be At Risk	2	77.0 ± 1.0	NB
N	<i>Hypnum pratense</i>	Meadow Plait Moss				S2	3 Sensitive	1	1.1 ± 0.0	NB
N	<i>Isopterygiopsis pulchella</i>	Neat Silk Moss				S2	3 Sensitive	3	95.4 ± 0.0	NB
N	<i>Meesia triquetra</i>	Three-ranked Cold Moss				S2	2 May Be At Risk	1	64.7 ± 100.0	NB
N	<i>Physcomitrium immersum</i>	a Moss				S2	3 Sensitive	6	36.9 ± 1.0	NB
N	<i>Platydictya jungermannioides</i>	False Willow Moss				S2	3 Sensitive	3	92.4 ± 0.0	NB
N	<i>Pohlia elongata</i>	Long-necked Nodding Moss				S2	3 Sensitive	7	91.1 ± 0.0	NB
N	<i>Sphagnum centrale</i>	Central Peat Moss				S2	3 Sensitive	7	77.7 ± 5.0	NS
N	<i>Sphagnum lindbergii</i>	Lindberg's Peat Moss				S2	3 Sensitive	8	9.8 ± 1.0	NB
N	<i>Sphagnum flexuosum</i>	Flexuous Peatmoss				S2	3 Sensitive	1	98.8 ± 0.0	NB
N	<i>Tayloria serrata</i>	Serrate Trumpet Moss				S2	3 Sensitive	5	40.5 ± 1.0	NB
N	<i>Tetradontium brownianum</i>	Little Georgia				S2	3 Sensitive	3	95.6 ± 1.0	NB
N	<i>Tetraplodon mnioides</i>	Entire-leaved Nitrogen Moss				S2	3 Sensitive	3	24.8 ± 0.0	NB
N	<i>Thamnobryum alleghaniense</i>	a Moss				S2	3 Sensitive	6	60.3 ± 0.0	NB
N	<i>Tortula mucronifolia</i>	Mucronate Screw Moss				S2	3 Sensitive	1	7.5 ± 0.0	NB
N	<i>Ulotia phyllantha</i>	a Moss				S2	3 Sensitive	5	31.3 ± 1.0	NB
N	<i>Anomobryum filiforme</i>	a moss				S2	5 Undetermined	5	59.1 ± 0.0	NB
N	<i>Cladonia macrophylla</i>	Fig-leaved Lichen				S2	5 Undetermined	2	99.4 ± 1.0	NB
N	<i>Fuscopannaria leucosticta</i>	Rimmed Shingles Lichen				S2	2 May Be At Risk	28	40.8 ± 0.0	NB
N	<i>Leptogium corticola</i>	Blistered Jellyskin Lichen				S2	2 May Be At Risk	1	80.4 ± 0.0	NB
N	<i>Nephroma laevigatum</i>	Mustard Kidney Lichen				S2	2 May Be At Risk	2	80.8 ± 10.0	NB
N	<i>Andreaea rothii</i>	a Moss				S2?	3 Sensitive	2	28.6 ± 0.0	NB
N	<i>Brachythecium digastrum</i>	a Moss				S2?	3 Sensitive	2	57.3 ± 0.0	NB
N	<i>Bryum pallescens</i>	Pale Bryum Moss				S2?	5 Undetermined	2	7.7 ± 1.0	NB
N	<i>Dichelyma capillaceum</i>	Hairlike Dichelyma Moss				S2?	3 Sensitive	1	98.7 ± 4.0	NB
N	<i>Dicranum spurium</i>	Spurred Broom Moss				S2?	3 Sensitive	2	17.9 ± 0.0	NB
N	<i>Hygrohypnum montanum</i>	a Moss				S2?	3 Sensitive	2	73.6 ± 1.0	NB
N	<i>Schistostega pennata</i>	Luminous Moss				S2?	3 Sensitive	3	53.4 ± 100.0	NB
N	<i>Seligeria campylopoda</i>	a Moss				S2?	3 Sensitive	1	32.9 ± 100.0	NB
N	<i>Seligeria diversifolia</i>	a Moss				S2?	3 Sensitive	2	59.1 ± 0.0	NB
N	<i>Sphagnum</i>	a Peatmoss				S2?	3 Sensitive	2	21.0 ± 10.0	NB

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N	<i>angermanicum</i>									
N	<i>Plagiomnium rostratum</i>	Long-beaked Leafy Moss				S2?	3 Sensitive	6	60.2 ± 0.0	NB
N	<i>Ramalina pollinaria</i>	Chalky Ramalina Lichen				S2?	5 Undetermined	1	99.4 ± 1.0	NB
N	<i>Nephroma arcticum</i>	Arctic Kidney Lichen				S2?	3 Sensitive	1	93.4 ± 1.0	NB
N	<i>Bryum uliginosum</i>	a Moss				S2S3	3 Sensitive	2	30.6 ± 4.0	NB
N	<i>Buxbaumia aphylla</i>	Brown Shield Moss				S2S3	3 Sensitive	2	74.6 ± 15.0	NB
N	<i>Calliergonella cuspidata</i>	Common Large Wetland Moss				S2S3	3 Sensitive	5	7.9 ± 1.0	NB
N	<i>Campyllum polygamum</i>	a Moss				S2S3	3 Sensitive	1	93.8 ± 0.0	NB
N	<i>Palustriella falcata</i>	a Moss				S2S3	3 Sensitive	2	90.5 ± 0.0	NB
N	<i>Didymodon rigidulus</i>	Rigid Screw Moss				S2S3	3 Sensitive	9	88.4 ± 8.0	NB
N	<i>Ephemerum serratum</i>	a Moss				S2S3	3 Sensitive	2	74.7 ± 0.0	NB
N	<i>Fissidens bushii</i>	Bush's Pocket Moss				S2S3	3 Sensitive	1	88.7 ± 3.0	NS
N	<i>Orthotrichum speciosum</i>	Showy Bristle Moss				S2S3	5 Undetermined	4	60.9 ± 2.0	NB
N	<i>Pohlia prolifera</i>	Cottony Nodding Moss				S2S3	3 Sensitive	3	95.7 ± 1.0	NB
N	<i>Racomitrium fasciculare</i>	a Moss				S2S3	3 Sensitive	2	68.8 ± 0.0	NB
N	<i>Scorpidium scorpioides</i>	Hooked Scorpion Moss				S2S3	3 Sensitive	4	2.4 ± 0.0	NB
N	<i>Sphagnum subfulvum</i>	a Peatmoss				S2S3	2 May Be At Risk	3	22.9 ± 1.0	NB
N	<i>Taxiphyllum deplanatum</i>	Imbricate Yew-leaved Moss				S2S3	3 Sensitive	1	31.3 ± 1.0	NB
N	<i>Zygodon viridissimus</i>	a Moss				S2S3	2 May Be At Risk	3	70.7 ± 5.0	NB
N	<i>Schistidium agassizii</i>	Elf Bloom Moss				S2S3	3 Sensitive	4	60.9 ± 2.0	NB
N	<i>Loeskeobryum brevirostre</i>	a Moss				S2S3	3 Sensitive	8	80.3 ± 3.0	NS
N	<i>Cyrtomnium hymenophylloides</i>	Short-pointed Lantern Moss				S2S3	3 Sensitive	3	90.5 ± 0.0	NB
N	<i>Cladonia acuminata</i>	Scantly Clad Pixie Lichen				S2S3	5 Undetermined	2	93.2 ± 1.0	NB
N	<i>Cladonia ramulosa</i>	Bran Lichen				S2S3	5 Undetermined	4	97.5 ± 1.0	NB
N	<i>Parmeliopsis ambigua</i>	Green Starburst Lichen				S2S3	5 Undetermined	1	90.8 ± 1.0	NB
N	<i>Sphaerophorus globosus</i>	Northern Coral Lichen				S2S3	3 Sensitive	5	89.5 ± 1.0	NB
N	<i>Cynodontium tenellum</i>	Delicate Dogtooth Moss				S3	3 Sensitive	1	31.3 ± 1.0	NB
N	<i>Hypnum curvifolium</i>	Curved-leaved Plait Moss				S3	3 Sensitive	7	70.7 ± 5.0	NB
N	<i>Tortella fragilis</i>	Fragile Twisted Moss				S3	3 Sensitive	1	96.0 ± 0.0	NB
N	<i>Schistidium maritimum</i>	a Moss				S3	4 Secure	6	31.3 ± 1.0	NB
N	<i>Hymenostylium recurvirostre</i>	Hymenostylium Moss				S3	3 Sensitive	4	95.7 ± 1.0	NB
N	<i>Solorina saccata</i>	Woodland Owl Lichen				S3	5 Undetermined	6	90.8 ± 1.0	NB
N	<i>Normandina pulchella</i>	Rimmed Elf-ear Lichen				S3	5 Undetermined	3	92.0 ± 1.0	NB
N	<i>Cladonia farinacea</i>	Farinose Pixie Lichen				S3	5 Undetermined	2	99.4 ± 1.0	NB
N	<i>Cladonia strepsilis</i>	Olive Cladonia Lichen				S3	4 Secure	1	38.1 ± 0.0	NB
N	<i>Leptogium lichenoides</i>	Tattered Jellyskin Lichen				S3	5 Undetermined	6	96.3 ± 1.0	NB
N	<i>Nephroma bellum</i>	Naked Kidney Lichen				S3	4 Secure	2	92.5 ± 1.0	NB
N	<i>Peltigera degenii</i>	Lustrous Pelt Lichen				S3	5 Undetermined	3	93.0 ± 1.0	NB
N	<i>Leptogium laceroides</i>	Short-bearded Jellyskin Lichen				S3	3 Sensitive	1	98.5 ± 1.0	NB
N	<i>Peltigera membranacea</i>	Membranous Pelt Lichen				S3	5 Undetermined	6	90.8 ± 1.0	NB
N	<i>Cladonia carneola</i>	Crowned Pixie-cup Lichen				S3	5 Undetermined	1	99.4 ± 1.0	NB
N	<i>Cladonia deformis</i>	Lesser Sulphur-cup Lichen				S3	4 Secure	4	90.2 ± 1.0	NB
N	<i>Aulacomnium androgynum</i>	Little Groove Moss				S3?	4 Secure	7	70.7 ± 5.0	NB
N	<i>Dicranella rufescens</i>	Red Forklet Moss				S3?	5 Undetermined	3	85.0 ± 4.0	NB
N	<i>Rhytidiadelphus loreus</i>	Lanky Moss				S3?	2 May Be At Risk	2	88.8 ± 10.0	NB
N	<i>Sphagnum lescurii</i>	a Peatmoss				S3?	5 Undetermined	6	19.9 ± 0.0	NB
N	<i>Stereocaulon</i>	Coralloid Foam Lichen				S3?	5 Undetermined	1	99.4 ± 1.0	NB

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N	<i>subcoralloides</i>									
N	<i>Anomodon rugelii</i>	Rugel's Anomodon Moss				S3S4	3 Sensitive	2	88.7 ± 3.0	NS
N	<i>Barbula convoluta</i>	Lesser Bird's-claw Beard Moss				S3S4	4 Secure	1	88.4 ± 8.0	NB
N	<i>Brachythecium velutinum</i>	Velvet Ragged Moss				S3S4	4 Secure	4	69.6 ± 0.0	NB
N	<i>Dicranella cerviculata</i>	a Moss				S3S4	3 Sensitive	5	31.3 ± 1.0	NB
N	<i>Dicranum majus</i>	Greater Broom Moss				S3S4	4 Secure	9	24.8 ± 0.0	NB
N	<i>Dicranum leioneuron</i>	a Dicranum Moss				S3S4	4 Secure	1	95.9 ± 0.0	NB
N	<i>Encalypta ciliata</i>	Fringed Extinguisher Moss				S3S4	3 Sensitive	1	96.4 ± 0.0	NB
N	<i>Fissidens bryoides</i>	Lesser Pocket Moss				S3S4	4 Secure	2	29.8 ± 5.0	NB
N	<i>Heterocladium dimorphum</i>	Dimorphous Tangle Moss				S3S4	4 Secure	1	60.9 ± 2.0	NB
N	<i>Isopterygiopsis muelleriana</i>	a Moss				S3S4	4 Secure	8	69.6 ± 0.0	NB
N	<i>Myurella julacea</i>	Small Mouse-tail Moss				S3S4	4 Secure	3	76.1 ± 8.0	NB
N	<i>Physcomitrium pyriforme</i>	Pear-shaped Urn Moss				S3S4	3 Sensitive	5	71.5 ± 0.0	NB
N	<i>Pogonatum dentatum</i>	Mountain Hair Moss				S3S4	4 Secure	2	31.3 ± 1.0	NB
N	<i>Sphagnum quinquefarium</i>	Five-ranked Peat Moss				S3S4	4 Secure	1	96.1 ± 0.0	NB
N	<i>Sphagnum torreyanum</i>	a Peatmoss				S3S4	4 Secure	6	9.3 ± 0.0	NB
N	<i>Sphagnum austinii</i>	Austin's Peat Moss				S3S4	4 Secure	1	8.6 ± 1.0	NB
N	<i>Sphagnum contortum</i>	Twisted Peat Moss				S3S4	4 Secure	1	16.8 ± 0.0	NB
N	<i>Splachnum rubrum</i>	Red Collar Moss				S3S4	4 Secure	1	35.1 ± 1.0	NB
N	<i>Tetraphis geniculata</i>	Geniculate Four-tooth Moss				S3S4	4 Secure	7	1.7 ± 0.0	NB
N	<i>Tetraplodon angustatus</i>	Toothed-leaved Nitrogen Moss				S3S4	4 Secure	2	28.9 ± 0.0	NB
N	<i>Weissia controversa</i>	Green-Cushioned Weissia				S3S4	4 Secure	2	83.9 ± 0.0	NS
N	<i>Abietinella abietina</i>	Wiry Fern Moss				S3S4	4 Secure	1	96.0 ± 0.0	NB
N	<i>Trichostomum tenuirostre</i>	Acid-Soil Moss				S3S4	4 Secure	4	69.6 ± 0.0	NB
N	<i>Pannaria rubiginosa</i>	Brown-eyed Shingle Lichen				S3S4	3 Sensitive	2	95.1 ± 1.0	NB
N	<i>Ramalina thrausta</i>	Angelhair Ramalina Lichen				S3S4	5 Undetermined	7	89.5 ± 1.0	NB
N	<i>Hypogymnia vittata</i>	Slender Monk's Hood Lichen				S3S4	4 Secure	18	89.5 ± 1.0	NB
N	<i>Cladonia floerkeana</i>	Gritty British Soldiers Lichen				S3S4	4 Secure	5	38.1 ± 0.0	NB
N	<i>Hypocenomyce friesii</i>	a Lichen				S3S4	5 Undetermined	1	96.3 ± 1.0	NB
N	<i>Melanelia panniformis</i>	Shingled Camouflage Lichen				S3S4	5 Undetermined	3	92.7 ± 1.0	NB
N	<i>Nephroma parile</i>	Powdery Kidney Lichen				S3S4	4 Secure	5	40.7 ± 0.0	NB
N	<i>Protopannaria pezizoides</i>	Brown-gray Moss-shingle Lichen				S3S4	4 Secure	14	72.9 ± 0.0	NB
N	<i>Pseudocyphellaria perpetua</i>	Gilded Specklebelly Lichen				S3S4	3 Sensitive	41	77.5 ± 0.0	NB
N	<i>Pannaria conoplea</i>	Mealy-rimmed Shingle Lichen				S3S4	3 Sensitive	6	80.4 ± 0.0	NB
N	<i>Anaptychia palmulata</i>	Shaggy Fringed Lichen				S3S4	3 Sensitive	1	98.2 ± 1.0	NB
N	<i>Peltigera neopolydactyla</i>	Undulating Pelt Lichen				S3S4	5 Undetermined	5	90.8 ± 1.0	NB
N	<i>Hypocenomyce scalaris</i>	Common Clam Lichen				S3S4	5 Undetermined	1	99.4 ± 1.0	NB
N	<i>Dermatocarpon luridum</i>	Brookside Stippleback Lichen				S3S4	4 Secure	12	40.9 ± 0.0	NB
N	<i>Grimmia anodon</i>	Toothless Grimmiid Moss				SH	5 Undetermined	2	9.1 ± 10.0	NB
N	<i>Leucodon brachypus</i>	a Moss				SH	2 May Be At Risk	6	62.9 ± 100.0	NB
N	<i>Thelia hirtella</i>	a Moss				SH	2 May Be At Risk	2	64.7 ± 100.0	NB
N	<i>Cyrto-hypnum minutulum</i>	Tiny Cedar Moss				SH	2 May Be At Risk	3	95.7 ± 10.0	NB
P	<i>Juglans cinerea</i>	Butternut	Endangered	Endangered	Endangered	S1	1 At Risk	54	22.3 ± 1.0	NB
P	<i>Polemonium</i>	Van Brunt's Jacob's-ladder	Threatened	Threatened	Threatened	S1	1 At Risk	72	27.0 ± 0.0	NB

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P	<i>vanbruntiae</i> <i>Symphyotrichum anticostense</i>	Anticosti Aster	Threatened	Threatened	Endangered	S2S3	1 At Risk	4	93.4 ± 0.0	NB
P	<i>Isoetes prototypus</i>	Prototype Quillwort	Special Concern	Special Concern	Endangered	S2	1 At Risk	27	23.9 ± 0.0	NB
P	<i>Pterospora andromedea</i>	Woodland Pinedrops			Endangered	S1	1 At Risk	11	91.2 ± 0.0	NB
P	<i>Cryptotaenia canadensis</i>	Canada Honewort				S1	2 May Be At Risk	1	72.9 ± 1.0	NB
P	<i>Sanicula trifoliata</i>	Large-Fruited Sanicle				S1	2 May Be At Risk	1	40.4 ± 5.0	NB
P	<i>Antennaria parlinii</i>	a Pussytoes				S1	2 May Be At Risk	7	56.6 ± 1.0	NB
P	<i>Antennaria howellii</i>	Pussy-Toes				S1	2 May Be At Risk	4	7.3 ± 1.0	NB
P	<i>ssp. petaloidea</i>					S1	2 May Be At Risk	4	7.3 ± 1.0	NB
P	<i>Bidens discoidea</i>	Swamp Beggarticks				S1	2 May Be At Risk	3	70.0 ± 0.0	NB
P	<i>Pseudognaphalium obtusifolium</i>	Eastern Cudweed				S1	2 May Be At Risk	2	88.7 ± 0.0	NB
P	<i>Helianthus decapetalus</i>	Ten-rayed Sunflower				S1	2 May Be At Risk	13	92.2 ± 0.0	NB
P	<i>Hieracium kalmii</i>	Kalm's Hawkweed				S1	2 May Be At Risk	5	19.7 ± 1.0	NB
P	<i>Hieracium kalmii</i> var. <i>kalmii</i>	Kalm's Hawkweed				S1	2 May Be At Risk	7	20.4 ± 1.0	NB
P	<i>Hieracium paniculatum</i>	Panicled Hawkweed				S1	2 May Be At Risk	17	49.7 ± 0.0	NB
P	<i>Hieracium robinsonii</i>	Robinson's Hawkweed				S1	3 Sensitive	4	90.6 ± 0.0	NB
P	<i>Senecio pseudoarnica</i>	Seabeach Ragwort				S1	2 May Be At Risk	14	80.7 ± 0.0	NB
P	<i>Cardamine parviflora</i> var. <i>arenicola</i>	Small-flowered Bittercress				S1	2 May Be At Risk	14	32.7 ± 0.0	NB
P	<i>Cardamine concatenata</i>	Cut-leaved Toothwort				S1	2 May Be At Risk	1	90.6 ± 1.0	NB
P	<i>Draba arabisans</i>	Rock Whitlow-Grass				S1	2 May Be At Risk	22	18.5 ± 0.0	NB
P	<i>Draba breweri</i> var. <i>cana</i>	Brewer's Whitlow-grass				S1	2 May Be At Risk	10	92.7 ± 0.0	NB
P	<i>Draba glabella</i>	Rock Whitlow-Grass				S1	2 May Be At Risk	10	6.5 ± 1.0	NB
P	<i>Minuartia groenlandica</i>	Greenland Stitchwort				S1	2 May Be At Risk	4	15.3 ± 0.0	NB
P	<i>Chenopodium capitatum</i>	Strawberry-blite				S1	2 May Be At Risk	4	10.3 ± 1.0	NB
P	<i>Chenopodium simplex</i>	Maple-leaved Goosefoot				S1	2 May Be At Risk	9	78.6 ± 1.0	NB
P	<i>Callitriche terrestris</i>	Terrestrial Water-Starwort				S1	5 Undetermined	1	99.5 ± 0.0	NB
P	<i>Triadenum virginicum</i>	Virginia St John's-wort				S1	2 May Be At Risk	2	15.1 ± 0.0	NB
P	<i>Viburnum acerifolium</i>	Maple-leaved Viburnum				S1	2 May Be At Risk	10	94.2 ± 0.0	NB
P	<i>Corema conradii</i>	Broom Crowberry				S1	2 May Be At Risk	1	8.5 ± 10.0	NB
P	<i>Vaccinium boreale</i>	Northern Blueberry				S1	2 May Be At Risk	1	29.5 ± 0.0	NB
P	<i>Vaccinium corymbosum</i>	Highbush Blueberry				S1	3 Sensitive	1	79.5 ± 5.0	NB
P	<i>Chamaesyce polygonifolia</i>	Seaside Spurge				S1	2 May Be At Risk	8	76.6 ± 0.0	NB
P	<i>Desmodium glutinosum</i>	Large Tick-Trefoil				S1	2 May Be At Risk	1	96.7 ± 1.0	NB
P	<i>Lespedeza capitata</i>	Round-headed Bush-clover				S1	2 May Be At Risk	8	70.9 ± 0.0	NB
P	<i>Gentiana rubricaulis</i>	Purple-stemmed Gentian				S1	2 May Be At Risk	13	45.5 ± 0.0	NB
P	<i>Lomatogonium rotatum</i>	Marsh Felwort				S1	2 May Be At Risk	2	57.0 ± 0.0	NB
P	<i>Proserpinaca pectinata</i>	Comb-leaved Mermaidweed				S1	2 May Be At Risk	3	31.8 ± 0.0	NB
P	<i>Pycnanthemum virginianum</i>	Virginia Mountain Mint				S1	2 May Be At Risk	4	39.6 ± 0.0	NB
P	<i>Lysimachia hybrida</i>	Lowland Yellow Loosestrife				S1	2 May Be At Risk	15	90.4 ± 0.0	NB
P	<i>Lysimachia quadrifolia</i>	Whorled Yellow Loosestrife				S1	2 May Be At Risk	16	9.3 ± 1.0	NB
P	<i>Primula laurentiana</i>	Laurentian Primrose				S1	2 May Be At Risk	28	70.3 ± 2.0	NS
P	<i>Ranunculus sceleratus</i>	Cursed Buttercup				S1	2 May Be At Risk	6	6.7 ± 0.0	NB
P	<i>Crataegus jonesiae</i>	Jones' Hawthorn				S1	2 May Be At Risk	5	71.0 ± 0.0	NB

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P	<i>Galium brevipes</i>	Limestone Swamp Bedstraw				S1	2 May Be At Risk	1	68.7 ± 5.0	NB
P	<i>Saxifraga paniculata</i> <i>ssp. neogaea</i>	White Mountain Saxifrage				S1	2 May Be At Risk	24	19.0 ± 10.0	NB
P	<i>Agalinis paupercula</i> <i>var. borealis</i>	Small-flowered Agalinis				S1	2 May Be At Risk	8	28.6 ± 1.0	NB
P	<i>Agalinis tenuifolia</i>	Slender Agalinis				S1	2 May Be At Risk	6	79.7 ± 0.0	NB
P	<i>Gratiola aurea</i>	Golden Hedge-Hyssop				S1	3 Sensitive	3	10.9 ± 5.0	NB
P	<i>Pedicularis canadensis</i>	Canada Lousewort				S1	2 May Be At Risk	20	54.2 ± 0.0	NB
P	<i>Viola sagittata</i> <i>var.</i> <i>ovata</i>	Arrow-Leaved Violet				S1	2 May Be At Risk	36	73.5 ± 0.0	NS
P	<i>Alisma subcordatum</i>	Southern Water Plantain				S1	5 Undetermined	4	35.6 ± 0.0	NB
P	<i>Carex atlantica</i> <i>ssp.</i> <i>atlantica</i>	Atlantic Sedge				S1	2 May Be At Risk	1	76.9 ± 0.0	NB
P	<i>Carex backii</i>	Rocky Mountain Sedge				S1	2 May Be At Risk	6	74.4 ± 0.0	NB
P	<i>Carex cephaloidea</i>	Thin-leaved Sedge				S1	2 May Be At Risk	2	97.7 ± 0.0	NB
P	<i>Carex merritt-feraldii</i>	Merritt Fernald's Sedge				S1	2 May Be At Risk	2	72.8 ± 0.0	NB
P	<i>Carex saxatilis</i>	Russet Sedge				S1	2 May Be At Risk	13	6.7 ± 10.0	NB
P	<i>Carex scirpoidea</i>	Scirpuslike Sedge				S1	2 May Be At Risk	6	71.9 ± 0.0	NB
P	<i>Carex sterilis</i>	Sterile Sedge				S1	2 May Be At Risk	1	94.9 ± 0.0	NB
P	<i>Carex grisea</i>	Inflated Narrow-leaved Sedge				S1	2 May Be At Risk	10	44.2 ± 0.0	NB
P	<i>Cyperus diandrus</i>	Low Flatsedge				S1	2 May Be At Risk	7	79.6 ± 1.0	NB
P	<i>Cyperus lupulinus</i>	Hop Flatsedge				S1	2 May Be At Risk	6	67.3 ± 0.0	NB
P	<i>Cyperus lupulinus</i> <i>ssp.</i> <i>macilentus</i>	Hop Flatsedge				S1	2 May Be At Risk	16	66.0 ± 0.0	NB
P	<i>Eleocharis olivacea</i>	Yellow Spikerush				S1	2 May Be At Risk	4	89.2 ± 1.0	NB
P	<i>Rhynchospora</i> <i>capillacea</i>	Slender Beakrush				S1	2 May Be At Risk	3	92.9 ± 0.0	NB
P	<i>Sisyrinchium</i> <i>angustifolium</i>	Narrow-leaved Blue-eyed-grass				S1	2 May Be At Risk	11	11.0 ± 1.0	NB
P	<i>Juncus greenei</i>	Greene's Rush				S1	2 May Be At Risk	1	41.6 ± 0.0	NB
P	<i>Juncus subtilis</i>	Creeping Rush				S1	2 May Be At Risk	1	47.1 ± 5.0	NB
P	<i>Allium canadense</i>	Canada Garlic				S1	2 May Be At Risk	11	39.9 ± 0.0	NB
P	<i>Goodyera pubescens</i>	Downy Rattlesnake-Plantain				S1	2 May Be At Risk	6	85.4 ± 0.0	NB
P	<i>Malaxis brachypoda</i>	White Adder's-Mouth				S1	2 May Be At Risk	4	79.9 ± 10.0	NB
P	<i>Platanthera flava</i> <i>var.</i> <i>herbiola</i>	Pale Green Orchid				S1	2 May Be At Risk	15	54.5 ± 0.0	NB
P	<i>Platanthera</i> <i>macrophylla</i>	Large Round-Leaved Orchid				S1	2 May Be At Risk	2	73.9 ± 1.0	NB
P	<i>Spiranthes casei</i>	Case's Ladies'-Tresses				S1	2 May Be At Risk	6	91.3 ± 0.0	NB
P	<i>Bromus pubescens</i>	Hairy Wood Brome Grass				S1	5 Undetermined	6	67.6 ± 0.0	NB
P	<i>Cinna arundinacea</i>	Sweet Wood Reed Grass				S1	2 May Be At Risk	22	48.9 ± 0.0	NB
P	<i>Danthonia compressa</i>	Flattened Oat Grass				S1	2 May Be At Risk	8	75.1 ± 1.0	NB
P	<i>Dichanthelium</i> <i>dichotomum</i>	Forked Panic Grass				S1	2 May Be At Risk	19	30.7 ± 1.0	NB
P	<i>Festuca subverticillata</i>	Nodding Fescue				S1	2 May Be At Risk	1	99.4 ± 1.0	NS
P	<i>Glyceria obtusa</i>	Atlantic Manna Grass				S1	2 May Be At Risk	6	36.3 ± 0.0	NB
P	<i>Sporobolus compositus</i>	Rough Dropseed				S1	2 May Be At Risk	17	92.5 ± 0.0	NB
P	<i>Potamogeton friesii</i>	Fries' Pondweed				S1	2 May Be At Risk	6	6.9 ± 5.0	NB
P	<i>Potamogeton nodosus</i>	Long-leaved Pondweed				S1	2 May Be At Risk	4	72.7 ± 0.0	NB
P	<i>Potamogeton</i> <i>strictifolius</i>	Straight-leaved Pondweed				S1	2 May Be At Risk	2	25.6 ± 0.0	NB
P	<i>Xyris difformis</i>	Bog Yellow-eyed-grass				S1	5 Undetermined	3	14.9 ± 0.0	NB
P	<i>Asplenium ruta-muraria</i> <i>var. cryptolepis</i>	Wallrue Spleenwort				S1	2 May Be At Risk	3	18.5 ± 0.0	NB
P	<i>Cystopteris laurentiana</i>	Laurentian Bladder Fern				S1	2 May Be At Risk	1	73.9 ± 1.0	NB
P	<i>Botrychium oneidense</i>	Blunt-lobed Moonwort				S1	2 May Be At Risk	4	53.4 ± 0.0	NB
P	<i>Botrychium rugulosum</i>	Rugulose Moonwort				S1	2 May Be At Risk	1	76.6 ± 1.0	NB

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P	<i>Schizaea pusilla</i>	Little Curlygrass Fern				S1	2 May Be At Risk	27	9.0 ± 0.0	NB
P	<i>Hieracium kalmii</i> var. <i>fasciculatum</i>	Kalm's Hawkweed				S1?	5 Undetermined	6	70.3 ± 0.0	NB
P	<i>Cuscuta campestris</i>	Field Dodder				S1?	2 May Be At Risk	3	72.0 ± 10.0	NB
P	<i>Drosera rotundifolia</i> var. <i>comosa</i>	Round-leaved Sundew				S1?	5 Undetermined	5	52.8 ± 1.0	NB
P	<i>Carex laxiflora</i>	Loose-Flowered Sedge				S1?	5 Undetermined	2	76.2 ± 5.0	NS
P	<i>Wolffia columbiana</i>	Columbian Watermeal				S1?	2 May Be At Risk	5	69.3 ± 0.0	NB
P	<i>Rumex aquaticus</i> var. <i>fenestratus</i>	Western Dock				S1S2	2 May Be At Risk	1	78.8 ± 1.0	NB
P	<i>Saxifraga virginensis</i>	Early Saxifrage				S1S2	2 May Be At Risk	14	91.2 ± 0.0	NB
P	<i>Potamogeton bicupulatus</i>	Snailseed Pondweed				S1S2	2 May Be At Risk	5	26.3 ± 0.0	NB
P	<i>Selaginella rupestris</i>	Rock Spikemoss				S1S2	2 May Be At Risk	27	74.0 ± 1.0	NB
P	<i>Thelypteris simulata</i>	Bog Fern				S1S2	2 May Be At Risk	7	71.9 ± 0.0	NB
P	<i>Cuscuta cephalanthi</i>	Buttonbush Dodder				S1S3	2 May Be At Risk	2	8.1 ± 1.0	NB
P	<i>Listera australis</i>	Southern Twayblade			Endangered	S2	1 At Risk	15	82.9 ± 0.0	NB
P	<i>Osmorhiza longistylis</i>	Smooth Sweet Cicely				S2	3 Sensitive	3	73.9 ± 0.0	NB
P	<i>Sanicula odorata</i>	Clustered Sanicle				S2	2 May Be At Risk	1	98.4 ± 0.0	NB
P	<i>Pseudognaphalium macounii</i>	Macoun's Cudweed				S2	3 Sensitive	8	8.3 ± 0.0	NB
P	<i>Solidago simplex</i> var. <i>racemosa</i>	Sticky Goldenrod				S2	2 May Be At Risk	12	92.0 ± 0.0	NB
P	<i>Ionactis linariifolius</i>	Stiff Aster				S2	3 Sensitive	1	89.9 ± 0.0	NB
P	<i>Symphotrichum racemosum</i>	Small White Aster				S2	3 Sensitive	8	40.9 ± 0.0	NB
P	<i>Impatiens pallida</i>	Pale Jewelweed				S2	2 May Be At Risk	3	72.4 ± 0.0	NB
P	<i>Alnus serrulata</i>	Smooth Alder				S2	3 Sensitive	28	48.9 ± 0.0	NB
P	<i>Arabis drummondii</i>	Drummond's Rockcress				S2	3 Sensitive	20	7.4 ± 1.0	NB
P	<i>Sagina nodosa</i>	Knotted Pearlwort				S2	3 Sensitive	15	31.4 ± 1.0	NB
P	<i>Sagina nodosa</i> ssp. <i>borealis</i>	Knotted Pearlwort				S2	3 Sensitive	2	14.8 ± 0.0	NB
P	<i>Stellaria longifolia</i>	Long-leaved Starwort				S2	3 Sensitive	6	7.5 ± 10.0	NB
P	<i>Atriplex franktonii</i>	Frankton's Saltbush				S2	4 Secure	3	50.6 ± 1.0	NB
P	<i>Chenopodium rubrum</i>	Red Pigweed				S2	3 Sensitive	4	4.7 ± 0.0	NB
P	<i>Hypericum dissimulatum</i>	Disguised St John's-wort				S2	3 Sensitive	6	47.4 ± 1.0	NB
P	<i>Triosteum aurantiacum</i>	Orange-fruited Tinker's Weed				S2	3 Sensitive	6	93.1 ± 0.0	NB
P	<i>Viburnum lentago</i>	Nannyberry				S2	4 Secure	82	79.4 ± 0.0	NB
P	<i>Viburnum recognitum</i>	Northern Arrow-Wood				S2	4 Secure	138	52.8 ± 0.0	NB
P	<i>Astragalus eucosmus</i>	Elegant Milk-vetch				S2	2 May Be At Risk	10	29.7 ± 0.0	NB
P	<i>Oxytropis campestris</i> var. <i>johannensis</i>	Field Locoweed				S2	3 Sensitive	7	18.1 ± 50.0	NB
P	<i>Quercus macrocarpa</i>	Bur Oak				S2	2 May Be At Risk	48	7.4 ± 1.0	NB
P	<i>Gentiana linearis</i>	Narrow-Leaved Gentian				S2	3 Sensitive	5	85.4 ± 5.0	NB
P	<i>Myriophyllum humile</i>	Low Water Milfoil				S2	3 Sensitive	5	63.0 ± 0.0	NB
P	<i>Proserpinaca palustris</i> var. <i>crebra</i>	Marsh Mermaidweed				S2	3 Sensitive	21	38.0 ± 0.0	NB
P	<i>Hedeoma pulegioides</i>	American False Pennyroyal				S2	4 Secure	60	4.2 ± 0.0	NB
P	<i>Nuphar lutea</i> ssp. <i>rubrodisca</i>	Red-disked Yellow Pond-lily				S2	3 Sensitive	10	12.5 ± 1.0	NB
P	<i>Orobancha uniflora</i>	One-Flowered Broomrape				S2	3 Sensitive	13	20.0 ± 2.0	NB
P	<i>Polygala paucifolia</i>	Fringed Milkwort				S2	3 Sensitive	16	53.4 ± 1.0	NB
P	<i>Polygala senega</i>	Seneca Snakeroot				S2	3 Sensitive	2	97.8 ± 1.0	NB
P	<i>Polygonum amphibium</i> var. <i>emersum</i>	Water Smartweed				S2	3 Sensitive	39	33.2 ± 0.0	NB
P	<i>Polygonum careyi</i>	Carey's Smartweed				S2	3 Sensitive	15	30.0 ± 5.0	NB

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P	<i>Podostemum ceratophyllum</i>	Horn-leaved Riverweed				S2	3 Sensitive	22	44.8 ± 0.0	NB
P	<i>Anemone multifida</i>	Cut-leaved Anemone				S2	3 Sensitive	1	93.3 ± 0.0	NB
P	<i>Hepatica nobilis</i> var. <i>obtusa</i>	Round-lobed Hepatica				S2	3 Sensitive	36	45.2 ± 1.0	NB
P	<i>Ranunculus flabellaris</i>	Yellow Water Buttercup				S2	4 Secure	17	45.7 ± 0.0	NB
P	<i>Ranunculus longirostris</i>	Eastern White Water-Crowfoot				S2	5 Undetermined	5	65.3 ± 1.0	NB
P	<i>Crataegus scabrada</i>	Rough Hawthorn				S2	3 Sensitive	7	18.4 ± 0.0	NB
P	<i>Crataegus succulenta</i>	Fleshy Hawthorn				S2	3 Sensitive	1	85.8 ± 5.0	NB
P	<i>Cephalanthus occidentalis</i>	Common Buttonbush				S2	3 Sensitive	39	61.7 ± 0.0	NB
P	<i>Salix candida</i>	Sage Willow				S2	3 Sensitive	3	93.8 ± 1.0	NB
P	<i>Agalinis neoscotica</i>	Nova Scotia Agalinis				S2	3 Sensitive	31	70.8 ± 0.0	NB
P	<i>Euphrasia randii</i>	Rand's Eyebright				S2	2 May Be At Risk	23	14.7 ± 0.0	NB
P	<i>Scrophularia lanceolata</i>	Lance-leaved Figwort				S2	3 Sensitive	5	28.1 ± 5.0	NB
P	<i>Dirca palustris</i>	Eastern Leatherwood				S2	2 May Be At Risk	5	91.3 ± 0.0	NB
P	<i>Phryma leptostachya</i>	American Lopseed				S2	3 Sensitive	2	95.9 ± 1.0	NB
P	<i>Verbena urticifolia</i>	White Vervain				S2	2 May Be At Risk	12	91.3 ± 1.0	NB
P	<i>Viola novae-angliae</i>	New England Violet				S2	3 Sensitive	5	32.8 ± 0.0	NB
P	<i>Symplocarpus foetidus</i>	Eastern Skunk Cabbage				S2	3 Sensitive	91	12.7 ± 1.0	NB
P	<i>Carex comosa</i>	Bearded Sedge				S2	2 May Be At Risk	5	75.2 ± 0.0	NS
P	<i>Carex granularis</i>	Limestone Meadow Sedge				S2	3 Sensitive	8	72.8 ± 5.0	NB
P	<i>Carex gynocrates</i>	Northern Bog Sedge				S2	3 Sensitive	5	75.1 ± 1.0	NB
P	<i>Carex hirtifolia</i>	Pubescent Sedge				S2	3 Sensitive	3	47.4 ± 0.0	NB
P	<i>Carex livida</i> var. <i>radicaulis</i>	Livid Sedge				S2	3 Sensitive	1	8.3 ± 2.0	NB
P	<i>Carex plantaginea</i>	Plantain-Leaved Sedge				S2	3 Sensitive	1	94.3 ± 0.0	NB
P	<i>Carex prairea</i>	Prairie Sedge				S2	3 Sensitive	1	81.2 ± 5.0	NS
P	<i>Carex rostrata</i>	Narrow-leaved Beaked Sedge				S2	3 Sensitive	2	76.2 ± 0.0	NB
P	<i>Carex salina</i>	Saltmarsh Sedge				S2	3 Sensitive	2	6.7 ± 1.0	NB
P	<i>Carex sprengeii</i>	Longbeak Sedge				S2	3 Sensitive	3	68.5 ± 0.0	NB
P	<i>Carex tenuiflora</i>	Sparse-Flowered Sedge				S2	2 May Be At Risk	11	71.1 ± 0.0	NB
P	<i>Carex albicans</i> var. <i>emmonsii</i>	White-tinged Sedge				S2	3 Sensitive	4	17.2 ± 0.0	NB
P	<i>Cyperus squarrosus</i>	Awned Flatsedge				S2	3 Sensitive	31	37.3 ± 0.0	NB
P	<i>Eriophorum gracile</i>	Slender Cottongrass				S2	2 May Be At Risk	8	68.7 ± 0.0	NB
P	<i>Blysmus rufus</i>	Red Bulrush				S2	3 Sensitive	3	75.5 ± 0.0	NB
P	<i>Elodea nuttallii</i>	Nuttall's Waterweed				S2	3 Sensitive	8	32.1 ± 0.0	NB
P	<i>Allium tricoccum</i>	Wild Leek				S2	2 May Be At Risk	12	30.6 ± 0.0	NB
P	<i>Najas gracillima</i>	Thread-Like Naiad				S2	3 Sensitive	11	36.5 ± 0.0	NB
P	<i>Calypso bulbosa</i> var. <i>americana</i>	Calypso				S2	2 May Be At Risk	3	13.6 ± 0.0	NB
P	<i>Coeloglossum viride</i> var. <i>virescens</i>	Long-bracted Frog Orchid				S2	2 May Be At Risk	5	41.9 ± 5.0	NB
P	<i>Cypripedium parviflorum</i> var. <i>makasin</i>	Small Yellow Lady's-Slipper				S2	2 May Be At Risk	5	2.3 ± 1.0	NB
P	<i>Spiranthes lucida</i>	Shining Ladies'-Tresses				S2	3 Sensitive	13	29.4 ± 0.0	NB
P	<i>Spiranthes ochroleuca</i>	Yellow Ladies'-tresses				S2	2 May Be At Risk	10	77.3 ± 5.0	NB
P	<i>Dichanthelium linearifolium</i>	Narrow-leaved Panic Grass				S2	3 Sensitive	15	44.9 ± 0.0	NB
P	<i>Elymus canadensis</i>	Canada Wild Rye				S2	2 May Be At Risk	13	70.7 ± 1.0	NB
P	<i>Leersia virginica</i>	White Cut Grass				S2	2 May Be At Risk	42	45.5 ± 0.0	NB
P	<i>Piptatherum canadense</i>	Canada Rice Grass				S2	3 Sensitive	5	49.7 ± 0.0	NB

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P	<i>Poa glauca</i>	Glaucous Blue Grass				S2	4 Secure	16	8.3 ± 2.0	NB
P	<i>Puccinellia phryganodes</i>	Creeping Alkali Grass				S2	3 Sensitive	15	27.1 ± 0.0	NB
P	<i>Schizachyrium scoparium</i>	Little Bluestem				S2	3 Sensitive	42	31.8 ± 0.0	NB
P	<i>Zizania aquatica</i> var. <i>aquatica</i>	Indian Wild Rice				S2	5 Undetermined	5	48.8 ± 0.0	NB
P	<i>Potamogeton vaseyi</i>	Vasey's Pondweed				S2	3 Sensitive	4	6.9 ± 1.0	NB
P	<i>Asplenium trichomanes</i>	Maidenhair Spleenwort				S2	3 Sensitive	17	4.7 ± 0.0	NB
P	<i>Woodwardia virginica</i>	Virginia Chain Fern				S2	3 Sensitive	14	75.3 ± 1.0	NB
P	<i>Woodsia alpina</i>	Alpine Cliff Fern				S2	3 Sensitive	8	19.0 ± 0.0	NB
P	<i>Selaginella selaginoides</i>	Low Spikemoss				S2	3 Sensitive	12	8.3 ± 6.0	NB
P	<i>Toxicodendron radicans</i>	Poison Ivy				S2?	3 Sensitive	15	31.0 ± 0.0	NB
P	<i>Symphotrichum novi-belgii</i> var. <i>crenifolium</i>	New York Aster				S2?	5 Undetermined	8	9.3 ± 0.0	NB
P	<i>Humulus lupulus</i> var. <i>lupuloides</i>	Common Hop				S2?	3 Sensitive	4	80.7 ± 0.0	NB
P	<i>Rubus recurvicaulis</i>	Arching Dewberry				S2?	4 Secure	5	17.9 ± 5.0	NB
P	<i>Galium obtusum</i>	Blunt-leaved Bedstraw				S2?	4 Secure	4	49.0 ± 1.0	NB
P	<i>Salix myricoides</i>	Bayberry Willow				S2?	3 Sensitive	8	72.8 ± 0.0	NB
P	<i>Carex vacillans</i>	Estuarine Sedge				S2?	3 Sensitive	4	63.8 ± 1.0	NB
P	<i>Platanthera huronensis</i>	Fragrant Green Orchid				S2?	5 Undetermined	2	88.5 ± 0.0	NB
P	<i>Solidago altissima</i>	Tall Goldenrod				S2S3	4 Secure	6	29.0 ± 1.0	NB
P	<i>Barbarea orthoceras</i>	American Yellow Rocket				S2S3	3 Sensitive	2	78.8 ± 10.0	NB
P	<i>Ceratophyllum echinatum</i>	Prickly Hornwort				S2S3	3 Sensitive	16	28.4 ± 0.0	NB
P	<i>Callitriche hermaphroditica</i>	Northern Water-starwort				S2S3	4 Secure	10	34.4 ± 1.0	NB
P	<i>Lonicera oblongifolia</i>	Swamp Fly Honeysuckle				S2S3	3 Sensitive	16	11.1 ± 6.0	NB
P	<i>Elatine americana</i>	American Waterwort				S2S3	3 Sensitive	8	10.0 ± 1.0	NB
P	<i>Bartonia paniculata</i>	Branched Bartonia				S2S3	3 Sensitive	5	15.3 ± 0.0	NB
P	<i>Bartonia paniculata</i> ssp. <i>iodandra</i>	Branched Bartonia				S2S3	3 Sensitive	36	8.8 ± 0.0	NB
P	<i>Geranium robertianum</i>	Herb Robert				S2S3	4 Secure	28	8.4 ± 1.0	NB
P	<i>Myriophyllum quitense</i>	Andean Water Milfoil				S2S3	4 Secure	71	6.3 ± 0.0	NB
P	<i>Epilobium coloratum</i>	Purple-veined Willowherb				S2S3	3 Sensitive	7	10.2 ± 1.0	NB
P	<i>Rumex pallidus</i>	Seabeach Dock				S2S3	3 Sensitive	6	13.0 ± 0.0	NB
P	<i>Rubus pensilvanicus</i>	Pennsylvania Blackberry				S2S3	4 Secure	15	14.7 ± 0.0	NB
P	<i>Galium labradoricum</i>	Labrador Bedstraw				S2S3	3 Sensitive	7	52.5 ± 1.0	NB
P	<i>Valeriana uliginosa</i>	Swamp Valerian				S2S3	3 Sensitive	1	86.8 ± 1.0	NB
P	<i>Carex adusta</i>	Lesser Brown Sedge				S2S3	4 Secure	7	5.9 ± 1.0	NB
P	<i>Corallorhiza maculata</i> var. <i>occidentalis</i>	Spotted Coralroot				S2S3	3 Sensitive	4	72.8 ± 0.0	NB
P	<i>Corallorhiza maculata</i> var. <i>maculata</i>	Spotted Coralroot				S2S3	3 Sensitive	3	83.0 ± 1.0	NB
P	<i>Listera auriculata</i>	Auricled Twayblade				S2S3	3 Sensitive	9	3.2 ± 1.0	NB
P	<i>Spiranthes cernua</i>	Nodding Ladies'-Tresses				S2S3	3 Sensitive	22	41.5 ± 0.0	NB
P	<i>Eragrostis pectinacea</i>	Tufted Love Grass				S2S3	4 Secure	14	47.5 ± 1.0	NB
P	<i>Stuckenia filiformis</i> ssp. <i>alpina</i>	Thread-leaved Pondweed				S2S3	3 Sensitive	7	8.3 ± 0.0	NB
P	<i>Potamogeton praelongus</i>	White-stemmed Pondweed				S2S3	4 Secure	12	8.3 ± 1.0	NB
P	<i>Isoetes acadensis</i>	Acadian Quillwort				S2S3	3 Sensitive	9	39.7 ± 0.0	NB
P	<i>Ophioglossum pusillum</i>	Northern Adder's-tongue				S2S3	3 Sensitive	9	4.9 ± 1.0	NB
P	<i>Botrychium</i>	Swamp Moonwort				S2S3	3 Sensitive	1	88.7 ± 0.0	NB

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P	<i>tenebrosus</i>									
P	<i>Panax trifolius</i>	Dwarf Ginseng				S3	3 Sensitive	15	17.2 ± 0.0	NB
P	<i>Artemisia campestris</i>	Field Wormwood				S3	4 Secure	25	67.6 ± 0.0	NB
P	<i>Artemisia campestris ssp. caudata</i>	Field Wormwood				S3	4 Secure	78	62.2 ± 0.0	NB
P	<i>Erigeron hyssopifolius</i>	Hyssop-leaved Fleabane				S3	4 Secure	53	13.3 ± 0.0	NB
P	<i>Prenanthes racemosa</i>	Glaucous Rattlesnakeroot				S3	4 Secure	67	4.3 ± 0.0	NB
P	<i>Tanacetum bipinnatum ssp. huronense</i>	Lake Huron Tansy				S3	4 Secure	20	15.3 ± 1.0	NB
P	<i>Symphotrichum boreale</i>	Boreal Aster				S3	3 Sensitive	11	29.3 ± 0.0	NB
P	<i>Betula pumila</i>	Bog Birch				S3	4 Secure	21	60.2 ± 1.0	NB
P	<i>Arabis glabra</i>	Tower Mustard				S3	5 Undetermined	1	81.5 ± 0.0	NB
P	<i>Arabis hirsuta var. pycnocarpa</i>	Western Hairy Rockcress				S3	4 Secure	18	7.4 ± 0.0	NB
P	<i>Cardamine maxima</i>	Large Toothwort				S3	4 Secure	29	10.4 ± 0.0	NB
P	<i>Subularia aquatica var. americana</i>	Water Awlwort				S3	4 Secure	14	27.2 ± 0.0	NB
P	<i>Lobelia cardinalis</i>	Cardinal Flower				S3	4 Secure	357	47.9 ± 0.0	NB
P	<i>Stellaria humifusa</i>	Saltmarsh Starwort				S3	4 Secure	7	6.2 ± 0.0	NB
P	<i>Hudsonia tomentosa</i>	Woolly Beach-heath				S3	4 Secure	3	17.7 ± 0.0	NB
P	<i>Cornus amomum ssp. obliqua</i>	Pale Dogwood				S3	3 Sensitive	194	31.1 ± 0.0	NB
P	<i>Crassula aquatica</i>	Water Pygmyweed				S3	4 Secure	10	46.8 ± 0.0	NB
P	<i>Rhodiola rosea</i>	Roseroot				S3	4 Secure	58	8.0 ± 5.0	NB
P	<i>Penthorum sedoides</i>	Ditch Stonecrop				S3	4 Secure	69	38.0 ± 0.0	NB
P	<i>Elatine minima</i>	Small Waterwort				S3	4 Secure	29	13.3 ± 5.0	NB
P	<i>Astragalus alpinus var. brunetianus</i>	Alpine Milk-Vetch				S3	4 Secure	3	92.0 ± 0.0	NB
P	<i>Hedysarum alpinum</i>	Alpine Sweet-vetch				S3	4 Secure	2	30.0 ± 0.0	NB
P	<i>Gentianella amarella ssp. acuta</i>	Northern Gentian				S3	4 Secure	6	7.0 ± 0.0	NB
P	<i>Geranium bicknellii</i>	Bicknell's Crane's-bill				S3	4 Secure	8	3.8 ± 5.0	NB
P	<i>Myriophyllum farwellii</i>	Farwell's Water Milfoil				S3	4 Secure	23	13.3 ± 0.0	NB
P	<i>Myriophyllum heterophyllum</i>	Variable-leaved Water Milfoil				S3	4 Secure	51	13.4 ± 0.0	NB
P	<i>Myriophyllum verticillatum</i>	Whorled Water Milfoil				S3	4 Secure	21	13.1 ± 1.0	NB
P	<i>Stachys tenuifolia</i>	Smooth Hedge-Nettle				S3	3 Sensitive	12	31.4 ± 0.0	NB
P	<i>Teucrium canadense</i>	Canada Germander				S3	3 Sensitive	5	75.8 ± 1.0	NS
P	<i>Utricularia radiata</i>	Little Floating Bladderwort				S3	4 Secure	38	2.4 ± 0.0	NB
P	<i>Nuphar lutea ssp. pumila</i>	Small Yellow Pond-lily				S3	4 Secure	15	8.3 ± 0.0	NB
P	<i>Epilobium hornemannii</i>	Hornemann's Willowherb				S3	4 Secure	6	24.8 ± 0.0	NB
P	<i>Epilobium hornemannii ssp. hornemannii</i>	Hornemann's Willowherb				S3	4 Secure	1	92.9 ± 0.0	NB
P	<i>Epilobium strictum</i>	Downy Willowherb				S3	4 Secure	24	9.2 ± 5.0	NB
P	<i>Polygala sanguinea</i>	Blood Milkwort				S3	3 Sensitive	15	56.3 ± 0.0	NB
P	<i>Polygonum arifolium</i>	Halberd-leaved Tearthumb				S3	4 Secure	20	45.8 ± 0.0	NB
P	<i>Polygonum punctatum</i>	Dotted Smartweed				S3	4 Secure	2	70.5 ± 0.0	NB
P	<i>Polygonum punctatum var. confertiflorum</i>	Dotted Smartweed				S3	4 Secure	15	69.2 ± 2.0	NB
P	<i>Polygonum scandens</i>	Climbing False Buckwheat				S3	4 Secure	34	31.1 ± 0.0	NB
P	<i>Littorella uniflora</i>	American Shoreweed				S3	4 Secure	20	23.4 ± 0.0	NB
P	<i>Primula mistassinica</i>	Mistassini Primrose				S3	4 Secure	12	0.4 ± 1.0	NB
P	<i>Pyrola minor</i>	Lesser Pyrola				S3	4 Secure	4	27.9 ± 0.0	NB
P	<i>Clematis occidentalis</i>	Purple Clematis				S3	4 Secure	24	10.0 ± 5.0	NB

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)	Prov
P	<i>Ranunculus gmelinii</i>	Gmelin's Water Buttercup				S3	4 Secure	8	48.8 ± 0.0	NB
P	<i>Thalictrum venulosum</i>	Northern Meadow-rue				S3	4 Secure	77	16.1 ± 5.0	NB
P	<i>Amelanchier canadensis</i>	Canada Serviceberry				S3	4 Secure	16	19.1 ± 1.0	NB
P	<i>Rosa palustris</i>	Swamp Rose				S3	4 Secure	35	3.6 ± 1.0	NB
P	<i>Rubus occidentalis</i>	Black Raspberry				S3	4 Secure	19	50.3 ± 0.0	NB
P	<i>Sanguisorba canadensis</i>	Canada Burnet				S3	4 Secure	2	99.1 ± 0.0	NB
P	<i>Galium boreale</i>	Northern Bedstraw				S3	4 Secure	9	22.3 ± 1.0	NB
P	<i>Salix interior</i>	Sandbar Willow				S3	4 Secure	27	62.0 ± 0.0	NB
P	<i>Salix nigra</i>	Black Willow				S3	3 Sensitive	124	6.8 ± 1.0	NB
P	<i>Salix pedicellaris</i>	Bog Willow				S3	4 Secure	47	15.1 ± 1.0	NB
P	<i>Comandra umbellata</i>	Bastard's Toadflax				S3	4 Secure	1	75.1 ± 10.0	NB
P	<i>Parnassia glauca</i>	Fen Grass-of-Parnassus				S3	4 Secure	1	90.0 ± 10.0	NB
P	<i>Limosella australis</i>	Southern Mudwort				S3	4 Secure	10	79.2 ± 0.0	NB
P	<i>Veronica serpyllifolia ssp. humifusa</i>	Thyme-Leaved Speedwell				S3	4 Secure	4	83.9 ± 100.0	NB
P	<i>Boehmeria cylindrica</i>	Small-spike False-nettle				S3	3 Sensitive	129	48.4 ± 0.0	NB
P	<i>Pilea pumila</i>	Dwarf Clearweed				S3	4 Secure	30	40.7 ± 0.0	NB
P	<i>Viola adunca</i>	Hooked Violet				S3	4 Secure	8	64.9 ± 1.0	NB
P	<i>Viola nephrophylla</i>	Northern Bog Violet				S3	4 Secure	8	4.1 ± 0.0	NB
P	<i>Carex arcta</i>	Northern Clustered Sedge				S3	4 Secure	50	48.5 ± 0.0	NB
P	<i>Carex atratiformis</i>	Scabrous Black Sedge				S3	4 Secure	1	8.3 ± 0.0	NB
P	<i>Carex capillaris</i>	Hairlike Sedge				S3	4 Secure	10	8.3 ± 2.0	NB
P	<i>Carex chordorrhiza</i>	Creeping Sedge				S3	4 Secure	20	36.4 ± 1.0	NB
P	<i>Carex conoidea</i>	Field Sedge				S3	4 Secure	30	6.9 ± 1.0	NB
P	<i>Carex eburnea</i>	Bristle-leaved Sedge				S3	4 Secure	10	90.7 ± 0.0	NB
P	<i>Carex exilis</i>	Coastal Sedge				S3	4 Secure	86	2.4 ± 0.0	NB
P	<i>Carex garberi</i>	Garber's Sedge				S3	3 Sensitive	2	29.2 ± 0.0	NB
P	<i>Carex haydenii</i>	Hayden's Sedge				S3	4 Secure	40	9.2 ± 1.0	NB
P	<i>Carex lupulina</i>	Hop Sedge				S3	4 Secure	110	30.8 ± 0.0	NB
P	<i>Carex michauxiana</i>	Michaux's Sedge				S3	4 Secure	62	2.5 ± 0.0	NB
P	<i>Carex ormostachya</i>	Necklace Spike Sedge				S3	4 Secure	7	60.5 ± 1.0	NB
P	<i>Carex rosea</i>	Rosy Sedge				S3	4 Secure	23	29.1 ± 0.0	NB
P	<i>Carex tenera</i>	Tender Sedge				S3	4 Secure	48	30.5 ± 0.0	NB
P	<i>Carex tuckermanii</i>	Tuckerman's Sedge				S3	4 Secure	70	30.8 ± 0.0	NB
P	<i>Carex vaginata</i>	Sheathed Sedge				S3	3 Sensitive	9	80.9 ± 0.0	NB
P	<i>Carex wiegandii</i>	Wiegand's Sedge				S3	4 Secure	38	2.0 ± 0.0	NB
P	<i>Carex recta</i>	Estuary Sedge				S3	4 Secure	9	11.6 ± 0.0	NB
P	<i>Cyperus dentatus</i>	Toothed Flatsedge				S3	4 Secure	146	14.3 ± 0.0	NB
P	<i>Cyperus esculentus</i>	Perennial Yellow Nutsedge				S3	4 Secure	42	40.5 ± 0.0	NB
P	<i>Eleocharis intermedia</i>	Matted Spikerush				S3	4 Secure	3	87.1 ± 0.0	NB
P	<i>Eleocharis quinqueflora</i>	Few-flowered Spikerush				S3	4 Secure	4	16.9 ± 0.0	NB
P	<i>Rhynchospora capitellata</i>	Small-headed Beakrush				S3	4 Secure	8	46.0 ± 0.0	NB
P	<i>Rhynchospora fusca</i>	Brown Beakrush				S3	4 Secure	36	2.4 ± 0.0	NB
P	<i>Trichophorum clintonii</i>	Clinton's Clubrush				S3	4 Secure	30	13.3 ± 0.0	NB
P	<i>Schoenoplectus fluviatilis</i>	River Bulrush				S3	3 Sensitive	58	11.8 ± 0.0	NB
P	<i>Schoenoplectus torreyi</i>	Torrey's Bulrush				S3	4 Secure	31	5.7 ± 0.0	NB
P	<i>Lemna trisulca</i>	Star Duckweed				S3	4 Secure	22	19.7 ± 1.0	NB
P	<i>Triantha glutinosa</i>	Sticky False-Asphodel				S3	4 Secure	8	29.2 ± 0.0	NB
P	<i>Cypripedium reginae</i>	Showy Lady's-Slipper				S3	3 Sensitive	20	1.4 ± 0.0	NB
P	<i>Liparis loeselii</i>	Loesel's Twayblade				S3	4 Secure	16	5.3 ± 0.0	NB
P	<i>Platanthera blephariglottis</i>	White Fringed Orchid				S3	4 Secure	52	79.0 ± 0.0	NB

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)	Prov
P	<i>Platanthera grandiflora</i>	Large Purple Fringed Orchid				S3	3 Sensitive	31	6.3 ± 1.0	NB
P	<i>Bromus latiglumis</i>	Broad-Grumed Brome				S3	3 Sensitive	2	47.5 ± 0.0	NB
P	<i>Calamagrostis pickeringii</i>	Pickering's Reed Grass				S3	4 Secure	105	3.7 ± 0.0	NB
P	<i>Dichanthelium depauperatum</i>	Starved Panic Grass				S3	4 Secure	27	46.9 ± 0.0	NB
P	<i>Muhlenbergia richardsonii</i>	Mat Muhly				S3	4 Secure	9	92.2 ± 0.0	NB
P	<i>Heteranthera dubia</i>	Water Stargrass				S3	4 Secure	59	7.6 ± 0.0	NB
P	<i>Potamogeton obtusifolius</i>	Blunt-leaved Pondweed				S3	4 Secure	16	15.6 ± 0.0	NB
P	<i>Potamogeton richardsonii</i>	Richardson's Pondweed				S3	3 Sensitive	16	8.3 ± 1.0	NB
P	<i>Xyris montana</i>	Northern Yellow-Eyed-Grass				S3	4 Secure	27	3.7 ± 0.0	NB
P	<i>Zannichellia palustris</i>	Horned Pondweed				S3	4 Secure	5	6.1 ± 0.0	NB
P	<i>Adiantum pedatum</i>	Northern Maidenhair Fern				S3	4 Secure	7	7.3 ± 1.0	NB
P	<i>Cryptogramma stelleri</i>	Steller's Rockbrake				S3	4 Secure	2	27.4 ± 1.0	NB
P	<i>Asplenium trichomanes-ramosum</i>	Green Spleenwort				S3	4 Secure	18	0.5 ± 1.0	NB
P	<i>Dryopteris fragrans</i> var. <i>remotiuscula</i>	Fragrant Wood Fern				S3	4 Secure	25	4.7 ± 0.0	NB
P	<i>Dryopteris goldiana</i>	Goldie's Woodfern				S3	3 Sensitive	5	95.5 ± 5.0	NB
P	<i>Woodsia glabella</i>	Smooth Cliff Fern				S3	4 Secure	40	37.6 ± 1.0	NB
P	<i>Equisetum palustre</i>	Marsh Horsetail				S3	4 Secure	6	74.5 ± 10.0	NB
P	<i>Isoetes tuckermanii</i>	Tuckerman's Quillwort				S3	4 Secure	28	22.3 ± 0.0	NB
P	<i>Lycopodium sabinifolium</i>	Ground-Fir				S3	4 Secure	11	6.4 ± 1.0	NB
P	<i>Huperzia appalachiana</i>	Appalachian Fir-Clubmoss				S3	3 Sensitive	16	9.2 ± 1.0	NB
P	<i>Botrychium dissectum</i>	Cut-leaved Moonwort				S3	4 Secure	26	7.1 ± 0.0	NB
P	<i>Botrychium lanceolatum</i> var. <i>angustisegmentum</i>	Lance-Leaf Grape-Fern				S3	3 Sensitive	7	4.5 ± 0.0	NB
P	<i>Botrychium simplex</i>	Least Moonwort				S3	4 Secure	9	71.8 ± 0.0	NB
P	<i>Polypodium appalachianum</i>	Appalachian Polypody				S3	4 Secure	15	7.5 ± 1.0	NB
P	<i>Utricularia resupinata</i>	Inverted Bladderwort				S3?	4 Secure	19	2.6 ± 0.0	NB
P	<i>Crataegus submollis</i>	Quebec Hawthorn				S3?	3 Sensitive	18	7.3 ± 1.0	NB
P	<i>Mertensia maritima</i>	Sea Lungwort				S3S4	4 Secure	29	9.9 ± 2.0	NB
P	<i>Lobelia kalmii</i>	Brook Lobelia				S3S4	4 Secure	18	10.3 ± 1.0	NB
P	<i>Suaeda calceoliformis</i>	Horned Sea-blite				S3S4	4 Secure	6	7.9 ± 1.0	NB
P	<i>Myriophyllum sibiricum</i>	Siberian Water Milfoil				S3S4	4 Secure	29	6.1 ± 0.0	NB
P	<i>Stachys pilosa</i>	Hairy Hedge-Nettle				S3S4	5 Undetermined	5	52.7 ± 1.0	NB
P	<i>Utricularia gibba</i>	Humped Bladderwort				S3S4	4 Secure	32	2.4 ± 0.0	NB
P	<i>Rumex maritimus</i>	Sea-Side Dock				S3S4	4 Secure	1	70.6 ± 1.0	NB
P	<i>Potentilla arguta</i>	Tall Cinquefoil				S3S4	4 Secure	32	29.2 ± 0.0	NB
P	<i>Rubus chamaemorus</i>	Cloudberry				S3S4	4 Secure	56	4.0 ± 0.0	NB
P	<i>Geocaulon lividum</i>	Northern Comandra				S3S4	4 Secure	9	8.7 ± 0.0	NB
P	<i>Juniperus horizontalis</i>	Creeping Juniper				S3S4	4 Secure	23	6.9 ± 1.0	NB
P	<i>Cladium mariscoides</i>	Smooth Twigrush				S3S4	4 Secure	40	3.7 ± 0.0	NB
P	<i>Eriophorum russeolum</i>	Russet Cottongrass				S3S4	4 Secure	5	6.4 ± 1.0	NB
P	<i>Triglochin gaspensis</i>	Gasp Arrowgrass				S3S4	4 Secure	18	6.8 ± 1.0	NB
P	<i>Spirodela polyrrhiza</i>	Great Duckweed				S3S4	4 Secure	36	38.7 ± 0.0	NB
P	<i>Corallorhiza maculata</i>	Spotted Coralroot				S3S4	3 Sensitive	15	9.2 ± 1.0	NB
P	<i>Calamagrostis stricta</i>	Slim-stemmed Reed Grass				S3S4	4 Secure	4	7.3 ± 2.0	NB
P	<i>Distichlis spicata</i>	Salt Grass				S3S4	4 Secure	3	78.4 ± 0.0	NB
P	<i>Potamogeton oakesianus</i>	Oakes' Pondweed				S3S4	4 Secure	49	5.1 ± 0.0	NB

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)	Prov
P	<i>Montia fontana</i>	Water Blinks				SH	2 May Be At Risk	1	54.0 ± 1.0	NB
P	<i>Solidago caesia</i>	Blue-stemmed Goldenrod				SX	0.1 Extirpated	2	10.3 ± 1.0	NB
P	<i>Celastrus scandens</i>	Climbing Bittersweet				SX	0.1 Extirpated	2	89.7 ± 100.0	NB
P	<i>Carex swanii</i>	Swan's Sedge				SX	0.1 Extirpated	59	74.6 ± 0.0	NS

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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.

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55	Newell, R.E. 2005. E.C. Smith Digital Herbarium. E.C. Smith Herbarium, Irving Biodiversity Collection, Acadia University, Web site: http://luxor.acadiau.ca/library/Herbarium/project/ . 582 recs.
52	Klymko, J.J.D. 2016. 2015 field data. Atlantic Canada Conservation Data Centre.
49	McAlpine, D.F. 1998. NBM Science Collections: Wood Turtle records. New Brunswick Museum, Saint John NB, 329 recs.
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42	Blaney, C.S.; Spicer, C.D. 2001. Fieldwork 2001. Atlantic Canada Conservation Data Centre. Sackville NB, 981 recs.
41	Blaney, C.S.; Mazerolle, D.M. 2010. Fieldwork 2010. Atlantic Canada Conservation Data Centre. Sackville NB, 15508 recs.
41	Blaney, C.S.; Mazerolle, D.M.; Belliveau, A.B. 2013. Atlantic Canada Conservation Data Centre Fieldwork 2013. Atlantic Canada Conservation Data Centre, 9000+ recs.
36	Cowie, F. 2007. Electrofishing Population Estimates 1979-98. Canadian Rivers Institute, 2698 recs.
36	Spicer, C.D. 2002. Fieldwork 2002. Atlantic Canada Conservation Data Centre. Sackville NB, 211 recs.
35	Blaney, C.S.; Spicer, C.D.; Mazerolle, D.M. 2005. Fieldwork 2005. Atlantic Canada Conservation Data Centre. Sackville NB, 2333 recs.
35	Kennedy, Joseph. 2010. New Brunswick Peregrine records, 2009. New Brunswick Dept Natural Resources, 19 recs (14 active).
33	Mills, E. Connell Herbarium Specimens, 1957-2009. University New Brunswick, Fredericton. 2012.
32	Benjamin, L.K. (compiler). 2012. Significant Habitat & Species Database. Nova Scotia Dept Natural Resources, 4965 recs.
30	Hinds, H.R. 1999. Connell Herbarium Database. University New Brunswick, Fredericton, 131 recs.
28	Klymko, J.J.D. 2012. Maritimes Butterfly Atlas, 2010 and 2011 records. Atlantic Canada Conservation Data Centre, 6318 recs.
28	Wissink, R. 2006. Fundy National Park Digital Database. Parks Canada, 41 recs.
27	Haughian, S.R. 2018. Description of <i>Fuscopannaria leucosticta</i> field work in 2017 . New Brunswick Museum, 314 recs.
26	Benedict, B. Connell Herbarium Specimens, Digital photos. University New Brunswick, Fredericton. 2005.
26	Klymko, J.J.D.; Robinson, S.L. 2014. 2013 field data. Atlantic Canada Conservation Data Centre.
26	Layberry, R.A. & Hall, P.W., LaFontaine, J.D. 1998. The Butterflies of Canada. University of Toronto Press. 280 pp+plates.
26	Pike, E., Tingley, S. & Christie, D.S. 2000. Nature NB Listserve. University of New Brunswick, listserv.unb.ca/archives/naturenb. 68 recs.
26	Tingley, S. (compiler). 2001. Butterflies of New Brunswick. , Web site: www.geocities.com/Yosemite/8425/buttrfly . 142 recs.
25	Munro, Marian K. Nova Scotia Provincial Museum of Natural History Herbarium Database. Nova Scotia Provincial Museum of Natural History, Halifax, Nova Scotia. 2013.
23	Doucet, D.A. 2008. Fieldwork 2008: Odonata. ACCDC Staff, 625 recs.
23	Speers, L. 2001. Butterflies of Canada database. Agriculture & Agri-Food Canada, Biological Resources Program, Ottawa, 190 recs.
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21	Benjamin, L.K. (compiler). 2007. Significant Habitat & Species Database. Nova Scotia Dept Natural Resources, 8439 recs.
20	Pronych, G. & Wilson, A. 1993. Atlas of Rare Vascular Plants in Nova Scotia. Nova Scotia Museum, Halifax NS, I:1-168, II:169-331. 1446 recs.
19	Klymko, J.J.D. 2016. 2014 field data. Atlantic Canada Conservation Data Centre.
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15	Clayden, S.R. 2005. Confidential supplement to Status Report on Ghost Antler Lichen (<i>Pseudevernia cladonia</i>). Committee on the Status of Endangered Wildlife in Canada, 27 recs.
15	Scott, F.W. 2002. Nova Scotia Herpetofauna Atlas Database. Acadia University, Wolfville NS, 8856 recs.
14	Spicer, C.D. 2001. Powerline Corridor Botanical Surveys, Charlotte & Saint John Counties. A M E C International, 1269 recs.
13	Benedict, B. Connell Herbarium Specimens. University New Brunswick, Fredericton. 2000.
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13	Downes, C. 1998-2000. Breeding Bird Survey Data. Canadian Wildlife Service, Ottawa, 111 recs.
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11	Webster, R.P. 2004. Lepidopteran Records for National Wildlife Areas in New Brunswick. Webster, 1101 recs.
10	Belliveau, A.G. 2014. Plant Records from Southern and Central Nova Scotia. Atlantic Canada Conservation Data Centre, 919 recs.
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10	Kennedy, Joseph. 2010. New Brunswick Peregrine records, 2010. New Brunswick Dept Natural Resources, 16 recs (11 active).
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10	Wissink, R. 2000. Rare Plants of Fundy: maps. Parks Canada, 20 recs.

# recs	CITATION
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8	Basquill, S.P. 2003. Fieldwork 2003. Atlantic Canada Conservation Data Centre, Sackville NB, 69 recs.
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7	Christie, D.S. 2000. Christmas Bird Count Data, 1997-2000. Nature NB, 54 recs.
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7	Hinds, H.R. 1992. Rare Vascular Plants of Fundy National Park. , 10 recs.
7	McAlpine, D.F. 1983. Status & Conservation of Solution Caves in New Brunswick. New Brunswick Museum, Publications in Natural Science, no. 1, 28pp.
6	Bateman, M.C. 2000. Waterfowl Brood Surveys Database, 1990-2000 . Canadian Wildlife Service, Sackville, unpublished data. 149 recs.
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6	Litvak, M.K. 2001. Shortnose Sturgeon records in four NB rivers. UNB Saint John NB. Pers. comm. to K. Bredin, 6 recs.
6	Munro, Marian K. Nova Scotia Provincial Museum of Natural History Herbarium Database. Nova Scotia Provincial Museum of Natural History, Halifax, Nova Scotia. 2014.
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5	McNeil, J.A. 2016. Blandings Turtle (<i>Emydoidea blandingii</i>), Eastern Ribbonsnake (<i>Thamnophis sauritus</i>), Wood Turtle (<i>Glyptemys insculpta</i>), and Snapping Turtle (<i>Chelydra serpentina</i>) sightings, 2016. Mersey Tobeatic Research Institute, 774 records.
5	Parker, M.S.R. 2011. Hampton Wind Farm 2010: significant floral/fauna observations. , 13 recs.
4	Bredin, K.A. 2001. WTF Project: Freshwater Mussel Fieldwork in Freshwater Species data. Atlantic Canada Conservation Data Centre, 101 recs.
4	Clayden, S.R. 2003. NS lichen ranks, locations. Pers. comm to C.S. Blaney. 1p, 5 recs, 5 recs.
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4	Hicklin, P.W. 1999. The Maritime Shorebird Survey Newsletter. Calidris, No. 7. 6 recs.
4	Layberry, R.A. 2012. Lepidopteran records for the Maritimes, 1974-2008. Layberry Collection, 1060 recs.
4	Marx, M. & Kenney, R.D. 2001. North Atlantic Right Whale Database. University of Rhode Island, 4 recs.
3	Adams, J. & Herman, T.B. 1998. Thesis, Unpublished map of <i>C. insculpta</i> sightings. Acadia University, Wolfville NS, 88 recs.
3	Bishop, G. 2012. Field data from September 2012 Anticosti Aster collection trip. , 135 rec.
3	Bishop, G., Bagnell, B.A. 2004. Site Assessment of Musquash Harbour, Nature Conservancy of Canada Property - Preliminary Botanical Survey. B&B Botanical, 12pp.
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3	Lautenschlager, R.A. 2005. Survey for Species at Risk on the Canadian Forest Service's Acadia Research Forest near Fredericton, New Brunswick. Atlantic Canada Conservation Data Centre, 6. 3 recs.
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2	Amirault, D.L. & Stewart, J. 2007. Piping Plover Database 1894-2006. Canadian Wildlife Service, Sackville, 3344 recs, 1228 new.
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2	Brunelle, P.-M. 2009. NS Power odonata records for Mersey, Tusket & Sissiboo systems. Nova Scotia Power, 218 recs.
2	Cameron, R.P. 2009. Cyanolichen database. Nova Scotia Environment & Labour, 1724 recs.
2	Catling, P.M. 1981. Taxonomy of autumn-flowering <i>Spiranthes</i> species of southern Nova Scotia in Can. J. Bot. , 59:1250-1273. 30 recs.
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2	Goltz, J.P. 2002. Botany Ramblings: 1 July to 30 September, 2002. N.B. Naturalist, 29 (3):84-92. 7 recs.
2	Hill, N.M. 1994. Status report on the Long's bulrush <i>Scirpus longii</i> in Canada. Committee on the Status of Endangered Wildlife in Canada, 7 recs.
2	Hinds, H.R. 1999. A Vascular Plant Survey of the Musquash Estuary in New Brunswick. , 12pp.
2	Proulx, V.D. 2002. Selaginella rupestris sight record at Centreville, Nova Scotia. Virginia D. Proulx collection, 2 recs.
2	Walker, E.M. 1942. Additions to the List of Odonates of the Maritime Provinces. Proc. Nova Scotian Inst. Sci., 20. 4: 159-176. 2 recs.
1	Amirault, D.L. 1997-2000. Unpublished files. Canadian Wildlife Service, Sackville, 470 recs.
1	Belliveau, A. 2013. Rare species records from Nova Scotia. Mersey Tobeatic Research Institute, 296 records. 296 recs.
1	Benedict, B. 2006. Argus annotation: <i>Salix pedicellaris</i> . Pers. comm to C.S. Blaney, June 21, 1 rec.
1	Benedict, B. <i>Agalinis neoscotica</i> specimen from Grand Manan. 2009.
1	Benjamin, L.K. 2009. Boreal Felt Lichen, Mountain Avens, Orchid and other recent records. Nova Scotia Dept Natural Resources, 105 recs.

# recs	CITATION
1	Benjamin, L.K. 2012. NSDNR fieldwork & consultant reports 2008-2012. Nova Scotia Dept Natural Resources, 196 recs.
1	Bredin, K.A. 2000. NB & NS Bog Project, fieldwork. Atlantic Canada Conservation Data Centre, Sackville, 1 rec.
1	Brunelle, P.-M. 2005. Wood Turtle observations. Pers. comm. to S.H. Gerriets, 21 Sep. 3 recs, 3 recs.
1	Brunton, D. F. & McIntosh, K. L. <i>Agalinis neoscotica</i> herbarium record from D. F. Brunton Herbarium. D.F. Brunton Herbarium, Ottawa. 2005.
1	Cameron, R.P. 2009. <i>Erioderma pedicellatum</i> database, 1979-2008. Dept Environment & Labour, 103 recs.
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1	Crowell, M.J. Plant specimens from Nictaux, NS sent to Sean Blaney for identification. Jacques Whitford Limited. 2005.
1	Dadswell, M.J. 1979. Status Report on Shortnose Sturgeon (<i>Acipenser brevirostrum</i>) in Canada. Committee on the Status of Endangered Wildlife in Canada, 15 pp.
1	Daury, R.W. & Bateman, M.C. 1996. The Barrow's Goldeneye (<i>Bucephala islandica</i>) in the Atlantic Provinces and Maine. Canadian Wildlife Service, Sackville, 47pp.
1	Dept of Fisheries & Oceans. 1999. Status of Wild Striped Bass, & Interaction between Wild & Cultured Striped Bass in the Maritime Provinces. , Science Stock Status Report D3-22. 13 recs.
1	Edsall, J. 1993. Summer 1993 Report. New Brunswick Bird Info Line, 2 recs.
1	Elderkin M.F. 2007. <i>Selaginella rupestris</i> , <i>Iris prismatica</i> & <i>Lophiola aurea</i> records in NS. NS Dept of Natural Resources, Wildlife Div. Pers. comm. to C.S. Blaney, 3 recs.
1	Hicklin, P.W. 1990. Shorebird Concentration Sites (unpubl. data). Canadian Wildlife Service, Sackville, 296 sites, 30 spp.
1	Hill, N. 2014. 2014 Monarch email report, Bridgetown, NS. Fern Hill Institute for Plant Conservation.
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1	Holder, M. & Kingsley, A.L. 2000. Peatland Insects in NB & NS: Results of surveys in 10 bogs during summer 2000. Atlantic Canada Conservation Data Centre, Sackville, 118 recs.
1	Jessop, B. 2004. <i>Acipenser oxyrinchus</i> locations. Dept of Fisheries & Oceans, Atlantic Region, Pers. comm. to K. Bredin. 1 rec.
1	Jolicoeur, G. 2008. <i>Anticosti Aster</i> at Chapel Bar, St John River. QC DOE? Pers. comm. to D.M. Mazerolle, 1 rec.
1	Klymko, J.J.D.; Robinson, S.L. 2012. 2012 field data. Atlantic Canada Conservation Data Centre, 447 recs.
1	LaFlamme, C. 2008. Discovery of <i>Goodyera pubescens</i> at Springdale, NB. Amec Earth and Environmental. Pers. comm. to D.M. Mazerolle, 1 rec.
1	LaPaix, R.W.; Crowell, M.J.; MacDonald, M. 2011. Stantec rare plant records, 2010-11. Stantec Consulting, 334 recs.
1	Maass, W.S.G. & Yetman, D. 2002. Assessment and status report on the boreal felt lichen (<i>Erioderma pedicellatum</i>) in Canada. Committee on the Status of Endangered Wildlife in Canada, 1 rec.
1	MacKinnon, D.S. 2013. Email report of Peregrine Falcon nest E of St. Martins NB. NS Department of Environment and Labour, 1 record.
1	Majka, C. 2009. Université de Moncton Insect Collection: Carabidae, Cerambycidae, Coccinellidae. Université de Moncton, 540 recs.
1	McAlpine, D.F. & Collingwood, L. 1989. Rare Salamander Survey in Fundy National Park. Fundy National Park, Internal Documents, 1 rec.
1	McAlpine, D.F. & Cox, S.L., McCabe, D.A., Schnare, J.-L. 2004. Occurrence of the Long-tailed Shrew (<i>Sorex dispar</i>) in the Nerepis Hills NB. Northeastern Naturalist, vol 11 (4) 383-386. 1 rec.
1	McAlpine, D.F. 1983. Species Record Cards. Fundy National Park, Library, 1 rec.
1	Neily, T.H. & Pepper, C.; Toms, B. 2013. Nova Scotia lichen location database. Mersey Tobeatic Research Institute, 1301 records.
1	Neily, T.H. & Pepper, C.; Toms, B. 2018. Nova Scotia lichen database [as of 2018-03]. Mersey Tobeatic Research Institute.
1	Newell, R. & Neily, T.; Toms, B.; Proulx, G. et al. 2011. NCC Properties Fieldwork in NS: August-September 2010. Nature Conservancy Canada, 106 recs.
1	Oldham, M.J. 2000. Oldham database records from Maritime provinces. Oldham, M.J; ONHIC, 487 recs.
1	Poirier, Nelson. 2012. <i>Geranium robertianum</i> record for NB. Pers. comm. to S. Blaney, Sep. 6, 1 rec.
1	Porter, C.J.M. 2014. Field work data 2007-2014. Nova Scotia Nature Trust, 96 recs.
1	Powell, B.C. 1967. Female sexual cycles of <i>Chrysemy spicta</i> & <i>Clemmys insculpta</i> in Nova Scotia. Can. Field-Nat., 81:134-139. 26 recs.
1	Sabine, D.L. & Goltz, J.P. 2006. Discovery of <i>Utricularia resupinata</i> at Little Otter Lake, CFB Gagetown. Pers. comm. to D.M. Mazerolle, 1 rec.
1	Sabine, D.L. 2004. Specimen data: Whittaker Lake & Marysville NB. Pers. comm. to C.S. Blaney, 2pp, 4 recs.
1	Sabine, D.L. 2012. Bronze Copper records, 2003-06. New Brunswick Dept of Natural Resources, 5 recs.
1	Sabine, D.L. 2013. Dwaine Sabine butterfly records, 2009 and earlier.
1	Smith, M. 2013. Email to Sean Blaney regarding <i>Schizaea pusilla</i> at Caribou Plain Bog, Fundy NP. pers. comm., 1 rec.
1	Taylor, Eric B. 1997. Status of the Sympatric Smelt (genus <i>Osmerus</i>) Populations of Lake Utopia, New Brunswick. Committee on the Status of Endangered Wildlife in Canada, 1 rec.
1	Toner, M. 2001. Lynx Records 1973-2000. NB Dept of Natural Resources, 29 recs.
1	Toner, M. 2005. <i>Listera australis</i> population at Bull Pasture Plains. NB Dept of Natural Resources. Pers. comm. to S. Blaney, 8 recs.
1	Toner, M. 2009. Wood Turtle Sightings. NB Dept of Natural Resources. Pers. comm. to S. Gerriets, Jul 13 & Sep 2, 2 recs.
1	Toner, M. 2011. Wood Turtle sighting. NB Dept of Natural Resources. Pers. com. to S. Gerriets, Sep 2, photo, 1 rec.
1	Torenvliet, Ed. 2010. Wood Turtle roadkill. NB Dept of Transport. Pers. com. to R. Lautenschlager, Aug. 20, photos, 1 rec.
1	Tummer, Kevin. 2016. Email communication (April 30, 2016) to John Klymko regarding Snapping Turtle observation in Nova Scotia. Pers. Comm.
1	Webster, R.P. & Edsall, J. 2007. 2005 New Brunswick Rare Butterfly Survey. Environmental Trust Fund, unpublished report, 232 recs.
1	Wissink, R. 2000. Four-toed Salamander Survey results, 2000. Fundy National Park, Internal Documents, 1 rec.



E-2 - Site Photos



Photo 1: View of Mill Creek at southern Project Site boundary (September 20, 2018).



Photo 2: View of the Tributary in the northwestern portion of the Project Site (October 26, 2018).



Photo 3: View of the Tributary crossing under Yellow Gate Road (Old Quarry Road; September 20, 2018).



Photo 4: View of Mill Creek flowing through the open water wetland (September 25, 2018).



Photo 5: View of the beaver dam creating water impoundment of the open water wetland and Mill Creek (September 25, 2018).



Photo 6: View of the beaver dam and the historic man-made dam at the outlet of the open water wetland and Mill Creek (September 25, 2018).



Photo 7: View of Mill Creek, downstream of wetland and dam (October 26, 2018).



Photo 8: View of Mill Creek, downstream of wetland and dam (October 26, 2018).



Photo 9: View of the Pond (previous clay extraction pit; September 20, 2018).



Photo 10: View of drainage channel with beaver influence (September 25, 2018).



E-3 - Stream Habitat Assessment Forms

**DNR&E / DFO - NEW BRUNSWICK
STREAM HABITAT INVENTORY**

River: Mill Creek + Tributary to
Delaney Lake

Start Point: 45.269662°, -66.172517°

End Point: 45.268067°, -66.190948°

Drainage Code: -

Personnel: Jennifer Hachey & Jenna McCoy

Date: October 26, 2018

GIS Map No.: -

Drainage Name: -

****Right and Left are looking DOWNSTREAM****

REACH NO.	UNIT NO.	STREAM TYPE	CHANNEL TYPE	LENGTH (m)	AVG WIDTH (m)		SUBSTRATE (%)							AVG DEPTH WET WIDTH (cm)	0 - 50% UNDERCUT BANK		0 - 50% OVERHANGING VEGETATION		LARGE WOODY DEMRIS IN STREAM (m)	FLOWS				EMBEDDEDNESS (CRITERIA) 1: <20% 2: 20%-35% 3: 35%-50% 4: >50%	COMMENTS	CHECKLIST OF LANDUSE ATTRIBUTES (COMMENTS)																			
					WET	BANK CHANNEL	BED-ROCK	BOULDER	ROCK	RUBBLE	GRAVEL	SAND	FINES		L	R	L	R		TYPE	FLOWS (cm/s)	TIME	TEMP (°C)																						
																	W	A																											
1	1	8, 21	1	-	6.2	6.2	-	5	40	30	20	5	-	21	-	-	1	1	4	-	-	-	2.83	-	2	40	1. ACTIVE BEAVER DAM 2. INACTIVE BEAVER DAM 3. WOODY DEBRIS (OBSTRUCTION) 4. MAN-MADE DAM OBSTRUCTION 5. ROCK DAM (SWIMMING POOL) 6. BRAIDED STREAM CHANNELS 7. OBSTRUCTION IN STREAM 8. ROAD FORD POLLUTION CAUSED BY: 9. FOOD PROCESSING INDUSTRY 10. FOREST INDUSTRY 11. CAMPSITE OR RESIDENTIAL 12. MINING 13. LITTER 14. OIL 15. AGRICULTURE WASTE 16. HEALTH HAZARD 17. CLEAR CUT TO STREAM EDGE 18. SELECTIVE CUT 19. BUFFER STRIP PRESENT 20. CATTLE CROSSING 21. EROSION FROM AGRICULTURE 22. SUSPENDED SILT NOTED 23. UNUSUAL STREAM SCOURING 24. LARGE BEDLOAD DEPOSIT 25. BANK EROSION - MODERATE 26. BANK EROSION - EXCESSIVE 27. STREAM DREDGING/BULLDOZONG 28. GRAVEL REMOVAL 29. CHANNELIZATION (RIPRAP, ETC) 30. STREAM DIVERSION 31. WATER WITHDRAWAL 32. REGULATED STREAM FLOW 33. CAMP/COTTAGE PRESENT 34. RESIDENTIAL AREA 35. ACCESS - ATVS 36. ACCESS - TRAILS 37. ACCESS - TRUCK/CAR 38. ACCESS - BOAT 39. ROAD CROSSING (BRIDGE) 40. ROAD CROSSING (CULVERT) 41. BOAT LANDING 42. ORGANIC LITTER 43. AQUATIC PLANTS ABUNDANT 44. GOOD SPAWNING 45. GOOD NURSERY 46. ATLANTIC SALMON OBSERVED 47. BROOK TROUT OBSERVED																		
1	2	8	1	100	5.4	9.1	5	25	50	10	5	5	-	24	-	-	-	2	2	-	-	-	2.99	1	1	6																			
1	3	1, 8, 22	1	200	5.2	7.7	20	30	30	10	10	-	-	36	50	50	5	5	5	-	-	-	2.75	1	1	1, 3, 7																			
1	Wetland - defined channel is absent																																												
1	Wetland - defined channel is absent																																												
1	6	8	1	500	6	6	-	-	5	5	20	50	20	2	5	5	15	1	1	-	-	-	3.43	2	2	-																			
1	7	8	1	600	3.5	4.5	-	5	5	65	20	5	-	30	30	50	10	-	-	-	-	-	3.31	2	1	-																			
1	8A	8	1	700	3	5.5	-	-	15	35	30	20	-	32	-	50	-	-	-	-	-	-	3.36	2	1	-																			
1	8B	7	1	800	1.5	1.5	-	50	30	10	10	-	-	80	-	-	-	1	1	-	-	-	3.28	2	1	-																			
1	9A	8	1	700	2.1	2.1	-	-	5	50	30	15	-	20	-	40	25	1	1	-	-	-	3.71	2	1	-																			
1	9B	8	1	800	1.5	1.5	-	-	-	-	5	90	5	18	50	50	50	0.5	0.5	-	-	-	3.24	3	2	-																			
STREAM TYPE														CHANNEL TYPE					SUBSTRATE (representing at least 25% of habitat type)				FLOW TYPE		POOL RATING (reverse side)																				
FASTWATER														POOLS											CRITERIA NO.	% OF POOLS IN SITE (LETTER)																			
1. Fall 2. Cascade 3. Riffle (GR/RB) 4. Riffle (R/B) 5. Riffle (Sand)														6. Sheet 7. Chute 8. Run 9. Rapid					10. Midchannel 11. Convergent 12. Lateral 13. Beaver				14. Trench 15. Plunge 16 17. Bogan					18. Eddy 19. Gabion 20. Log Structure 21. Road Crossing				22. Wood Debris 23. Man-Made Dam 24. Natural Deadwater				1. Main (if measurement refers to main area of river) *2. Side Channel (water diverted by islands) *3. Split (if river is split into various different stream *4. Bogan (backwater/narrow stretch of water) *Specify Left (L), Right (R) or Middle (M)		3. Rock = 180 - 460 mm 4. Rubble = 54 - 179 mm 5. Gravel = 2.6 - 53 mm 6. Sand = 0.06 - 2.5 mm 7. Fines = 0.0005 - 0.05 mm				1. Survey 2. Spring 3. Brook / River Tributary 4. Spring Seep		POOL DEPTH ≥ 1.5m 1 - Instream Cover ≥ 30% 2 - Instream Cover < 30%	a - > 30% b - > 10 to c - < 10%
																									POOL DEPTH .5 - 1.5m 3 - Instream Cover 5-30% 4 - Instream Cover > 30%	a - > 50% b - < 50%																			

**DNR&E / DFO - NEW BRUNSWICK
STREAM HABITAT INVENTORY**

River: Mill Creek + Tributary to
Delaney Lake

Start Point: 45.269662°, -66.172517°

End Point: 45.268067°, -66.190948°

Drainage Code: -

Personnel: Jennifer Hachey & Jenna McCoy

Date: October 26, 2018

GIS Map No.: -

Drainage Name: -

****Right and Left are looking DOWNSTREAM****

REACH NO.	UNIT NO.	STREAM TYPE	CHANNEL TYPE	LENGTH (m)	AVG WIDTH (m)		SUBSTRATE (%)							AVG DEPTH WET WIDTH (cm)	0 - 50% UNDERCUT BANK		0 - 50% OVERHANGING VEGETATION		LARGE WOODY DEBRIS IN STREAM (m)	FLOWS			EMBEDDEDNESS (CRITERIA) 1: <20% 2: 20%-35% 3: 35%-50% 4: >50%	COMMENTS	CHECKLIST OF LANDUSE ATTRIBUTES (COMMENTS)						
					WET	BANK CHANNEL	BED-ROCK	BOULDER	ROCK	RUBBLE	GRAVEL	SAND	FINES		L	R	L	R		TYPE	FLOWS (cm/s)	TEMP (°C)				W	A				
1	10	8	1	900	1.7	1.7	-	-	-	-	10	85	5	26	50	50	50	50	1	-	-	-	3.25	3	2	-					
1	11	4	1	1000	3.3	4.4	-	30	30	20	5	5	-	22	10	20	10	0	-	-	-	-	3.2	3	1	-	POLLUTION CAUSED BY:				
1	12	3	1	1100	1.5	24	-	5	15	40	30	5	-	12	50	10	40	40	1	-	-	-	3	3	1	-	9. FOOD PROCESSING INDUSTRY 10. FOREST INDUSTRY 11. CAMPSITE OR RESIDENTIAL 12. MINING 13. LITTER				
1	13	8	1	1200	2.5	2.5	-	-	-	-	-	50	50	22	50	50	10	10	5	-	-	-	3.16	3	3	-	14. OIL 15. AGRICULTURE WASTE 16. HEALTH HAZARD 17. CLEAR CUT TO STREAM EDGE 18. SELECTIVE CUT				
1	14	8	1	1300	1.3	1.5	-	-	-	-	-	10	80	22	10	15	5	10	-	-	-	-	3	3	4	-	19. BUFFER STRIP PRESENT 20. CATTLE CROSSING 21. EROSION FROM AGRICULTURE 22. SUSPENDED SILT NOTED				
1	15	1	1	1400	1.2	1.2	-	-	-	-	-	-	100	15	-	-	35	35	-	-	-	-	2.95	3	4	-	23. UNUSUAL STREAM SCOURING 24. LARGE BEDLOAD DEPOSIT 25. BANK EROSION - MODERATE 26. BANK EROSION - EXCESSIVE				
1	16	8	1	1500	2.5	2.5	-	-	-	-	-	-	100	35	40	20	10	5	5	-	-	-	3	3	4	-	27. STREAM DREDGING/BULLDOZING 28. GRAVEL REMOVAL 29. CHANNELIZATION (RIPRAP, ETC) 30. STREAM DIVERSION 31. WATER WITHDRAWAL				
																												32. REGULATED STREAM FLOW 33. CAMP/COTTAGE PRESENT 34. RESIDENTIAL AREA 35. ACCESS - ATV'S 36. ACCESS - TRAILS 37. ACCESS - TRUCK/CAR 38. ACCESS - BOAT 39. ROAD CROSSING (BRIDGE) 40. ROAD CROSSING (CULVERT) 41. BOAT LANDING 42. ORGANIC LITTER 43. AQUATIC PLANTS ABUNDANT 44. GOOD SPAWNING 45. GOOD NURSERY 46. ATLANTIC SALMON OBSERVED 47. BROOK TROUT OBSERVED			
STREAM TYPE														CHANNEL TYPE					SUBSTRATE (representing at least 25% of habitat type)			FLOW TYPE			POOL RATING (reverse side)						
FASTWATER					POOLS																										
1. Fall	6. Sheet	10. Midchannel	14. Trench	18. Eddy	22. Wood Debris																										
2. Cascade	7. Chute	11. Convergenc	15. Plunge	19. Gabion	23. Man-Made Dam																										
3. Riffle (GR/RB)	8. Run	12. Lateral	16	20. Log Structure	24. Natural Deadwater																										
4. Riffle (R/B)	9. Rapid	13. Beaver	17. Bogan	21. Road Crossing																											
5. Riffle (Sand)																															
														1. Main (if measurement refers to main area of river) *2. Side Channel (water diverted by islands) *3. Split (if river is split into various different stream *4. Bogan (backwater/narrow stretch of water) *Specify Left (L), Right (R) or Middle (M)					1. Bedrock, Ledge = >461 mm 2. Boulder = 180 - 460 mm 3. Rock = 54 - 179 mm 4. Rubble = 2.6 - 53 mm 5. Gravel = 0.06 - 2.5 mm 6. Sand = 0.0005 - 0.05 mm 7. Fines =			1. Survey 2. Spring 3. Brook / River Tributary 4. Spring Seep			POOL DEPTH ≥ 1.5m a - > 30% 1 - Instream Cover ≥ 30% b - > 10 to 2 - Instream Cover < 30% c - < 10%						
																						POOL DEPTH .5 - 1.5m a - > 50% 3 - Instream Cover 5-30% b - < 50% 4 - Instream Cover > 30%									

REACH NO.	SITE (50m - interval)	% SITE		SHADE (%)	STREAM BANKS										O ₂ (mg/l)	pH	DEPTH						POOL RATING (CRITERIA ON OTHER SIDE)		POOL TAIL			% TURBULENCE
		RIFFLE/RUN	POOLS		VEGETATION (%)				EROSION (%)								1/4 (m)		1/2 (m)		3/4 (m)		EMBEDDEDNESS CRITERIA 1: ≤ 20% 2: 20% - 35% 3: 35% - 50% 4: ≥ 50%	MEAN SUBSTRATE SIZE (cm)	% FINE			
					BARE GROUND	GRASSES	SHRUBS	TREES	LEFT BANK (0 - 50%)			RIGHT BANK (0 - 50%)					Wet	CHANNEL	Wet	CHANNEL	Wet	CHANNEL				NO.	LETTER	
									STABLE	BARE STABLE	ERODING	STABLE	BARE STABLE	ERODING														
1	0	100	-	40	15	70	-	15	45	-	5	50	-	-	14.04	5.43	23	50	17	40	24	35	-	-	-	-	-	-
1	100	100	-	100	90	-	-	10	50	-	-	-	-	-	10.21	6.10	21	30	33	45	19	34	-	-	-	-	-	-
1	200	100	-	20	80	-	-	20	5	3	42	23	2	25	11.34	6.60	34	94	50	120	25	73	-	-	-	-	-	-
1	300	Wetland - defined channel is absent																										
1	400	Wetland - defined channel is absent																										
1	500	100	-	10	0	85	15	-	20	20	10	40	-	10	9.40	7.50	1.3	1.5	2	2.2	1.3	1.5	-	-	-	-	-	-
1	600	100	-	15	5	20	75	-	20	20	10	40	-	10	10.08	7.63	10	50	45	85	35	75	-	-	-	-	-	-
1	700	100	-	50	40	5	50	5	25	25	-	-	-	50	10.48	7.80	40	90	35	50	20	35	-	-	-	-	-	-
1	800	100	-	95	80	-	-	20	25	25	-	50	-	-	11.88	7.79	80	120	80	120	80	120	-	-	-	-	-	20
1	700	100	-	10	-	15	85	-	-	-	50	15	-	35	11.34	7.79	24	32	20	30	16	34	-	-	-	-	-	-
1	800	100	-	90	5	5	-	90	20	15	15	25	-	25	11.49	7.76	10	50	30	70	15	55	-	-	-	-	-	-
REACH NO.	UNIT NO.	STREAM TYPE	WET WIDTH (m)	DEPTH (cm)			AVERAGE DEPTH SUM/4		COEFFICIENT (0.9 - SMOOTH) (0.8 - ROUGH)	LENGTH (3m)	FLOAT TIME (sec)									COMMENTS (LOCATION)								
				1/4 WAY	1/2 WAY	3/4 WAY	CENTIMETERS	METERS (m)			1/4 WAY			1/2 WAY			3/4 WAY				AVERAGE							
											T1	T2	T3	T1	T2	T3	T1	T2	T3									
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
FORMULA (CMS) = $W \frac{(m)}{(m)} \times D \frac{(m)}{(m)} \times A \frac{(m)}{(m)} \times L \frac{(m)}{(m)}$				T _____ (sec) WHERE: W =width, D = depth, L = length, A is coefficient for the stream bottom																								

REACH NO.	SITE (50m - interval)	% SITE		SHADE (%)	STREAM BANKS										O ₂ (mg/l)	pH	DEPTH						POOL RATING (CRITERIA ON OTHER SIDE)		POOL TAIL			% TURBULENCE
		RIFFLE/RUN	POOLS		VEGETATION (%)				EROSION (%)								1/4 (m)		1/2 (m)		3/4 (m)		EMBEDDEDNESS CRITERIA 1: ≤ 20% 2: 20% - 35% 3: 35% - 50% 4: ≥ 50%	MEAN SUBSTRATE SIZE (cm)	% FINE			
					BARE GROUND	GRASSES	SHRUBS	TREES	LEFT BANK (0 - 50%)			RIGHT BANK (0 - 50%)					Wet	CHANNEL	Wet	CHANNEL	Wet	CHANNEL				NO.	LETTER	
									STABLE	BARE STABLE	ERODING	STABLE	BARE STABLE	ERODING														
1	900	100	-	80	10	5	80	5	35	-	15	5	-	45	10.86	7.72	19	45	33	54	27	63	-	-	-	-	-	-
1	1000	100	-	90	80	-	-	20	100	-	-	100	-	-	9.24	7.73	13	20	29	32	24	25	-	-	-	-	-	-
1	1100	100	-	80	10	10	5	75	10	-	90	30	-	70	11.50	7.76	13	24	15	24	9	25	-	-	-	-	-	-
1	1200	100	-	40	-	40	-	60	10	-	90	20	-	80	7.30	7.66	20	35	30	45	15	30	-	-	-	-	-	-
1	1300	100	-	90	10	20	-	70	20	-	80	10	-	90	8.70	7.67	15	30	40	55	10	25	-	-	-	-	-	-
1	1400	100	-	10	-	100	-	-	80	-	20	80	-	20	11.49	7.68	15	35	15	35	15	35	-	-	-	-	-	-
1	1500	100	-	90	-	20	-	80	75	-	25	85	-	15	8.88	7.68	35	65	40	70	30	60	-	-	-	-	-	-
REACH NO.	UNIT NO.	STREAM TYPE	WET WIDTH (m)	DEPTH (cm)			AVERAGE DEPTH SUM/4		COEFFICIENT (0.9 - SMOOTH) (0.8 - ROUGH)	LENGTH (3m)	FLOAT TIME (sec)									COMMENTS (LOCATION)								
				1/4 WAY	1/2 WAY	3/4 WAY	CENTIMETERS	METERS (m)			1/4 WAY			1/2 WAY			3/4 WAY				AVERAGE							
											T1	T2	T3	T1	T2	T3	T1	T2	T3									
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

FORMULA (CMS) = $\frac{W}{D} \times \frac{A}{L} \times T$ (m) x D (m) x A (m) x L (m) T (sec)

WHERE: W =width, D = depth, L = length, A is coefficient for the stream bottom



APPENDIX F

VEC: Wildlife and Wildlife Habitat

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LIST OF ATTACHMENTS

F-1	ACCDC Report
F-2	Habitat Comparison Table

1.0 RATIONALE FOR THE VALUED ENVIRONMENTAL COMPONENT (VEC)

The Project footprint currently provides suitable habitat for several terrestrial wildlife species, including habitat that could support migratory birds. Migratory birds are protected under the federal *Migratory Bird Convention Act (MBCA)*. Certain wildlife species are protected under federal or provincial *Species at Risk Acts* or under the *New Brunswick Fish and Wildlife Act*. As such, Project related activities (e.g., vegetation clearing, ground disturbance, excavation, blasting, etc.) present potential interactions with wildlife and their habitat, which could impact terrestrial species and/or ecosystem health.

In order to assess any influence of the Project on wildlife and wildlife habitat, four components have been identified for the valued environmental component (VEC):

- *Terrestrial Habitat* describes the general environmental conditions observed within the Project footprint;
- *Ecologically Significant Areas (ESAs)* are areas designated as protected or managed by federal, provincial, or non-government agencies;
- *Wildlife*, which for the purpose of this assessment includes all incidental sightings and evidence of wildlife species but does not include birds and fish, and *Wildlife Habitat*. This component also encompasses any wildlife species at risk (SAR) and species of conservation concern (SOCC). Wildlife SAR are considered species that have a protective status under Schedule 1 of the federal *Species at Risk Act (SARA)* or are protected under the provincial *New Brunswick Species at Risk Act (NBSAR)*. Wildlife SOCC include species that are:
 - Considered rare in New Brunswick with a Atlantic Canada Conservation Data Centre (ACCDC) S-rank of S1 (imperiled) to S3 (vulnerable); and/or
 - Ranked At Risk, May Be At Risk or Sensitive by the New Brunswick Department of Energy and Resource Development (NBDERD); and
- *Birds*, including SAR and SOCC, and *Bird Habitat*. Bird SAR are considered species that have a protective status under Schedule 1 of the federal *SARA* or are protected under the provincial *NBSAR*. Bird SOCC include species that are:
 - Considered rare in New Brunswick with a ACCDC rank of S1 to S3; and/or
 - Ranked At Risk, May Be At Risk or Sensitive by the NBDERD.

2.0 BOUNDARIES FOR THE ENVIRONMENTAL EFFECTS ASSESSMENT

2.1 Spatial Boundaries

The assessment of wildlife and wildlife habitat has been completed for three spatial boundaries:

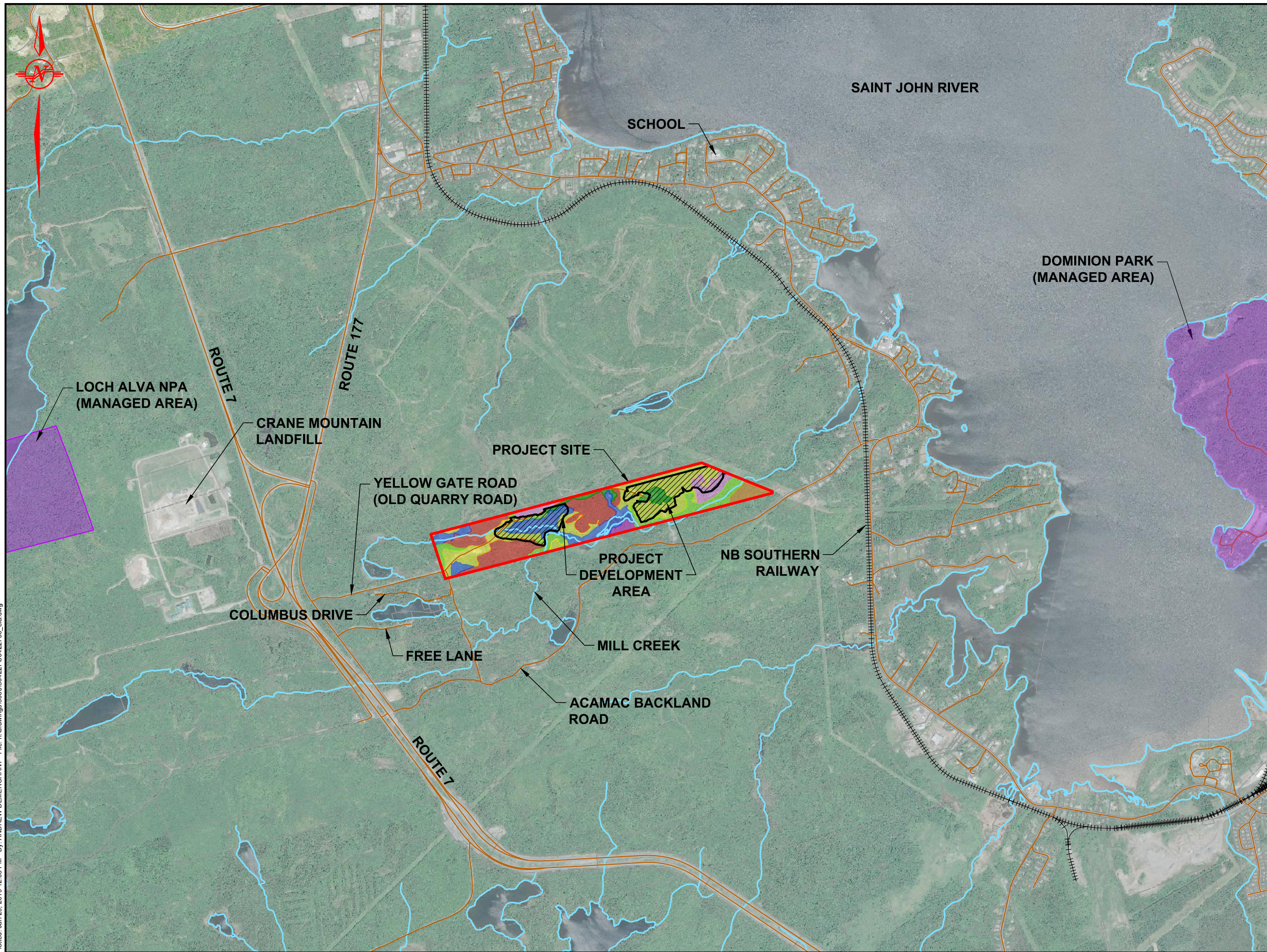
- The Project Development Area (PDA) is defined as the footprint of ground disturbance required for the Project activities (portion of PID 00289595; Figure F-1);
- The Project Site is defined at the southwestern portion of PID 00289595 as investigated during the baseline environmental studies (Figure F-1); and
- The Assessment Area encompasses a 5 kilometre (km) radius of the PDA where wildlife SAR and SOCC have been recorded by ACCDC.

2.2 Temporal Boundaries

The assessment of wildlife and wildlife habitat has been completed for the following temporal boundaries:

- The construction phase of the Project;
- The operational phase of the Project; and
- The reclamation phase of the Project.

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- LEGEND**
- HABITAT - SBFMX
 - HABITAT - SEWCS
 - HABITAT - SBIMX
 - HABITAT - MEWCS
 - HABITAT - MBIHW
 - HABITAT - MSPBF
 - HABITAT - WL
 - HABITAT - QU

Drawn By	AGSD	Checked By	JH
Calculations By		Checked By	
Date	JAN, 2019		

Project
 ENVIRONMENTAL IMPACT ASSESSMENT
 CRANE MOUNTAIN LANDFILL CLAY AND
 AGGREGATE QUARRY

Drawing
 WILDLIFE AND WILDLIFE HABITAT
 SPATIAL BOUNDARIES



File No.	Drawing	Revision No.
90422706	F-1	0



3.0 METHODOLOGY

A two-phased approach was used to determine the existing wildlife and wildlife habitat conditions, and any potential interaction with the Project, including:

- A desktop study of all existing information for habitat, wildlife SAR and wildlife SOCC within the Assessment Area; and
- Field investigations to delineate habitat types and to conduct a bird habitat survey within the Project Site.

Specific to the Environmental Impact Assessment (EIA) document, potential interactions or effects of the Project on wildlife and wildlife habitat have been identified and are discussed. Where residual effects are anticipated, the proposed methods for mitigating the potential effects have been presented.

3.1 Terrestrial Habitat

Terrestrial habitat types were determined by reviewing the NBDERD forest inventory and then field verified; the verified field observations are presented herein. Senior Terrestrial Ecologist Derrick Mitchell of Boreal Environmental conducted a terrestrial habitat inventory on September 20, October 8 and October 9, 2018. The habitat inventory included traversing the entire Project Site and delineating the habitat types by development stage and forest species composition contained within the boundaries.

3.2 Ecological Significant Areas (ESAs)

A data request was submitted to the ACCDC for a 5 km radius of the Project Site (*i.e.*, Assessment Area). The ACCDC report provides the location and information on significant or managed natural areas. A Managed Area (MA) is a site with some level of protection for wildlife within the boundaries. Ecologically Significant Areas (ESA) are sites that may or may not have legal protection. The ACCDC report is presented in Attachment F-1.

3.3 Wildlife

3.3.1 Desktop

The ACCDC report also provides the location of recorded wildlife SAR or SOCC and the presence or absence of any location sensitive species within a 5 km radius of the Project Site. The ACCDC report was reviewed prior to completing any field investigations to determine the potential for any terrestrial wildlife SAR and/or SOCC within the Project Site. Upon completion of field investigations, habitat comparisons were completed for any SAR or SOCC that were recorded within the 5 km radius to the observed conditions within the Project Site.

3.3.2 Field

GEMTEC personnel visited the site on September 20, September 25, October 9, and October 26, 2018 for the purposes of assessing the environmental conditions within the Project Site. Any incidental sighting or evidence of wildlife and critical habitat for SAR was recorded during the site visit. For the purposes of this assessment, critical habitat is defined as per the federal *SARA*.

3.4 Birds and Bird Habitat

3.4.1 Desktop

The ACCDC report was reviewed prior to completing any field investigations to determine the potential for any bird SAR and/or SOCC within the Project Site.

3.4.2 Field

Derrick Mitchell conducted a bird habitat assessment in the Project Site on September 20, October 8 and October 9, 2018. The bird habitat assessment included traversing the entire Project Site with special attention given to habitats with an elevated potential for bird SAR and SOCC observations or nests. Any incidental sightings or singing of bird SAR or SOCC were recorded and critical habitat, if any, was identified. For the purposes of this assessment, critical habitat is the habitat necessary for the survival or recovery of a listed endangered, threatened or extirpated species in Schedule 1 of *SARA* as identified in the recovery strategy or action plan for a given listed species.

A bird survey (including point counts) will be completed during the 2019 breeding bird season (likely May or June 2019). The results of that survey will be submitted as an addendum to this EIA.

4.0 DESCRIPTION OF EXISTING ENVIRONMENT

The Project Site is located within the Fundy Coast Ecoregion, a narrow coastal environment along the Bay of Fundy, in New Brunswick and Nova Scotia. Activities within the ecoregion include: forestry; farmland; fisheries; tourism; and seashore recreation, with the highest tides (averaging 10 metres in the Minas Basin in the Bay of Fundy). The area is strongly influenced by the Atlantic Ocean with high winds, high humidity, fog in the summer and fall, slow warm up in the spring, and cool, wet summers with mild, wet winters. The general terrain is variable, ranging from rolling steep slopes, to deeply incised highland, to undulating plains (Ecological Framework of Canada, 2018).

The Project Site is approximately 59.7 hectares (ha) in size and is characterized by rough uneven terrain with abundant limestone outcroppings and thin calcareous soils. Most of the habitat is forested, representing 57.1 ha (95.6%) of the total Project Site. This 57.1 ha includes wetlands that, in general, are forested swamp complexes dominated by Eastern White Cedar (*Thuja occidentalis*), Yellow-Green Sedge (*Carex flava*) and Three-Seeded Sedge (*Carex trisperma*). Most of the forested habitat is in the sapling stage of development due to historic forest harvesting activities that occurred approximately 20 years ago. It is likely that the historic harvesting significantly altered the species composition of the Project Site via highgrading, the selection of the largest/best quality trees, and commercial clearcutting, evidenced by remnant patches of forest and stumps. The entire Project Site was dominated by mature Eastern White Cedar, White Spruce (*Picea glauca*), Red Spruce (*Picea rubens*), Balsam Fir (*Abies balsamea*), and shade tolerant deciduous species such as Yellow Birch (*Betula alleghaniensis*).

4.1 Terrestrial Habitats

Within the Project Site, there are eight different habitat types, as described below and presented on Figure F-1:

- Quarry (QU) occupies 2.6 ha (4.3%) of the Project Site and consists of sparsely vegetated, bare limestone and forested areas regenerating in dense Speckled Alder (*Alnus incana*) and scattered Mountain Paper Birch (*Betula papyrifera* var. *cordifolia*);
- Wetland (WL) occupies 15.2 ha (9.1%) of the Project Site and is generally characterized as a forested swamp complex with open water. Dominant vegetation species in the wetlands include Eastern White Cedar and Speckled Alder, Glossy Buckthorn (*Frangula alnus*), Yellow-Green Sedge, and Three-Seeded Sedge;
- Eastern White Cedar Swamp (EWCS):
 - The mature stand (MEWCS) tends to be associated with watercourses and limestone outcropping which is common throughout the Project Site. It is dominated by mature Eastern White Cedar, scattered Eastern Larch (*Larix laricina*) and a sparse understory of Eastern White Cedar due to closed canopy conditions.

The herbaceous layer tends to be sparse with Cinnamon Fern (*Osmunda cinnamomea*) and Bristly-Stalked Sedge (*Carex leptalea*). Combined, this habitat occupies approximately 7.5 ha (12.5%) of the Project Site.

- The sapling (SEWCS) tends to be associated with very dry disturbed or clearcut areas where the soils are thin or exposed limestone outcroppings. The habitat 4.1 ha (6.9%) of the Project Site is dominated by sapling Eastern White Cedar, Mountain Paper Birch and Pincherry (*Prunus pensylvanica*). The shrub and herbaceous layer are mostly absent;
- Mature Birch Mixedwood (MBIMX) habitat occupies 1.9 ha (3.2%) of the Project Site and is represented by one forest stand. MBIMX habitat tends to be closed canopied and consists of early successional tree species that are approximately 50 years old. The tree layer is predominantly made up of Mountain Paper Birch, Yellow Birch, Red Maple (*Acer rubrum*), Eastern White Cedar, White Spruce, and Balsam Fir. The shrub layer tends to be discontinuous and dominated by Wild Raisin (*Viburnum nudum*) and Mountain Holly (*Ilex mucronata*). The herbaceous layer is typical of upland areas throughout the Project Site and is dominated by Bunchberry (*Cornus canadensis*), Wild Lily-Of-The-Valley (*Maianthemum canadense*), Wild Sarsaparilla (*Aralia nudicaulis*), and Starflower (*Trientalis borealis*);
- Sapling (SBIMX) habitat within the Project Site occupies 20.1 ha (33.7%) and tends to be closed canopied and consists of early successional tree species approximately 20 years old. The tree layer is predominantly made up of Mountain Paper Birch, Red Maple, Balsam Fir and Trembling Aspen (*Populus tremuloides*). Residual mature trees that were not historically harvested are scattered throughout the stand and include; Balsam Fir, Eastern White Cedar, Red Spruce, White Spruce (*Picea glauca*), and Eastern White Pine (*Pinus strobus*). The shrub layer tends to be absent or very sparse, which is typical of early successional stands at this stage of development as very little sunlight is able to reach the forest floor. The herbaceous layer is dominated by Bunchberry, Wild Lily-Of-The-Valley, Wild Sarsaparilla, and Starflower;
- Mature Spruce Balsam Fir (MSPBF) habitat within the Project Site is represented by one small stand approximately 0.9 ha (1.5%) in size. This habitat is approximately 50 years old and dominated by a mixture of closed canopy Red Spruce, White Spruce and Balsam Fir. For the most part, the shrub and herbaceous layers are absent due to closed canopy conditions; and
- Sapling Balsam Fir Mixedwood (SBFMX) habitat occupies 13.5 ha (22.6%) of the Project Site and is approximately 20 years old. This habitat type is similar to BIMX; however, it has a higher percentage of conifer tree species. As with BIMX this habitat has residual matures trees scattered throughout. The tree layer is dominated by Balsam Fir, Mountain Paper Birch, Red Spruce, White Spruce, Red Maple, Trembling Aspen, and White Pine. The shrub layer is discontinuous and predominantly made up of Wild Raisin, Mountain

Holly and, in some areas, Glossy Buckthorn an invasive species. The herbaceous layer consisted of Bunchberry, Bracken Fern (*Pteridium aquilinum*), Starflower, and Wild Lily-of-The-Valley.

Table F-1 provides a summary of habitat types by area and percent of the Project Site occupied by each type.

Table F-1 Summary of Habitat Type by Area and Percent Cover

Stand Type	Area (ha)	Percent (%)
Quarry (QU)	2.6	4.3
Wetland (WL)	9.1	15.2
Mature Eastern White Cedar (MEWCS)	7.5	12.5
Mature Birch Mixedwood (MBIMX)	1.9	3.2
Mature Spruce Balsam Fir (MSPBF)	0.9	1.5
Sapling Eastern White Cedar (SEWCS)	4.1	6.9
Sapling Birch Mixedwood (SBIHW)	20.1	33.7
Sapling Balsam Fir Mixedwood (SBFMX)	13.5	22.6
Total	59.7	99.9

Patches of mature contiguous forest greater than 10 ha and free from edge effects or 'Interior Forest' are important for a number of bird species that rely on this habitat type for foraging and breeding. Interior forest is preferred by some species that are less adaptable to disturbance than others. No mature interior forest was identified within the Project Site.

4.2 Ecological Significant Areas (ESAs)

The ACCDC report identified two MAs within a 5 km radius of the Project Site (Figure F-1):

- The Loch Alva MA is located approximately 2.2 km west of the Project Site and is a natural protected area (NPA) approximately 22,000 ha in size. This NPA was established to capture the representative ecological features of the Fundy Coastal Ecoregion (valleys, ridges, coastal hills). Public access for low impact recreation (*i.e.*, hiking) is permitted; and
- Dominion Park is a municipally managed park and a United National Educational, Scientific and Cultural Organization (UNESCO) Stonehammer Geopark.

No National Wildlife Areas (NWAs), Migratory Bird Sanctuaries (MBSs), Ramsar Sites, or New Brunswick Protected Natural Areas, with the exception of the Loch Alva MA, are located within

5 km of the Project Site (Environment Canada Protected Areas Network, 2018, Ramsar Sites Information Service, 2018, and NBDERD Protected Natural Areas, 2018).

The Project is not expected to interact with any ESAs or MAs and, therefore, is not discussed further in this VEC assessment.

4.3 Wildlife

White-Tailed Deer (*Odocoileus virginianus*) scat and tracks and evidence of Beaver (*Castor*) were observed throughout the Project Site. This area is likely inhabited or frequented by other wildlife typically found in New Brunswick including, but not limited to, Moose (*Alces alces*), Eastern Coyote (*Canis latrans*), Black Bear (*Ursus americanus*), Red Fox (*Vulpes vulpes*), Raccoon (*Procyon lotor*), Snowshoe Hare (*Lepus americanus*), North American Porcupine (*Erethizon dorsatum*) Eastern Grey Squirrel (*Sciurus carolinensis*), and Eastern Chipmunk (*Tamias striatus*).

The ACCDC listed the Eastern Painted Turtle (*Chrysemys picta picta*) as occurring within 5 km of the Project Site. The Eastern Painted Turtle is not considered a SAR or SOCC under this assessment as it is not protected federally or provincially and has a ACCDC rank of S4 (Secure). Eastern Painted Turtles inhabit lakes, ponds, creeks, and wetlands with soft, muddy bottoms and abundant aquatic vegetation (CWF, 2018). The preferred habitat for this species was observed within the Project Site.

4.3.1 Wildlife Species at Risk (SAR) and Critical Habitat

The ACCDC listed both the Wood Turtle (*Glyptemys insculpta*) and the Bat Hibernaculum (consisting of three species of bats: Little Brown Myotis (*Myotis lucifugus*), Long-Eared Myotis (*Myotis septentrionalis*), and Tri-Coloured Bat (*Perimyotis subflavus*)) as location sensitive species (*i.e.*, known to in-habitat areas within the Assessment Area).

The Wood Turtle is listed as Threatened under *SARA* and the *NBSAR*. This species is generally found in forested habitats and require daily water resources; thus are associated with clear, freshwater streams and the associated floodplains. The preferred streams contain a year-around flow with substrate beds of sand, gravel and sometimes cobble. Wood Turtles also use bogs, marshy pastures, beaver ponds, oxbow lakes, riparian and shrub areas, meadows, hay and agricultural fields, and transmission line right-of-ways (*SARA*, 2016). These habitats were observed within the Project Site, specifically along Mill Creek and a tributary to Delaney Lake (herein referred to as the "Tributary").

The three species included in the Bat Hibernaculum are listed as Endangered under *SARA* and *NBSAR*. These species are most susceptible to White Nose Syndrome, a fungus that kills bats by awakening them during their hibernation periods when there is no food and depletes their fat reserves. These bats over-winter in caves, abandoned mines or in buildings (NBDERD, 2018c). Suitable habitat for Bat Hibernaculum was not observed on the Project Site.

The ACCDC had no other records of wildlife SAR (excluding birds and fish) within the Assessment Area. Additionally, no wildlife SAR or associated critical habitat were observed within the Project Site.

4.3.2 Wildlife Species of Conservation Concern (SOCC)

The ACCDC has five records of wildlife SOCC (excluding birds and fish) as having been observed within the Assessment Area: the Northern Dusky Salamander (*Desmognathus fuscus*); the Monarch Butterfly (*Danaus plexippus*); the Crowberry Blue Butterfly (*Plebejus idas empetri*); the Swamp Spreadwing (*Lestes vigilax*); and the Saltmarsh Hydrobe (*Spurwinkia salsa*).

Northern Dusky Salamander is considered Not At Risk by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), has an ACCDC rank of S3 (vulnerable), and a NBDERD rank of Sensitive. This species is typically found on land, near groundwater fed streams or seeps and springs, and under logs, rocks and leaf litter (Ontario, 2018). Suitable habitat for the Northern Dusky Salamander may be present within the Project Site.

The Monarch Butterfly is ranked S3B, S3M (vulnerable breeding, migrant) by ACCDC and is designated as a species of Special Concern under SARA and NBSAR. The COSEWIC has designated the species as Endangered. In general, the Monarch Butterfly can be found wherever there is an abundance of wildflowers, especially Milkweed (*Asclepius* spp.). These plant species tend to grow along roadsides, on abandoned farmland, in dry sandy areas, and along river banks (COSEWIC, 2010). No Monarch Butterflies nor Milkweed were observed during the field investigations and no suitable Monarch Butterfly breeding habitat was identified.

Crowberry Blue Butterfly is ranked S3 (vulnerable) by ACCDC and has a NBDERD rank of Secure. Typical habitat include openings in mixed evergreen forests, bogs, wet meadows and seeps. Crowberry Blue was not identified during the field investigations (Butterflies and Moths of North America, 2018).

The Swamp Spreadwing is ranked S3 (vulnerable) by ACCDC and Sensitive by NBDERD. This species is generally found in shaded acidic waters such a bogs, lakes, swamps and slow streams (OC, 2018). Swamp Spreadwings were not identified during the field investigations and suitable habitat is not present within the Project Site.

Saltmarsh Hydrobe is a very small aquatic snail that is listed as S3 (vulnerable) by ACCDC. This species prefers brackish waters (iNaturalist, 2018) and is not expected to be found within the Project Site.

No terrestrial wildlife SOCC were observed within the Project Site and the terrestrial habitat present is not likely to support any other non-bird wildlife SOCC.

4.4 Birds and Bird Habitat

The ACCDC report lists 33 bird species that have been recorded within the Assessment Area. Most of the 33 bird species listed in the ACCDC report were recorded along Bay Street, approximately 4 km southeast of the Project Site, near the Saint John River.

4.4.1 Bird Species at Risk

Of the 33 bird species identified in the ACCDC report, eight were considered to be SAR. Of the eight, only one bird SAR, the Bald Eagle (*Haliaeetus leucocephalus*), has a high potential for nesting and/or foraging in the Project Site. Table F-2 summarizes SAR birds and potential interactions with the Project based on known habitats in the Project Site.

The Bald Eagle is considered regionally endangered under the *NBSAR* but is not considered a Schedule 1 species by *SARA*. The Bald Eagle will often establish a nest in the top of a tall tree or near water. Concern over exploitation of the Bald Eagle prevents NBDERD from publishing the precise location of their nests. Although Bald Eagles can be found throughout New Brunswick, they are more common in southern New Brunswick and near open water (NBDERD, 2018a). No nests were encountered but Bald Eagles were observed during the field surveys in September and October, 2018. The Crane Mountain Landfill (herein referred to as the “Landfill”) presents an anthropogenic foraging habitat located within the Assessment Area and likely attracts a number of Bald Eagles. An independent bird survey in 2018 showed 53 individual Bald Eagles at the Landfill.

The ACCDC listed the Peregrine Falcon (*Falco peregrinus*) as a location sensitive species that has a known nesting location within the Assessment Area. The Peregrine Falcon is a species of Special Concern under *SARA* and Endangered under *NBSAR*. Peregrine Falcons generally nest off a cliff but can also be found nesting on an office tower or bridge (e.g., Harbour Bridge in Saint John; NBDERD, 2018b). Suitable habitat for Peregrine Falcons was not observed within the Project Site, and it is not expected that this species utilizes this area.

A bird survey will be completed during the 2019 breeding bird season (likely May or June 2019), and the results of that survey will be submitted as an addendum to this EIA.

Table F-2 Bird Species at Risk with 5 km of the Project Site + Potential Use of Project Site

Common Name	Scientific Name	S-Rank	NBDERD General Status	Nesting Habitat	Probability of Nesting in Project Site
Barn Swallow	<i>Hirundo rustica</i>	S2B, S2M	Sensitive	Artificial structures, bridges, barns, and other outbuildings	Low
Bank Swallow	<i>Riparia riparia</i>	S2S3B,S2S3M	Sensitive	Riverbanks, road cuts, lake and ocean bluffs	Low
Canada Warbler	<i>Wilsonia canadensis</i>	S3B, S3M	At Risk	Moist dense thickets near wetlands	Moderate
Bobolink	<i>Dolichonyx oryzivorus</i>	S3B, S3M	Sensitive	Hayfields and pastures	Low
Common Nighthawk	<i>Chordeiles minor</i>	S3B, S4M	At Risk	Open area habitats, abandoned agriculture areas, disturbed areas, bogs, rock outcrops and gravel roofs	Moderate
Bald Eagle	<i>Haliaeetus leucocephalus</i>	S3B	At Risk	Nests in forests near water bodies and avoids heavily developed areas.	High
Red Headed Woodpecker	<i>Melanerpes erythrocephalus</i>	SNA	Accidental	Deciduous woodlands in eastern United States of America.	Low

4.4.2 Bird Species of Conservation Concern

Twenty-two (22) of the remaining 25 bird species recorded within the Assessment Area are considered SOCC; however, none of the SOCC have a high potential for nesting within the Project Site. Table F-3 summarizes SOCC birds and the potential interactions with the Project based on known habitats in the Project Site.

No nests or incidental bird sightings were identified for SOCC during the bird habitat assessment. A bird survey will be completed during the 2019 breeding bird season (likely May or June 2019). The results of that survey will be submitted as an addendum to this EIA.

Table F-3 Bird Species of Conservation Concern Recorded within 5 km of the Project Site

Common Name	Scientific Name	S-Rank	NBDERD General Status	Nesting Habitat	Probability of Nesting in Project Area
Wilson's Phalarope	<i>Phalaropus tricolor</i>	S1B, S1M	Sensitive	A shorebird that prefers wetland, upland shrubby areas, marshes and roadside ditches.	Low
Lesser Scaup	<i>Aythya affinis</i>	S1B,S4M	Secure	Marsh ponds, lakes, bays, estuaries	Low
Willow Flycatcher	<i>Empidonax traillii</i>	S1S2B,S1S2M	Sensitive	Shrub thickets, especially willows, near standing water or along streams	Moderate
Brown-Crowned Night-Heron	<i>Nycticorax nycticorax</i>	S1S2B,S1S2M	Sensitive	Saltmarshes, freshwater marshes, streams, ponds and tidal mudflats.	Low
House Wren	<i>Troglodytes aedon</i>	S1S2B,S1S2M	Undetermined	Variety of semi-open habitats, including suburbs, orchards, woodlots, open forest, streamside groves	Low
Northern Mockingbird	<i>Mimus polyglottos</i>	S2B,S2M	Sensitive	Urban/suburban, farms, roadsides, shrub thickets Favors areas with dense low shrubs and open ground	Low
Brown Thrasher	<i>Toxostoma rufum</i>	S2B,S2M	Sensitive	Dense shrub thickets around edges of deciduous or mixed woods, shrubby edges of swamps	Moderate

Table F-3 Bird Species of Conservation Concern Recorded within 5 km of the Project Site

Common Name	Scientific Name	S-Rank	NBDERD General Status	Nesting Habitat	Probability of Nesting in Project Area
Gadwall	<i>Anas strepera</i>	S2B,S3M	Secure	Lakes, ponds, and coastal marshes	Low
Long-Eared Owl	<i>Asio otus</i>	S2S3	Undetermined	Mature forest for nesting and roosting. Tends to avoid contiguous forested habitats.	Low
Northern Shoveler	<i>Petrochelidon pyrrhonota</i>	S2S3B, S2S3M	Secure	Shallow wetlands with submerged vegetation in saltmarshes, estuaries, lakes and flooded fields.	Low
Cliff Swallow	<i>Petrochelidon pyrrhonota</i>	S2S3B,S2S3M	Sensitive	Bridges, farms, cliffs, and river bluffs.	Low
Red Crossbill	<i>Loxia curvirostra</i>	S3	Secure	Mature coniferous forests.	Low
Pine Siskin	<i>Carduelis pinus</i>	S3	Secure	Coniferous and mixed woods, often around edges or clearings; sometimes in deciduous woods, isolated conifer stands.	Moderate

Table F-3 Bird Species of Conservation Concern Recorded within 5 km of the Project Site

Common Name	Scientific Name	S-Rank	NBDERD General Status	Nesting Habitat	Probability of Nesting in Project Area
Turkey Vulture	<i>Cathartes aura</i>	S3B,S3M	Secure	Hollow trees, crevices in cliffs, under rocks, caves, inside dense thickets, or in old buildings.	Low
Killdeer	<i>Charadrius vociferus</i>	S3B,S3M	Sensitive	Open habitat, pastures, plowed fields, large lawns, mudflats, lake shores, coastal estuaries	Low
Black-Billed Cuckoo	<i>Coccyzus erythrophthalmus</i>	S3B,S3M	Secure	Deciduous thickets and shrub thickets on the edges of woodland or marshes. Also along shrubby edges of second growth of mixed forest	Moderate
Brown-Headed Cowbird	<i>Molothrus ater</i>	S3B,S3M	Secure	Grasslands with low and scattered trees, forest edges, shrub thickets, fields, pastures, orchards, and residential areas	Low
Common Eider	<i>Somateria mollissima</i>	S3B, S4M, S3N	Secure	Rock coasts, shoals ad islands.	Low

Table F-3 Bird Species of Conservation Concern Recorded within 5 km of the Project Site

Common Name	Scientific Name	S-Rank	NBDERD General Status	Nesting Habitat	Probability of Nesting in Project Area
Northern Pintail	<i>Anas acuta</i>	S3B,S5M	Sensitive	Open country with shallow, seasonal wetlands and low vegetation	Low
Red-Breasted Merganser	<i>Mergus serrator</i>	S3B,S5M,S4S5N	Secure	Shores of lakes and rivers, inside hollow stump, under rock, or in shallow burrow	Low
Bufflehead	<i>Bucephala albeola</i>	S3M, S2N	Sensitive	Shallow, sheltered coves, harbors, estuaries, or beaches, avoiding open coastlines	Low
Evening Grosbeak	<i>Coccothraustes vespertinus</i>	S3B, S3S4N, SUM	Sensitive	Coniferous and mixed forests; often associated with spruce and fir	Low

5.0 SUMMARY OF POTENTIAL EFFECTS

5.1 Terrestrial Wildlife and Habitat Potential Effects

There are a number of identified potential effects to terrestrial wildlife and habitat as a result of the Project.

Approximately 16 ha of vegetation clearing will take place within the proposed PDA. Wildlife will not be able to utilize this area during all phases of the Project. However, the affected habitat is not considered to be of high value for wildlife and similar habitat conditions are abundant in the surrounding area. The loss of wildlife habitat will be partially offset during the reclamation phase of the Project, when re-vegetation efforts will be undertaken.

Noise from Project activities during all phases of the Project may disrupt wildlife. Increased noise levels will be limited to active working periods when machinery is operating or blasting is occurring within the Project Site.

Suitable habitat (not Critical Habitat) for Wood Turtle was observed on-site and may be impacted by Project activities during all Project phases.

Motor vehicle traffic will occur during all phases of the Project and vehicular collisions may cause injury or death to involved wildlife. Other accidental events include possible contaminant spills that may result in wildlife injury or death and/or destruction of habitat or foraging areas.

There is a possibility of increased human interaction with wildlife as a result of increased personnel within the Project Site. In addition, there is a possibility of wildlife attraction to waste and garbage stored on site.

5.2 Birds and Bird Habitat Potential Effects

A list of birds and bird habitat known to occur within 5 km of the Project Site are summarized above in Table F-2 and Table F-3. A number of adverse potential effects to birds and bird habitat were identified as a result of Project activities.

Although Bald Eagles (SAR) were identified during the bird habitat assessment on the Project Site, no Bald Eagle nests were observed. Therefore, it is unlikely that preferred nesting habitat for this species will be impacted during various Project phases. In addition, it was observed that suitable nesting habitat is not limiting in surrounding areas.

Migratory birds may utilize the habitat within the Project Site and these birds and their nests are protected under the federal *MBCA*. Project activities may alter or destroy migratory bird habitat as a result of the vegetation clearing, alteration of wetlands and/or alteration of the Tributary during the construction phase. With respect to SAR and SOCC, a follow-up bird survey will be

conducted during the breeding bird season of 2019 to better determine use of the Project Site by migratory bird SAR and SOCC.

Noise from Project activities may disrupt bird species within the Project Site, or deter migratory birds from utilizing this area. Sound quality potential effects are limited to active working periods of the various Project phases when machinery is operating within the Project Site.

Attraction to cleared or stockpile areas may result in an increase in bird injuries or deaths, and/or destruction of nests.

Use of artificial light during nighttime operations may attract bird species. In general, construction activities will be limited to daylight hours. As such, this effect is not discussed further in this VEC assessment.

Accidental contaminant spills may result in bird injury or death and/or destruction of nests, habitat or foraging areas.

5.3 Accidents, Malfunctions and Unplanned Events

There is a potential for accidents to occur during all phases of the Project. Accidents that may impact wildlife and wildlife habitat within the Project Site include:

- Fire;
- Failure of sedimentation and erosion controls structures;
- Vehicle collisions with wildlife; and
- Accidental release of hazardous chemicals or petroleum products.

6.0 PROPOSED MITIGATION MEASURES

The potential effects and proposed mitigation measures to minimize the potential effects to wildlife and wildlife habitat during all phases of the Project are summarized in Table F-4. An Environmental Management Plan (EMP) will be developed prior to the commencement of the Project.

Table F-4 Summary of Mitigation Measures for Wildlife and Wildlife Habitat

Project Component	Summary of Potential Interaction	Mitigation Measures
All Project Phases (Construction, Operational, Reclamation)		
Birds and Bird Habitat	<ul style="list-style-type: none"> • Potential bird SAR habitat was identified within the Project Site and could be destroyed or altered during the Project activities; • Project activities may alter or destroy migratory bird habitat; • Noise from Project activities may disrupt bird species or deter migratory birds from utilizing the area; and • Attraction to cleared/stockpile areas may result in an increase in bird injuries and/or deaths or destruction of nests. 	<ul style="list-style-type: none"> • A bird survey will be completed during the 2019 breeding bird season; the results will be submitted as an addendum to this EIA; • If vegetation clearing must take place within the bird breeding season (April 15 - August 31), a non-intrusive nesting survey will be conducted by a bird expert; • If a nesting bird species is encountered, contact with and disturbance of the species and its habitat will be avoided, if possible; and • An appropriate vegetated buffer will be established around any nests encountered to protect them from disturbance and work in that area will be avoided until after the birds have fledged or vacated.
Terrestrial Wildlife and Habitat	<ul style="list-style-type: none"> • Vegetation clearing will alter/destroy wildlife habitat within the PDA; • Noise from Project activities may disrupt wildlife; • Possibility of increased human interaction as a result of increased personnel within the Project Site, possible attraction to waste/garbage stored on site. 	<ul style="list-style-type: none"> • Blasting activities for the aggregate quarry will be conducted by a certified contractor in accordance with an Approval to Operate from NBDELG; • Nearby wildlife will likely be deterred by the noise on the Project Site during Project activities and similar habitat types are not limiting on adjoining properties; • Equipment will be maintained in good working order; • Equipment will be muffled, if feasible; and

Table F-4 Summary of Mitigation Measures for Wildlife and Wildlife Habitat

Project Component	Summary of Potential Interaction	Mitigation Measures
		<ul style="list-style-type: none"> • A vegetated buffer will be maintained around the PDA to reduce sound impacts to the surrounding receptors.
Terrestrial Wildlife and Habitat	<ul style="list-style-type: none"> • Potential Wood Turtle (wildlife SAR) habitat was observed within the Project Site. 	<ul style="list-style-type: none"> • Vegetation clearing within proximity to watercourses (Mill Creek and the Tributary) will be conducted outside of the Wood Turtle nesting season (April to May); • If vegetation clearing must take place within the Wood Turtle breeding season (April - May), a non-intrusive nesting survey will be conducted by a qualified biologist; • Silt fencing will be installed around work areas within the 30-metre buffer of on-site watercourses to minimize the risk of a Wood Turtle entering the PDA; • If a Wood Turtle is encountered in the Project Site, the turtle will be relocated in the same direction of travel outside of the active work area. Turtles that are nesting will not be moved; and • Potential Wood Turtle nesting activity will be reported to the NBDERD, Species at Risk Program, and work will cease in nearby areas until a method to proceed has been approved by the NBDERD.
Accidents, Malfunctions and Unplanned Events		
Fire	Increased potential for destruction of habitat and wildlife death from fire.	<ul style="list-style-type: none"> • No chemical or petroleum storage will occur within 30-metres of an environmental sensitive area (<i>i.e.</i>, wetland, watercourse).

Table F-4 Summary of Mitigation Measures for Wildlife and Wildlife Habitat

Project Component	Summary of Potential Interaction	Mitigation Measures
<p>Accidental Release of Contaminants</p>	<p>Increased potential for contaminants to be released into habitat through the accidental release of fuels and lubricants from equipment.</p> <p>Accidental contaminant spills may result in wildlife injury, death and/or destruction of habitat or foraging areas.</p>	<ul style="list-style-type: none"> • Equipment will be kept in good working order; and • Emergency and spill response procedures will be in place prior to construction as per an EMP.
<p>Failure of Erosion Control Structures</p>	<p>Potential for sediment loading in habitats from ground disturbance.</p>	<ul style="list-style-type: none"> • Appropriate erosion and sediment control (ESC) structures will be properly installed around work areas prior to commencement of Project activities. All structures will be inspected regularly to ensure that they are functioning as intended; • At the first evidence that runoff of sediment is starting to occur, Project work will temporarily cease. All siltation prevention devices shall be inspected and monitored; any necessary repairs will be made such that they accomplish their intended function prior to work commencing; • On-site water may be treated in a sedimentation pond, as required, prior to discharge into the surrounding environment; • Once the Project work is complete, all exposed, erodible soil will be permanently stabilized against erosion; and • Existing vegetation will be retained whenever possible and tree/vegetation clearing will be kept to a minimum.

7.0 SUMMARY OF POTENTIAL SIGNIFICANT RESIDUAL EFFECTS

A significant residual effect to the wildlife and wildlife habitat VEC is considered to be:

- A decline in abundance of terrestrial wildlife populations beyond baseline conditions to the extent that the local viability of a given population would be compromised;
- The loss of habitat area and/or habitat function such that the ability of the Assessment Area to continue to support existing populations of SAR and SOCC is lost; and
- The destruction of wildlife SAR or their critical habitat.

The construction and operational phases of the Project are expected to temporarily affect the wildlife and wildlife habitat within the PDA. Vegetation clearing, clay extraction and quarrying activities will result in the loss of approximately 16 ha of existing terrestrial wildlife habitat. A portion of the habitat loss will be offset by the rehabilitation of the PDA in the reclamation phase. The loss of habitat is not expected to impact any wildlife species at a population level, and the habitat conditions that will be lost are widely available in the Assessment Area. Furthermore, the proposed mitigation measures will reduce adverse effects to the extent that the Project is not expected to result in any significant residual effects to wildlife, wildlife habitat or birds. However, a follow-up bird survey will be conducted during the breeding season of 2019 to determine if any bird SAR or SOCC use the Project Site for breeding. Additional mitigation will be applied to avoid effects on bird SAR and SOCC, as required.

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ATTACHMENTS

F-1 - ACCDC Report

DATA REPORT 6203: Saint John, NB

Prepared 17 September 2018
by J. Churchill, Data Manager

CONTENTS OF REPORT

1.0 Preface

- 1.1 Data List
- 1.2 Restrictions
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- Map 1: Buffered Study Area

2.0 Rare and Endangered Species

- 2.1 Flora
- 2.2 Fauna
- Map 2: Flora and Fauna

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- 3.1 Managed Areas
- 3.2 Significant Areas
- Map 3: Special Areas

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5.0 Rare Species within 100 km

- 5.1 Source Bibliography



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
StJohnNB_6203ob.xls	All Rare and legally protected <i>Flora and Fauna</i> in your study area
StJohnNB_6203ob100km.xls	A list of Rare and legally protected <i>Flora and Fauna</i> within 100 km of your study area
StJohnNB_6203ma.xls	All <i>Managed Areas</i> in your study area
StJohnNB_6203ff.xls	Rare and common <i>Freshwater Fish</i> in your study area (DFO database)

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

Tel: (506) 364-2658

sean.blaney@accdc.ca

Animals (Fauna)

John Klymko, Zoologist

Tel: (506) 364-2660

john.klymko@accdc.ca

Plant Communities

Sarah Robinson, Community Ecologist

Tel: (506) 364-2664

sarah.robinson@accdc.ca

Data Management, GIS

James Churchill, Data Manager

Tel: (902) 679-6146

james.churchill@accdc.ca

Billing

Jean Breau

Tel: (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: Duncan Bayne
(902) 648-3536
Duncan.Bayne@novascotia.ca

Western: Sarah Spencer
(902) 634-7555
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Central: Shavonne Meyer
(902) 893-6350
Shavonne.Meyer@novascotia.ca

Central: Kimberly George
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Eastern: Lisa Doucette
(902) 863-4513
Lisa.Doucette@novascotia.ca

Eastern: Terry Power
(902) 563-3370
Terrance.Power@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

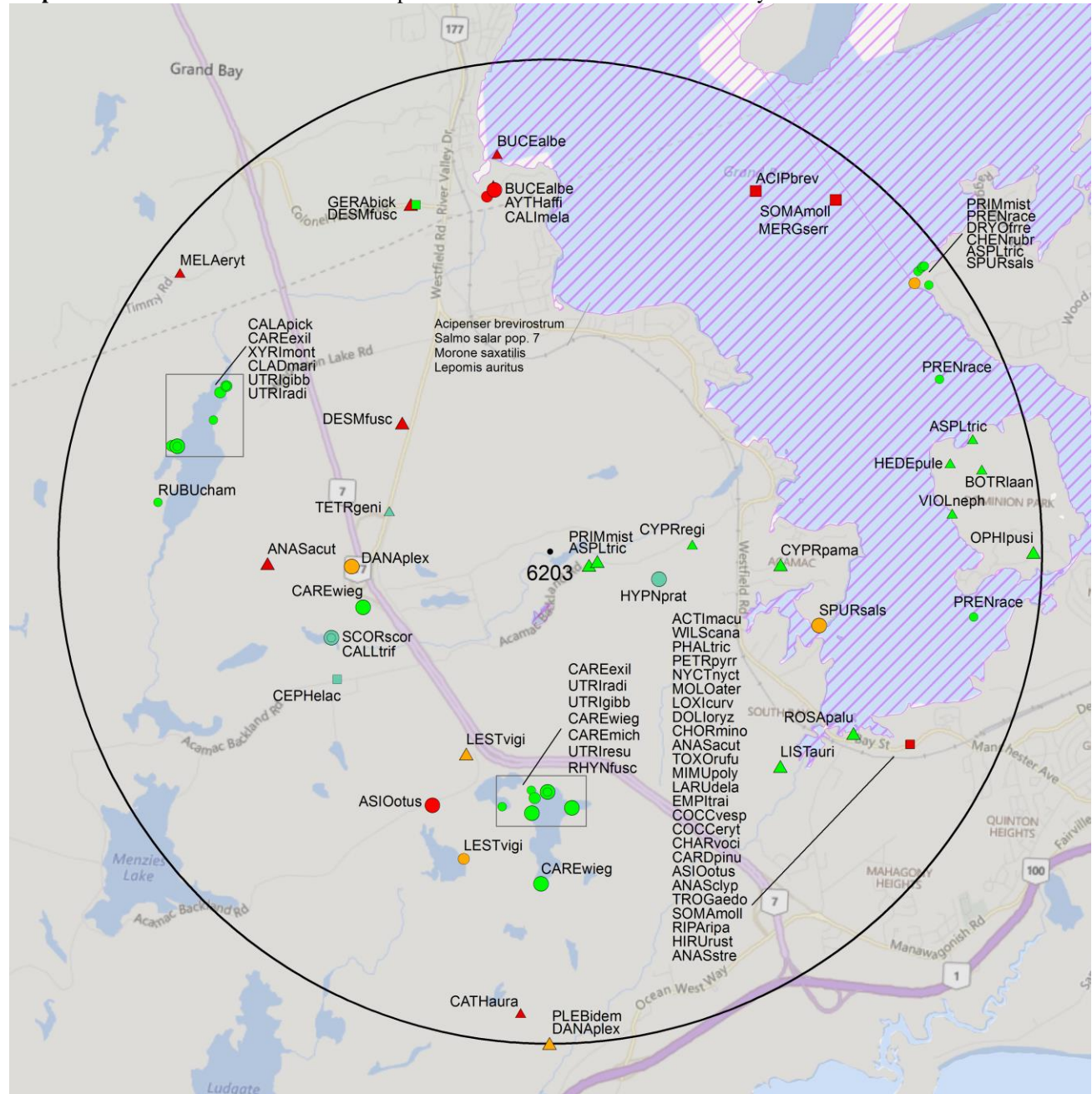
2.1 FLORA

The study area contains 45 records of 26 vascular, 5 records of 5 nonvascular flora (Map 2 and attached: *ob.xls).

2.2 FAUNA

The study area contains 67 records of 33 vertebrate, 9 records of 4 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.



- RESOLUTION**
- 4.7 within 50s of kilometers
 - 4.0 within 10s of kilometers
 - 3.7 within 5s of kilometers
 - △ 3.0 within kilometers
 - △ 2.7 within 500s of meters
 - ◇ 2.0 within 100s of meters
 - ◇ 1.7 within 10s of meters

- HIGHER TAXON**
- vertebrate fauna
 - invertebrate fauna
 - vascular flora
 - nonvascular flora

3.0 SPECIAL AREAS

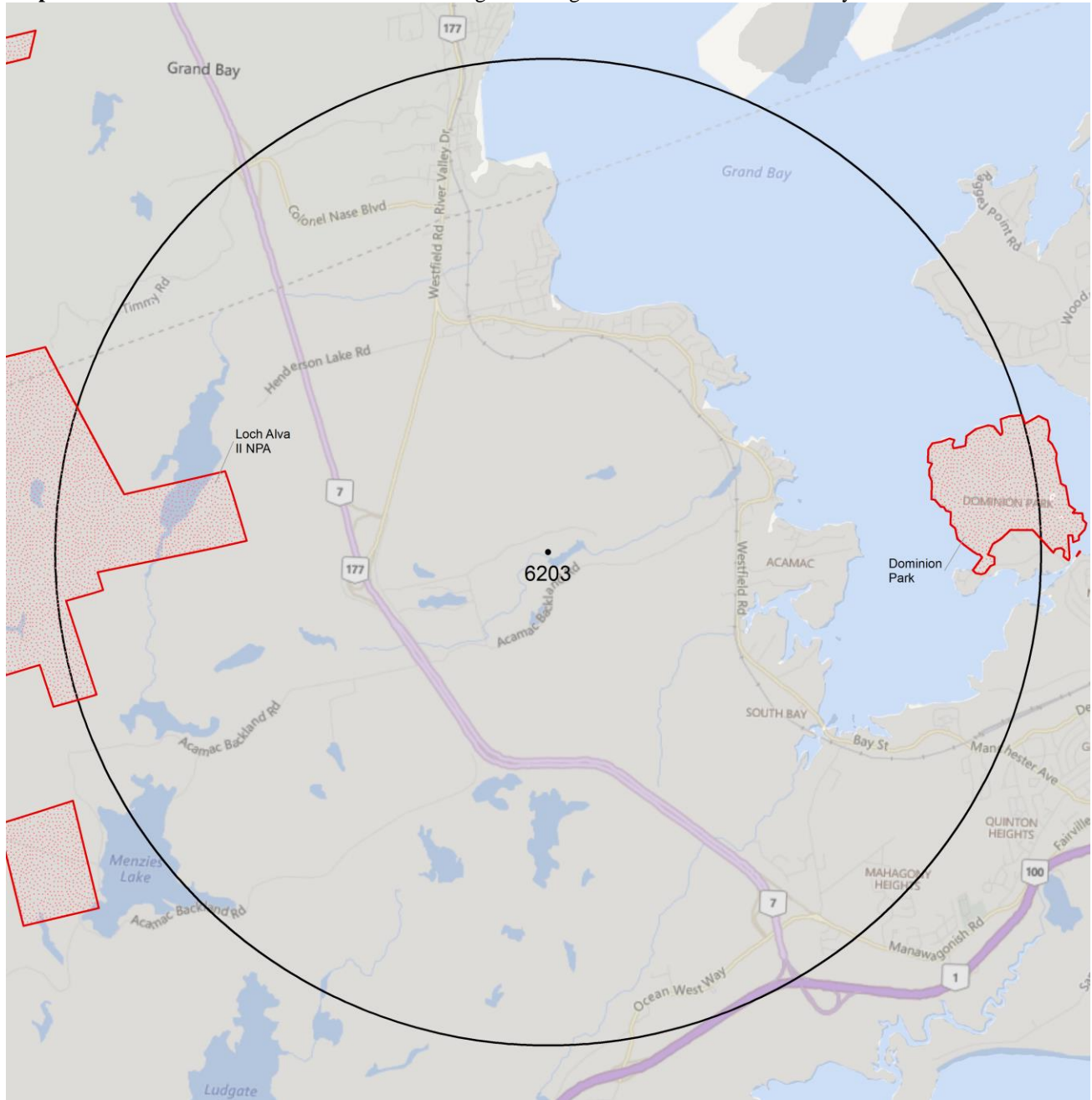
3.1 MANAGED AREAS

The GIS scan identified 2 managed areas in the vicinity of the study area (Map 3 and attached file: *ma*.xls).

3.2 SIGNIFICANT AREAS

The GIS scan identified no biologically significant sites in the vicinity of the study area (Map 3).

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



MANAGED AREAS SIGNIFIANT AREAS



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 (\pm 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	Prov GS Rank	# recs	Distance (km)
N	<i>Calliergon trifarium</i>	Three-ranked Moss				S1?	2 May Be At Risk	1	2.4 \pm 0.0
N	<i>Cephaloziella elachista</i>	Spurred Threadwort				S1S3	6 Not Assessed	1	2.5 \pm 5.0
N	<i>Hypnum pratense</i>	Meadow Plait Moss				S2	3 Sensitive	1	1.1 \pm 0.0
N	<i>Scorpidium scorpioides</i>	Hooked Scorpion Moss				S2S3	3 Sensitive	1	2.4 \pm 0.0
N	<i>Tetraphis geniculata</i>	Geniculate Four-tooth Moss				S3S4	4 Secure	1	1.7 \pm 0.0
P	<i>Chenopodium rubrum</i>	Red Pigweed				S2	3 Sensitive	1	4.7 \pm 0.0
P	<i>Hedeoma pulegioides</i>	American False Pennyroyal				S2	4 Secure	1	4.2 \pm 0.0
P	<i>Cypripedium parviflorum</i> var. <i>makasin</i>	Small Yellow Lady's-Slipper				S2	2 May Be At Risk	1	2.3 \pm 1.0
P	<i>Asplenium trichomanes</i>	Maidenhair Spleenwort				S2	3 Sensitive	2	4.7 \pm 0.0
P	<i>Listera auriculata</i>	Auricled Twayblade				S2S3	3 Sensitive	1	3.2 \pm 1.0
P	<i>Ophioglossum pusillum</i>	Northern Adder's-tongue				S2S3	3 Sensitive	1	4.9 \pm 1.0
P	<i>Prenanthes racemosa</i>	Glaucous Rattlesnakeroot				S3	4 Secure	3	4.3 \pm 0.0
P	<i>Geranium bicknellii</i>	Bicknell's Crane's-bill				S3	4 Secure	1	3.8 \pm 5.0
P	<i>Utricularia radiata</i>	Little Floating Bladderwort				S3	4 Secure	3	2.4 \pm 0.0
P	<i>Primula mistassinica</i>	Mistassini Primrose				S3	4 Secure	2	0.4 \pm 1.0
P	<i>Rosa palustris</i>	Swamp Rose				S3	4 Secure	1	3.6 \pm 1.0
P	<i>Viola nephrophylla</i>	Northern Bog Violet				S3	4 Secure	1	4.1 \pm 0.0
P	<i>Carex exilis</i>	Coastal Sedge				S3	4 Secure	4	2.4 \pm 0.0
P	<i>Carex michauxiana</i>	Michaux's Sedge				S3	4 Secure	1	2.5 \pm 0.0
P	<i>Carex wiegandii</i>	Wiegand's Sedge				S3	4 Secure	3	2.0 \pm 0.0
P	<i>Rhynchospora fusca</i>	Brown Beakrush				S3	4 Secure	4	2.4 \pm 0.0
P	<i>Cypripedium reginae</i>	Showy Lady's-Slipper				S3	3 Sensitive	1	1.4 \pm 0.0
P	<i>Calamagrostis pickingeringii</i>	Pickering's Reed Grass				S3	4 Secure	1	3.7 \pm 0.0
P	<i>Xyris montana</i>	Northern Yellow-Eyed-Grass				S3	4 Secure	1	3.7 \pm 0.0
P	<i>Asplenium trichomanes-ramosum</i>	Green Spleenwort				S3	4 Secure	3	0.5 \pm 1.0
P	<i>Dryopteris fragrans</i> var. <i>remotiuscula</i>	Fragrant Wood Fern				S3	4 Secure	2	4.7 \pm 0.0
P	<i>Botrychium lanceolatum</i> var. <i>angustisegmentum</i>	Lance-Leaf Grape-Fern				S3	3 Sensitive	1	4.5 \pm 0.0
P	<i>Utricularia resupinata</i>	Inverted Bladderwort				S3?	4 Secure	1	2.6 \pm 0.0
P	<i>Utricularia gibba</i>	Humped Bladderwort				S3S4	4 Secure	2	2.4 \pm 0.0
P	<i>Rubus chamaemorus</i>	Cloudberry				S3S4	4 Secure	1	4.0 \pm 0.0
P	<i>Cladium mariscoides</i>	Smooth Twigrush				S3S4	4 Secure	2	3.7 \pm 0.0

4.2 FAUNA

	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)
A	<i>Melanerpes erythrocephalus</i>	Red-headed Woodpecker	Endangered	Threatened		SNA	8 Accidental	1	4.7 \pm 0.0
A	<i>Hirundo rustica</i>	Barn Swallow	Threatened	Threatened	Threatened	S2B,S2M	3 Sensitive	3	4.1 \pm 7.0
A	<i>Riparia riparia</i>	Bank Swallow	Threatened	Threatened		S2S3B,S2S3M	3 Sensitive	2	4.1 \pm 7.0
A	<i>Wilsonia canadensis</i>	Canada Warbler	Threatened	Threatened	Threatened	S3B,S3M	1 At Risk	1	4.2 \pm 7.0
A	<i>Dolichonyx oryzivorus</i>	Bobolink	Threatened	Threatened	Threatened	S3B,S3M	3 Sensitive	2	4.2 \pm 7.0
A	<i>Acipenser brevirostrum</i>	Shortnose Sturgeon	Special Concern	Special Concern	Special Concern	S3	3 Sensitive	1	4.2 \pm 10.0
A	<i>Coccythraustes vespertinus</i>	Evening Grosbeak	Special Concern			S3B,S3S4N,SUM	3 Sensitive	1	4.2 \pm 7.0
A	<i>Chordeiles minor</i>	Common Nighthawk	Special Concern	Threatened	Threatened	S3B,S4M	1 At Risk	3	4.2 \pm 7.0
A	<i>Desmognathus fuscus</i>	Northern Dusky Salamander	Not At Risk			S3	3 Sensitive	2	2.0 \pm 1.0
A	<i>Phalaropus tricolor</i>	Wilson's Phalarope				S1B,S1M	3 Sensitive	1	4.2 \pm 7.0

	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)
A	<i>Aythya affinis</i>	Lesser Scaup				S1B,S4M	4 Secure	1	3.7 ± 0.0
A	<i>Nycticorax nycticorax</i>	Black-crowned Night-heron				S1S2B,S1S2M	3 Sensitive	1	4.2 ± 7.0
A	<i>Empidonax traillii</i>	Willow Flycatcher				S1S2B,S1S2M	3 Sensitive	1	4.2 ± 7.0
A	<i>Troglodytes aedon</i>	House Wren				S1S2B,S1S2M	5 Undetermined	2	4.1 ± 7.0
A	<i>Mimus polyglottos</i>	Northern Mockingbird				S2B,S2M	3 Sensitive	4	4.2 ± 7.0
A	<i>Toxostoma rufum</i>	Brown Thrasher				S2B,S2M	3 Sensitive	1	4.2 ± 7.0
A	<i>Anas strepera</i>	Gadwall				S2B,S3M	4 Secure	3	4.1 ± 7.0
A	<i>Asio otus</i>	Long-eared Owl				S2S3	5 Undetermined	2	2.8 ± 0.0
A	<i>Anas clypeata</i>	Northern Shoveler				S2S3B,S2S3M	4 Secure	2	4.2 ± 7.0
A	<i>Petrochelidon pyrrhonota</i>	Cliff Swallow				S2S3B,S2S3M	3 Sensitive	3	4.2 ± 7.0
A	<i>Loxia curvirostra</i>	Red Crossbill				S3	4 Secure	1	4.2 ± 7.0
A	<i>Carduelis pinus</i>	Pine Siskin				S3	4 Secure	2	4.2 ± 7.0
A	<i>Cathartes aura</i>	Turkey Vulture				S3B,S3M	4 Secure	1	4.7 ± 0.0
A	<i>Charadrius vociferus</i>	Killdeer				S3B,S3M	3 Sensitive	3	4.2 ± 7.0
A	<i>Coccyzus erythrophthalmus</i>	Black-billed Cuckoo				S3B,S3M	4 Secure	1	4.2 ± 7.0
A	<i>Molothrus ater</i>	Brown-headed Cowbird				S3B,S3M	2 May Be At Risk	1	4.2 ± 7.0
A	<i>Somateria mollissima</i>	Common Eider				S3B,S4M,S3N	4 Secure	7	4.1 ± 7.0
A	<i>Anas acuta</i>	Northern Pintail				S3B,S5M	3 Sensitive	2	2.9 ± 1.0
A	<i>Mergus serrator</i>	Red-breasted Merganser				S3B,S5M,S4S5N	4 Secure	1	4.6 ± 8.0
A	<i>Bucephala albeola</i>	Bufflehead				S3M,S2N	3 Sensitive	6	3.7 ± 0.0
A	<i>Actitis macularius</i>	Spotted Sandpiper				S3S4B,S5M	4 Secure	3	4.1 ± 7.0
A	<i>Larus delawarensis</i>	Ring-billed Gull				S3S4B,S5M	4 Secure	1	4.2 ± 7.0
A	<i>Calidris melanotos</i>	Pectoral Sandpiper				S3S4M	4 Secure	1	3.7 ± 0.0
I	<i>Danaus plexippus</i>	Monarch	Endangered	Special Concern	Special Concern	S3B,S3M	3 Sensitive	2	2.0 ± 0.0
I	<i>Plebejus idas empetri</i>	Crowberry Blue				S3	4 Secure	1	5.0 ± 1.0
I	<i>Lestes vigilax</i>	Swamp Spreadwing				S3	3 Sensitive	3	2.2 ± 1.0
I	<i>Spurwinkia salsa</i>	Saltmarsh Hydrobe				S3		3	2.8 ± 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?
<i>Chrysemys picta picta</i>	Eastern Painted Turtle			YES
<i>Chelydra serpentina</i>	Snapping Turtle	Special Concern	Special Concern	No
<i>Glyptemys insculpta</i>	Wood Turtle	Threatened	Threatened	YES
<i>Haliaeetus leucocephalus</i>	Bald Eagle		Endangered	YES
<i>Falco peregrinus pop. 1</i>	Peregrine Falcon - anatum/tundrius pop.	Special Concern	Endangered	YES
<i>Cicindela marginipennis</i>	Cobblestone Tiger Beetle	Endangered	Endangered	No
<i>Coenonympha nipsisquit</i>	Maritime Ringlet	Endangered	Endangered	No
<i>Bat Hibernaculum</i>		[Endangered] ¹	[Endangered] ¹	YES

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
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24	Erskine, A.J. 1992. Maritime Breeding Bird Atlas Database. NS Museum & Nimbus Publ., Halifax, 82,125 recs.
22	Blaney, C.S.; Mazerolle, D.M.; Klymko, J; Spicer, C.D. 2006. Fieldwork 2006. Atlantic Canada Conservation Data Centre. Sackville NB, 8399 recs.
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4	Hicks, Andrew. 2009. Coastal Waterfowl Surveys Database, 2000-08. Canadian Wildlife Service, Sackville, 46488 recs (11149 non-zero).
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1	Bradford, R.G. et al. 1999. Update on the Status of Striped bass (<i>Morone saxatilis</i>) in eastern Canada in 1998.
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1	Edsall, J. 2001. Lepidopteran records in New Brunswick, 1997-99. , Pers. comm. to K.A. Bredin. 91 recs.
1	Klymko, J.J.D. 2018. 2017 field data. Atlantic Canada Conservation Data Centre.
1	Layberry, R.A. 2012. Lepidopteran records for the Maritimes, 1974-2008. Layberry Collection, 1060 recs.
1	McAlpine, D.F. 1998. NBM Science Collections databases to 1998. New Brunswick Museum, Saint John NB, 241 recs.
1	Sollows, M.C. 2008. NBM Science Collections databases: herpetiles. New Brunswick Museum, Saint John NB, download Jan. 2008, 8636 recs.
1	Tingley, S. (compiler). 2001. Butterflies of New Brunswick. , Web site: www.geocities.com/Yosemite/8425/buttrfly . 142 recs.

5.0 RARE SPECIES WITHIN 100 KM

A 100 km buffer around the study area contains 34348 records of 148 vertebrate and 1214 records of 74 invertebrate fauna; 6668 records of 361 vascular, 617 records of 178 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 (\pm the precision, in km, of the record).

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)	Prov
A	<i>Myotis lucifugus</i>	Little Brown Myotis	Endangered	Endangered	Endangered	S1	1 At Risk	60	1.9 \pm 1.0	NB
A	<i>Myotis septentrionalis</i>	Northern Long-eared Myotis	Endangered	Endangered	Endangered	S1	1 At Risk	17	4.0 \pm 0.0	NB
A	<i>Perimyotis subflavus</i>	Eastern Pipistrelle	Endangered	Endangered	Endangered	S1	1 At Risk	8	4.0 \pm 0.0	NB
A	<i>Eubalaena glacialis</i>	North Atlantic Right Whale	Endangered	Endangered	Endangered	S1		7	67.9 \pm 1.0	NB
A	<i>Sterna dougallii</i>	Roseate Tern	Endangered	Endangered	Endangered	S1?B,S1?M	1 At Risk	3	53.0 \pm 0.0	NB
A	<i>Charadrius melodus melodus</i>	Piping Plover melodus ssp	Endangered	Endangered	Endangered	S1B,S1M	1 At Risk	23	6.6 \pm 0.0	NB
A	<i>Dermochelys coriacea</i> (Atlantic pop.)	Leatherback Sea Turtle - Atlantic pop.	Endangered	Endangered	Endangered	S1S2N	1 At Risk	4	11.9 \pm 0.0	NB
A	<i>Salmo salar pop. 1</i>	Atlantic Salmon - Inner Bay of Fundy pop.	Endangered	Endangered	Endangered	S2	2 May Be At Risk	53	28.5 \pm 1.0	NB
A	<i>Calidris canutus rufa</i>	Red Knot rufa ssp	Endangered		Endangered	S2M	1 At Risk	377	6.6 \pm 0.0	NB
A	<i>Rangifer tarandus pop. 2</i>	Woodland Caribou (Atlantic-Gasp [r-sie pop.]	Endangered	Endangered	Extirpated	SX	0.1 Extirpated	4	25.1 \pm 5.0	NB
A	<i>Sturnella magna</i>	Eastern Meadowlark	Threatened	Threatened	Threatened	S1B,S1M	2 May Be At Risk	45	29.3 \pm 7.0	NB
A	<i>Ixobrychus exilis</i>	Least Bittern	Threatened	Threatened	Threatened	S1S2B,S1S2M	1 At Risk	29	11.6 \pm 7.0	NB
A	<i>Hylocichla mustelina</i>	Wood Thrush	Threatened	Threatened	Threatened	S1S2B,S1S2M	2 May Be At Risk	189	6.4 \pm 7.0	NB
A	<i>Caprimulgus vociferus</i>	Whip-Poor-Will	Threatened	Threatened	Threatened	S2B,S2M	1 At Risk	86	7.8 \pm 7.0	NB
A	<i>Hirundo rustica</i>	Barn Swallow	Threatened	Threatened	Threatened	S2B,S2M	3 Sensitive	1362	4.1 \pm 7.0	NB
A	<i>Catharus bicknelli</i>	Bicknell's Thrush	Threatened	Special Concern	Threatened	S2B,S2M	1 At Risk	24	7.2 \pm 1.0	NB
A	<i>Glyptemys insculpta</i>	Wood Turtle	Threatened	Threatened	Threatened	S2S3	1 At Risk	96	0.4 \pm 10.0	NB
A	<i>Chaetura pelagica</i>	Chimney Swift	Threatened	Threatened	Threatened	S2S3B,S2M	1 At Risk	447	10.4 \pm 7.0	NB
A	<i>Riparia riparia</i>	Bank Swallow	Threatened	Threatened	Threatened	S2S3B,S2S3M	3 Sensitive	447	4.1 \pm 7.0	NB
A	<i>Acipenser oxyrinchus</i>	Atlantic Sturgeon	Threatened		Threatened	S3	4 Secure	1	44.5 \pm 1.0	NB
A	<i>Wilsonia canadensis</i>	Canada Warbler	Threatened	Threatened	Threatened	S3B,S3M	1 At Risk	868	4.2 \pm 7.0	NB
A	<i>Dolichonyx oryzivorus</i>	Bobolink	Threatened	Threatened	Threatened	S3B,S3M	3 Sensitive	1042	4.2 \pm 7.0	NB
A	<i>Anguilla rostrata</i>	American Eel	Threatened		Threatened	S4	4 Secure	40	5.5 \pm 0.0	NB
A	<i>Osmerus mordax pop. 2</i>	Lake Utopia Smelt large-bodied pop.	Threatened		Threatened			2	48.6 \pm 10.0	NB
A	<i>Coturnicops noveboracensis</i>	Yellow Rail	Special Concern	Special Concern	Special Concern	S1?B,SUM	2 May Be At Risk	3	58.5 \pm 7.0	NB
A	<i>Histrionicus histrionicus pop. 1</i>	Harlequin Duck - Eastern pop.	Special Concern	Special Concern	Endangered	S1B,S1S2N,S2M	1 At Risk	159	25.0 \pm 17.0	NB
A	<i>Falco peregrinus pop. 1</i>	Peregrine Falcon - anatum/tundrius	Special Concern	Special Concern	Endangered	S1B,S3M	1 At Risk	625	4.2 \pm 7.0	NB
A	<i>Asio flammeus</i>	Short-eared Owl	Special Concern	Special Concern	Special Concern	S2B,S2M	3 Sensitive	17	38.6 \pm 7.0	NB
A	<i>Bucephala islandica</i> (Eastern pop.)	Barrow's Goldeneye - Eastern pop.	Special Concern	Special Concern	Special Concern	S2M,S2N	3 Sensitive	56	6.9 \pm 0.0	NB
A	<i>Balaenoptera physalus</i>	Fin Whale - Atlantic pop.	Special Concern	Special Concern	Special Concern	S2S3		5	13.8 \pm 1.0	NB
A	<i>Acipenser brevirostrum</i>	Shortnose Sturgeon	Special Concern	Special Concern	Special Concern	S3	3 Sensitive	7	4.2 \pm 10.0	NB
A	<i>Chelydra serpentina</i>	Snapping Turtle	Special Concern	Special Concern	Special Concern	S3	3 Sensitive	33	26.2 \pm 0.0	NB
A	<i>Euphagus carolinus</i>	Rusty Blackbird	Special Concern	Special Concern	Special Concern	S3B,S3M	2 May Be At Risk	123	7.2 \pm 2.0	NB
A	<i>Contopus cooperi</i>	Olive-sided Flycatcher	Special Concern	Threatened	Threatened	S3B,S3M	1 At Risk	354	6.4 \pm 7.0	NB
A	<i>Coccothraustes vespertinus</i>	Evening Grosbeak	Special Concern			S3B,S3S4N,SUM	3 Sensitive	286	4.2 \pm 7.0	NB
A	<i>Chordeiles minor</i>	Common Nighthawk	Special Concern	Threatened	Threatened	S3B,S4M	1 At Risk	331	4.2 \pm 7.0	NB

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)	Prov
A	<i>Phalaropus lobatus</i>	Red-necked Phalarope	Special Concern			S3M	3 Sensitive	216	6.6 ± 0.0	NB
A	<i>Phocoena phocoena</i> (NW Atlantic pop.)	Harbour Porpoise - Northwest Atlantic pop.	Special Concern	Threatened		S4		231	10.2 ± 0.0	NB
A	<i>Contopus virens</i>	Eastern Wood-Pewee	Special Concern	Special Concern	Special Concern	S4B,S4M	4 Secure	637	6.4 ± 7.0	NB
A	<i>Podiceps auritus</i>	Horned Grebe	Special Concern		Special Concern	S4N,S4M	4 Secure	270	6.3 ± 0.0	NB
A	<i>Odobenus rosmarus rosmarus</i>	Atlantic Walrus	Special Concern		Extirpated	SX		1	77.3 ± 5.0	NS
A	<i>Hemidactylium scutatum</i>	Four-toed Salamander	Not At Risk			S1?	5 Undetermined	11	80.8 ± 0.0	NS
A	<i>Bubo scandiacus</i>	Snowy Owl	Not At Risk			S1N,S2S3M	4 Secure	30	7.5 ± 3.0	NB
A	<i>Accipiter cooperii</i>	Cooper's Hawk	Not At Risk			S1S2B,S1S2M	2 May Be At Risk	18	38.5 ± 7.0	NB
A	<i>Fulica americana</i>	American Coot	Not At Risk			S1S2B,S1S2M	3 Sensitive	8	38.8 ± 7.0	NB
A	<i>Aegolius funereus</i>	Boreal Owl	Not At Risk			S1S2B,SUM	2 May Be At Risk	5	34.6 ± 7.0	NB
A	<i>Sorex dispar</i>	Long-tailed Shrew	Not At Risk	Special Concern		S2	3 Sensitive	2	25.8 ± 1.0	NB
A	<i>Buteo lineatus</i>	Red-shouldered Hawk	Not At Risk	Special Concern		S2B,S2M	2 May Be At Risk	50	24.4 ± 1.0	NB
A	<i>Chlidonias niger</i>	Black Tern	Not At Risk			S2B,S2M	3 Sensitive	136	30.3 ± 7.0	NB
A	<i>Globicephala melas</i>	Long-finned Pilot Whale	Not At Risk			S2S3	3	13.0 ± 1.0	NB	
A	<i>Lynx canadensis</i>	Canadian Lynx	Not At Risk		Endangered	S3	1 At Risk	13	26.2 ± 1.0	NB
A	<i>Desmognathus fuscus</i>	Northern Dusky Salamander	Not At Risk			S3	3 Sensitive	58	2.0 ± 1.0	NB
A	<i>Megaptera novaeangliae</i>	Humpback Whale (NW Atlantic pop.)	Not At Risk	Special Concern		S3		4	67.9 ± 5.0	NB
A	<i>Sterna hirundo</i>	Common Tern	Not At Risk			S3B,SUM	3 Sensitive	280	5.4 ± 10.0	NB
A	<i>Podiceps grisegena</i>	Red-necked Grebe	Not At Risk			S3M,S2N	3 Sensitive	679	7.1 ± 0.0	NB
A	<i>Lagenorhynchus acutus</i>	Atlantic White-sided Dolphin	Not At Risk			S3S4		1	13.0 ± 1.0	NB
A	<i>Haliaeetus leucocephalus</i>	Bald Eagle	Not At Risk		Endangered	S4	1 At Risk	1437	4.2 ± 7.0	NB
A	<i>Canis lupus</i>	Gray Wolf	Not At Risk		Extirpated	SX	0.1 Extirpated	4	5.8 ± 1.0	NB
A	<i>Puma concolor pop. 1</i>	Eastern Cougar	Data Deficient		Endangered	SNA	5 Undetermined	82	17.9 ± 1.0	NB
A	<i>Morone saxatilis</i>	Striped Bass	E,E,SC			S3	2 May Be At Risk	10	9.5 ± 10.0	NB
A	<i>Salvelinus alpinus</i>	Arctic Char				S1	3 Sensitive	3	77.0 ± 0.0	NB
A	<i>Vireo flavifrons</i>	Yellow-throated Vireo				S1?B,S1?M	8 Accidental	16	7.2 ± 1.0	NB
A	<i>Tringa melanoleuca</i>	Greater Yellowlegs				S1?B,S5M	4 Secure	951	6.4 ± 1.0	NB
A	<i>Aythya americana</i>	Redhead				S1B,S1M	8 Accidental	4	10.4 ± 7.0	NB
A	<i>Gallinula chloropus</i>	Common Moorhen				S1B,S1M	3 Sensitive	25	12.8 ± 1.0	NB
A	<i>Grus canadensis</i>	Sandhill Crane				S1B,S1M	8 Accidental	9	30.4 ± 0.0	NB
A	<i>Bartramia longicauda</i>	Upland Sandpiper				S1B,S1M	3 Sensitive	45	34.6 ± 0.0	NB
A	<i>Phalaropus tricolor</i>	Wilson's Phalarope				S1B,S1M	3 Sensitive	58	4.2 ± 7.0	NB
A	<i>Leucophaeus atricilla</i>	Laughing Gull				S1B,S1M	3 Sensitive	83	7.2 ± 1.0	NB
A	<i>Progne subis</i>	Purple Martin				S1B,S1M	2 May Be At Risk	231	10.4 ± 7.0	NB
A	<i>Thryothorus ludovicianus</i>	Carolina Wren				S1B,S1M	8 Accidental	35	10.4 ± 7.0	NB
A	<i>Oxyura jamaicensis</i>	Ruddy Duck				S1B,S2S3M	4 Secure	52	6.3 ± 0.0	NB
A	<i>Uria aalge</i>	Common Murre				S1B,S3N,S3M	4 Secure	122	22.3 ± 15.0	NB
A	<i>Aythya affinis</i>	Lesser Scaup				S1B,S4M	4 Secure	203	3.7 ± 0.0	NB
A	<i>Aythya marila</i>	Greater Scaup				S1B,S4M,S2N	4 Secure	37	6.3 ± 0.0	NB
A	<i>Eremophila alpestris</i>	Horned Lark				S1B,S4N,S5M	2 May Be At Risk	30	6.4 ± 1.0	NB
A	<i>Sterna paradisaea</i>	Arctic Tern				S1B,SUM	2 May Be At Risk	126	27.1 ± 16.0	NB
A	<i>Fratercula arctica</i>	Atlantic Puffin				S1B,SUN,SUM	3 Sensitive	157	22.3 ± 15.0	NB
A	<i>Branta bernicla</i>	Brant				S1N, S2S3M	4 Secure	544	6.3 ± 0.0	NB
A	<i>Chroicocephalus ridibundus</i>	Black-headed Gull				S1N,S2M	3 Sensitive	42	7.2 ± 1.0	NB
A	<i>Butorides virescens</i>	Green Heron				S1S2B,S1S2M	3 Sensitive	22	11.6 ± 7.0	NB
A	<i>Nycticorax nycticorax</i>	Black-crowned Night-heron				S1S2B,S1S2M	3 Sensitive	62	4.2 ± 7.0	NB
A	<i>Empidonax traillii</i>	Willow Flycatcher				S1S2B,S1S2M	3 Sensitive	104	4.2 ± 7.0	NB
A	<i>Stelgidopteryx serripennis</i>	Northern Rough-winged Swallow				S1S2B,S1S2M	2 May Be At Risk	21	9.8 ± 7.0	NB

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)	Prov
A	<i>Troglodytes aedon</i>	House Wren				S1S2B,S1S2M	5 Undetermined	32	4.1 ± 7.0	NB
A	<i>Rissa tridactyla</i>	Black-legged Kittiwake				S1S2B,S4N,S5M	4 Secure	49	34.0 ± 7.0	NB
A	<i>Calidris bairdii</i>	Baird's Sandpiper				S1S2M	3 Sensitive	101	6.3 ± 1.0	NB
A	<i>Cistothorus palustris</i>	Marsh Wren				S2B,S2M	3 Sensitive	89	6.4 ± 7.0	NB
A	<i>Mimus polyglottos</i>	Northern Mockingbird				S2B,S2M	3 Sensitive	155	4.2 ± 7.0	NB
A	<i>Toxostoma rufum</i>	Brown Thrasher				S2B,S2M	3 Sensitive	94	4.2 ± 7.0	NB
A	<i>Pooecetes gramineus</i>	Vesper Sparrow				S2B,S2M	2 May Be At Risk	82	15.4 ± 0.0	NB
A	<i>Anas strepera</i>	Gadwall				S2B,S3M	4 Secure	122	4.1 ± 7.0	NB
A	<i>Alca torda</i>	Razorbill				S2B,S3N,S3M	4 Secure	147	22.3 ± 15.0	NB
A	<i>Pinicola enucleator</i>	Pine Grosbeak				S2B,S4S5N,S4S5M	3 Sensitive	32	37.2 ± 7.0	NB
A	<i>Tringa solitaria</i>	Solitary Sandpiper				S2B,S5M	4 Secure	258	6.3 ± 0.0	NB
A	<i>Oceanodroma leucorhoa</i>	Leach's Storm-Petrel				S2B,SUM	3 Sensitive	125	40.0 ± 0.0	NB
A	<i>Chen caerulescens</i>	Snow Goose				S2M	4 Secure	7	6.3 ± 1.0	NB
A	<i>Phalacrocorax carbo</i>	Great Cormorant				S2N,S2M	4 Secure	312	5.8 ± 3.0	NB
A	<i>Somateria spectabilis</i>	King Eider				S2N,S2M	4 Secure	56	46.0 ± 9.0	NB
A	<i>Larus hyperboreus</i>	Glaucous Gull				S2N,S2M	4 Secure	156	6.3 ± 0.0	NB
A	<i>Asio otus</i>	Long-eared Owl				S2S3	5 Undetermined	19	2.8 ± 0.0	NB
A	<i>Picoides dorsalis</i>	American Three-toed Woodpecker				S2S3	3 Sensitive	10	46.5 ± 7.0	NB
A	<i>Salmo salar</i>	Atlantic Salmon				S2S3	2 May Be At Risk	35	10.8 ± 1.0	NB
A	<i>Anas clypeata</i>	Northern Shoveler				S2S3B,S2S3M	4 Secure	96	4.2 ± 7.0	NB
A	<i>Myiarchus crinitus</i>	Great Crested Flycatcher				S2S3B,S2S3M	3 Sensitive	242	7.2 ± 4.0	NB
A	<i>Petrochelidon pyrrhonota</i>	Cliff Swallow				S2S3B,S2S3M	3 Sensitive	560	4.2 ± 7.0	NB
A	<i>Pluvialis dominica</i>	American Golden-Plover				S2S3M	3 Sensitive	265	6.4 ± 1.0	NB
A	<i>Calcarius lapponicus</i>	Lapland Longspur				S2S3N,SUM	3 Sensitive	38	6.3 ± 1.0	NB
A	<i>Cephus grylle</i>	Black Guillemot				S3	4 Secure	772	6.4 ± 1.0	NB
A	<i>Loxia curvirostra</i>	Red Crossbill				S3	4 Secure	140	4.2 ± 7.0	NB
A	<i>Carduelis pinus</i>	Pine Siskin				S3	4 Secure	310	4.2 ± 7.0	NB
A	<i>Prosopium cylindraceum</i>	Round Whitefish				S3	4 Secure	1	74.9 ± 0.0	NB
A	<i>Salvelinus namaycush</i>	Lake Trout				S3	3 Sensitive	4	11.5 ± 0.0	NB
A	<i>Sorex maritimensis</i>	Maritime Shrew				S3	4 Secure	2	81.2 ± 0.0	NS
A	<i>Eptesicus fuscus</i>	Big Brown Bat				S3	3 Sensitive	48	8.3 ± 1.0	NB
A	<i>Cathartes aura</i>	Turkey Vulture				S3B,S3M	4 Secure	296	4.7 ± 0.0	NB
A	<i>Rallus limicola</i>	Virginia Rail				S3B,S3M	3 Sensitive	119	11.9 ± 7.0	NB
A	<i>Charadrius vociferus</i>	Killdeer				S3B,S3M	3 Sensitive	816	4.2 ± 7.0	NB
A	<i>Tringa semipalmata</i>	Willet				S3B,S3M	3 Sensitive	174	6.6 ± 0.0	NB
A	<i>Coccyzus erythrophthalmus</i>	Black-billed Cuckoo				S3B,S3M	4 Secure	184	4.2 ± 7.0	NB
A	<i>Vireo gilvus</i>	Warbling Vireo				S3B,S3M	4 Secure	232	9.1 ± 7.0	NB
A	<i>Piranga olivacea</i>	Scarlet Tanager				S3B,S3M	4 Secure	130	10.4 ± 7.0	NB
A	<i>Passerina cyanea</i>	Indigo Bunting				S3B,S3M	4 Secure	110	10.1 ± 7.0	NB
A	<i>Molothrus ater</i>	Brown-headed Cowbird				S3B,S3M	2 May Be At Risk	292	4.2 ± 7.0	NB
A	<i>Icterus galbula</i>	Baltimore Oriole				S3B,S3M	4 Secure	196	5.8 ± 2.0	NB
A	<i>Somateria mollissima</i>	Common Eider				S3B,S4M,S3N	4 Secure	1930	4.1 ± 7.0	NB
A	<i>Dendroica tigrina</i>	Cape May Warbler				S3B,S4S5M	4 Secure	143	9.1 ± 7.0	NB
A	<i>Anas acuta</i>	Northern Pintail				S3B,S5M	3 Sensitive	54	2.9 ± 1.0	NB
A	<i>Mergus serrator</i>	Red-breasted Merganser				S3B,S5M,S4S5N	4 Secure	382	4.6 ± 8.0	NB
A	<i>Arenaria interpres</i>	Ruddy Turnstone				S3M	4 Secure	697	6.4 ± 1.0	NB
A	<i>Phalaropus fulicarius</i>	Red Phalarope				S3M	3 Sensitive	120	40.0 ± 0.0	NB
A	<i>Melanitta nigra</i>	Black Scoter				S3M,S1S2N	3 Sensitive	810	6.5 ± 0.0	NB
A	<i>Bucephala albeola</i>	Bufflehead				S3M,S2N	3 Sensitive	1116	3.7 ± 0.0	NB
A	<i>Calidris maritima</i>	Purple Sandpiper				S3M,S3N	4 Secure	251	6.6 ± 0.0	NB
A	<i>Uria lomvia</i>	Thick-billed Murre				S3N,S3M	5 Undetermined	67	18.5 ± 8.0	NB
A	<i>Synaptomys cooperi</i>	Southern Bog Lemming				S3S4	4 Secure	79	29.7 ± 1.0	NB

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)	Prov
A	<i>Tyrannus tyrannus</i>	Eastern Kingbird				S3S4B,S3S4M	3 Sensitive	527	7.0 ± 2.0	NB
A	<i>Actitis macularius</i>	Spotted Sandpiper				S3S4B,S5M	4 Secure	900	4.1 ± 7.0	NB
A	<i>Gallinago delicata</i>	Wilson's Snipe				S3S4B,S5M	4 Secure	683	6.6 ± 0.0	NB
A	<i>Larus delawarensis</i>	Ring-billed Gull				S3S4B,S5M	4 Secure	245	4.2 ± 7.0	NB
A	<i>Dendroica striata</i>	Blackpoll Warbler				S3S4B,S5M	4 Secure	88	11.4 ± 0.0	NB
A	<i>Pluvialis squatarola</i>	Black-bellied Plover				S3S4M	4 Secure	841	6.6 ± 0.0	NB
A	<i>Limosa haemastica</i>	Hudsonian Godwit				S3S4M	4 Secure	92	6.6 ± 0.0	NB
A	<i>Calidris pusilla</i>	Semipalmated Sandpiper				S3S4M	4 Secure	2032	5.7 ± 3.0	NB
A	<i>Calidris melanotos</i>	Pectoral Sandpiper				S3S4M	4 Secure	306	3.7 ± 0.0	NB
A	<i>Calidris alba</i>	Sanderling				S3S4M,S1N	3 Sensitive	846	6.3 ± 1.0	NB
A	<i>Morus bassanus</i>	Northern Gannet				SHB,S5M	4 Secure	829	5.7 ± 0.0	NB
A	<i>Lanius ludovicianus</i>	Loggerhead Shrike				SXB,SXM	1 At Risk	1	85.2 ± 1.0	NB
C	<i>Quercus macrocarpa</i> - <i>Acer rubrum</i> / <i>Onoclea sensibilis</i> - <i>Carex arcta</i> Forest	Bur Oak - Red Maple / Sensitive Fern - Northern Clustered Sedge Forest				S2		1	67.7 ± 0.0	
C	<i>Acer saccharinum</i> / <i>Onoclea sensibilis</i> - <i>Lysimachia terrestris</i> Forest	Silver Maple / Sensitive Fern - Swamp Yellow Loosestrife Forest				S3		1	54.9 ± 0.0	NB
C	<i>Acer saccharum</i> - <i>Fraxinus americana</i> / <i>Polystichum</i> <i>acrostichoides</i> Forest	Sugar Maple - White Ash / Christmas Fern Forest				S3S4		1	31.5 ± 0.0	NB
I	<i>Cicindela marginipennis</i>	Cobblestone Tiger Beetle	Endangered	Endangered	Endangered	S1	1 At Risk	42	71.0 ± 0.0	NB
I	<i>Gomphus ventricosus</i>	Skillet Clubtail	Endangered		Endangered	S1S2	2 May Be At Risk	48	55.8 ± 0.0	NB
I	<i>Danaus plexippus</i>	Monarch	Endangered	Special Concern	Special Concern	S3B,S3M	3 Sensitive	115	2.0 ± 0.0	NB
I	<i>Ophiogomphus howei</i>	Pygmy Snaketail	Special Concern	Special Concern	Special Concern	S2	2 May Be At Risk	14	48.8 ± 0.0	NB
I	<i>Alasmidonta varicosa</i>	Brook Floater	Special Concern		Special Concern	S2	3 Sensitive	1	86.3 ± 0.0	NB
I	<i>Lampsilis cariosa</i>	Yellow Lampmussel	Special Concern	Special Concern	Special Concern	S2	3 Sensitive	100	32.2 ± 1.0	NB
I	<i>Bombus terricola</i>	Yellow-banded Bumblebee	Special Concern		Special Concern	S3?	3 Sensitive	22	45.2 ± 0.0	NB
I	<i>Appalachina sayana</i>	Spike-lip Crater	Not At Risk			S3?		1	14.7 ± 1.0	NB
I	<i>Haematopota rara</i>	Shy Cleg				S1	5 Undetermined	1	83.7 ± 1.0	NB
I	<i>Lycaena dorcas</i>	Dorcas Copper				S1	2 May Be At Risk	1	69.6 ± 0.0	NB
I	<i>Erora laeta</i>	Early Hairstreak				S1	2 May Be At Risk	4	76.1 ± 1.0	NS
I	<i>Arigomphus furcifer</i>	Lilypad Clubtail				S1	5 Undetermined	8	62.0 ± 0.0	NB
I	<i>Polites origenes</i>	Crossline Skipper				S1?	5 Undetermined	5	49.8 ± 0.0	NB
I	<i>Plebejus saepiolus</i>	Greenish Blue				S1S2	4 Secure	3	46.4 ± 0.0	NB
I	<i>Ophiogomphus colubrinus</i>	Boreal Snaketail				S1S2	2 May Be At Risk	36	26.1 ± 1.0	NB
I	<i>Brachyleptura circumdata</i>	a Longhorned Beetle				S2		6	70.0 ± 0.0	NB
I	<i>Satyrrium calanus falacer</i>	Banded Hairstreak				S2	4 Secure	19	77.9 ± 1.0	NS
I	<i>Strymon melinus</i>	Grey Hairstreak				S2	4 Secure	6	13.9 ± 0.0	NB
I	<i>Aeshna clepsydra</i>	Mottled Darner				S2	3 Sensitive	13	10.4 ± 1.0	NB
I	<i>Somatochlora tenebrosa</i>	Clamp-Tipped Emerald				S2	5 Undetermined	7	78.2 ± 0.0	NB
I	<i>Ladona exusta</i>	White Corporal				S2	5 Undetermined	12	37.1 ± 0.0	NB
I	<i>Hetaerina americana</i>	American Rubyspot				S2	3 Sensitive	2	85.6 ± 0.0	NB
I	<i>Ischnura posita</i>	Fragile Forktail				S2	2 May Be At Risk	22	53.2 ± 0.0	NB
I	<i>Callophrys henrici</i>	Henry's Elfin				S2S3	4 Secure	15	76.1 ± 1.0	NS
I	<i>Celithemis martha</i>	Martha's Pennant				S2S3	5 Undetermined	4	5.2 ± 0.0	NB
I	<i>Sphaeroderus nitidicollis</i>	a Ground Beetle				S3	4 Secure	1	70.1 ± 0.0	NB
I	<i>Lepturoopsis biforis</i>	a Longhorned Beetle				S3		1	11.1 ± 1.0	NB

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)	Prov
I	<i>Orthosoma brunneum</i>	a Longhorned Beetle				S3		1	70.2 ± 5.0	NB
I	<i>Elaphrus americanus</i>	a Ground Beetle				S3	4 Secure	1	72.7 ± 0.0	NB
I	<i>Desmocerus palliatus</i>	Elderberry Borer				S3		4	11.1 ± 1.0	NB
I	<i>Agonum excavatum</i>	a Ground Beetle				S3	4 Secure	1	72.7 ± 0.0	NB
I	<i>Clivina americana</i>	a Ground Beetle				S3	4 Secure	1	72.7 ± 0.0	NB
I	<i>Olisthopus parmatus</i>	a Ground Beetle				S3	4 Secure	1	70.1 ± 0.0	NB
I	<i>Paratachys scitulus</i>	a Ground Beetle				S3	5 Undetermined	1	72.7 ± 0.0	NB
I	<i>Coccinella hieroglyphica kirbyi</i>	a Ladybird Beetle				S3	4 Secure	1	11.1 ± 1.0	NB
I	<i>Hippodamia parenthesis</i>	Parenthesis Lady Beetle				S3	4 Secure	2	11.1 ± 1.0	NB
I	<i>Stenocorus vittigera</i>	a Longhorned Beetle				S3		1	72.6 ± 0.0	NB
I	<i>Gnathacmaeops pratensis</i>	a Longhorned Beetle				S3		5	11.1 ± 1.0	NB
I	<i>Pogonocherus mixtus</i>	a Longhorned Beetle				S3		1	11.1 ± 1.0	NB
I	<i>Badister neopulchellus</i>	a Ground Beetle				S3	4 Secure	1	72.7 ± 0.0	NB
I	<i>Calathus gregarius</i>	a Ground Beetle				S3	4 Secure	1	97.0 ± 1.0	NB
I	<i>Saperda lateralis</i>	a Longhorned Beetle				S3		2	9.9 ± 0.0	NB
I	<i>Hesperia sassacus</i>	Indian Skipper				S3	4 Secure	9	76.9 ± 0.0	NB
I	<i>Euphyes bimaculata</i>	Two-spotted Skipper				S3	4 Secure	12	43.4 ± 0.0	NB
I	<i>Lycaena hyllus</i>	Bronze Copper				S3	3 Sensitive	6	15.1 ± 1.0	NB
I	<i>Satyrium acadica</i>	Acadian Hairstreak				S3	4 Secure	23	11.1 ± 1.0	NB
I	<i>Callophrys polios</i>	Hoary Elfin				S3	4 Secure	15	11.1 ± 1.0	NB
I	<i>Plebejus idas empetri</i>	Crowberry Blue				S3	4 Secure	15	5.0 ± 1.0	NB
I	<i>Speyeria aphrodite</i>	Aphrodite Fritillary				S3	4 Secure	29	5.6 ± 1.0	NB
I	<i>Boloria bellona</i>	Meadow Fritillary				S3	4 Secure	40	41.3 ± 0.0	NB
I	<i>Polygonia satyrus</i>	Satyr Comma				S3	4 Secure	14	16.6 ± 1.0	NB
I	<i>Polygonia gracilis</i>	Hoary Comma				S3	4 Secure	7	12.3 ± 7.0	NB
I	<i>Nymphalis l-album</i>	Compton Tortoiseshell				S3	4 Secure	25	9.7 ± 1.0	NB
I	<i>Gomphus vastus</i>	Cobra Clubtail				S3	3 Sensitive	58	37.7 ± 0.0	NB
I	<i>Gomphus abbreviatus</i>	Spine-crowned Clubtail				S3	4 Secure	25	12.9 ± 0.0	NB
I	<i>Gomphaeschna furcillata</i>	Harlequin Darner				S3	5 Undetermined	19	82.2 ± 1.0	NB
I	<i>Dorocordulia lepida</i>	Petite Emerald				S3	4 Secure	38	10.5 ± 0.0	NB
I	<i>Somatochlora cingulata</i>	Lake Emerald				S3	4 Secure	11	10.5 ± 0.0	NB
I	<i>Somatochlora forcipata</i>	Forcipate Emerald				S3	4 Secure	20	70.1 ± 1.0	NB
I	<i>Williamsonia fletcheri</i>	Ebony Boghaunter				S3	4 Secure	9	62.8 ± 0.0	NB
I	<i>Lestes eurinus</i>	Amber-Winged Spreadwing				S3	4 Secure	8	9.0 ± 1.0	NB
I	<i>Lestes vigilax</i>	Swamp Spreadwing				S3	3 Sensitive	38	2.2 ± 1.0	NB
I	<i>Enallagma geminatum</i>	Skimming Bluet				S3	5 Undetermined	12	12.9 ± 0.0	NB
I	<i>Enallagma signatum</i>	Orange Bluet				S3	4 Secure	16	47.4 ± 0.0	NB
I	<i>Stylurus scudderii</i>	Zebra Clubtail				S3	4 Secure	73	37.7 ± 0.0	NB
I	<i>Alasmidonta undulata</i>	Triangle Floater				S3	3 Sensitive	40	12.5 ± 1.0	NB
I	<i>Leptodea ochracea</i>	Tidewater Mucket				S3	4 Secure	60	7.2 ± 1.0	NB
I	<i>Striatura ferrea</i>	Black Striate				S3		1	83.1 ± 1.0	NB
I	<i>Neohelix albolabris</i>	Whitelip				S3		2	60.2 ± 0.0	NB
I	<i>Spurwinkia salsa</i>	Saltmarsh Hydrobe				S3		34	2.8 ± 0.0	NB
I	<i>Pantala hymenaea</i>	Spot-Winged Glider				S3B,S3M	4 Secure	5	10.0 ± 1.0	NB
I	<i>Satyrium liparops strigosum</i>	Striped Hairstreak				S3S4	4 Secure	7	77.3 ± 7.0	NB
I	<i>Cupido comyntas</i>	Eastern Tailed Blue				S3S4	4 Secure	8	20.9 ± 5.0	NB
I	<i>Coccinella transversoguttata richardsoni</i>	Transverse Lady Beetle				SH	2 May Be At Risk	2	6.6 ± 0.0	NB
N	<i>Erioderma mollissimum</i>	Graceful Felt Lichen	Endangered		Endangered	SH	2 May Be At Risk	1	93.2 ± 1.0	NB
N	<i>Erioderma</i>	Boreal Felt Lichen - Atlantic pop.	Endangered	Endangered	Endangered	SH	1 At Risk	3	72.7 ± 1.0	NB

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)	Prov
	<i>pedicellatum</i> (<i>Atlantic pop.</i>)									
N	<i>Peltigera hydrothyria</i>	Eastern Waterfan	Threatened			S1	5 Undetermined	2	93.0 ± 1.0	NB
N	<i>Anzia colpodes</i>	Black-foam Lichen	Threatened			S1S2	5 Undetermined	1	97.5 ± 1.0	NB
N	<i>Degelia plumbea</i>	BluDegelia plumbeae Felt Lichen	Special Concern	Special Concern	Special Concern	S1	2 May Be At Risk	4	71.5 ± 5.0	NB
N	<i>Pseudevernia cladonia</i>	Ghost Antler Lichen	Not At Risk			S2S3	5 Undetermined	19	20.8 ± 0.0	NB
N	<i>Bryum muehlenbeckii</i>	Muehlenbeck's Bryum Moss				S1	2 May Be At Risk	1	7.3 ± 1.0	NB
N	<i>Didymodon rigidulus</i> var. <i>gracilis</i>	a moss				S1	2 May Be At Risk	1	96.2 ± 1.0	NB
N	<i>Sphagnum macrophyllum</i>	Sphagnum				S1	2 May Be At Risk	2	9.5 ± 0.0	NB
N	<i>Syntrichia ruralis</i>	a Moss				S1	2 May Be At Risk	1	75.0 ± 0.0	NB
N	<i>Coscinodon cribrosus</i>	Sieve-Toothed Moss				S1	2 May Be At Risk	1	8.3 ± 0.0	NB
N	<i>Cladonia metacorallifera</i>	Reptilian Pixie-cup Lichen				S1	5 Undetermined	4	90.2 ± 1.0	NB
N	<i>Peltigera collina</i>	Tree Pelt Lichen				S1	2 May Be At Risk	1	80.8 ± 10.0	NB
N	<i>Peltigera malacea</i>	Veinless Pelt Lichen				S1	5 Undetermined	1	92.7 ± 1.0	NB
N	<i>Bryoria bicolor</i>	Electrified Horsehair Lichen				S1	2 May Be At Risk	1	92.7 ± 1.0	NB
N	<i>Hygrobriella laxifolia</i>	Lax Notchwort				S1?	6 Not Assessed	1	90.3 ± 1.0	NB
N	<i>Atrichum angustatum</i>	Lesser Smoothcap Moss				S1?	2 May Be At Risk	1	88.7 ± 3.0	NS
N	<i>Bartramia ithyphylla</i>	Straight-leaved Apple Moss				S1?	2 May Be At Risk	1	90.3 ± 0.0	NB
N	<i>Calliergon trifarium</i>	Three-ranked Moss				S1?	2 May Be At Risk	1	2.4 ± 0.0	NB
N	<i>Dichelyma falcatum</i>	a Moss				S1?	2 May Be At Risk	2	22.8 ± 1.0	NB
N	<i>Dicranum bonjeanii</i>	Bonjean's Broom Moss				S1?	2 May Be At Risk	1	84.1 ± 1.0	NB
N	<i>Entodon brevisetus</i>	a Moss				S1?	2 May Be At Risk	1	99.8 ± 10.0	NB
N	<i>Eurhynchium hians</i>	Light Beaked Moss				S1?	2 May Be At Risk	3	72.3 ± 0.0	NB
N	<i>Homomallium adnatum</i>	Adnate Hairy-gray Moss				S1?	2 May Be At Risk	2	99.8 ± 10.0	NB
N	<i>Plagiothecium latebricola</i>	Alder Silk Moss				S1?	2 May Be At Risk	2	8.6 ± 0.0	NB
N	<i>Racomitrium ericoides</i>	a Moss				S1?	2 May Be At Risk	1	79.0 ± 3.0	NB
N	<i>Rhytidium rugosum</i>	Wrinkle-leaved Moss				S1?	2 May Be At Risk	2	74.3 ± 0.0	NB
N	<i>Splachnum pennsylvanicum</i>	Southern Dung Moss				S1?	2 May Be At Risk	1	85.8 ± 1.0	NB
N	<i>Platylomella lescurii</i>	a Moss				S1?	5 Undetermined	1	70.9 ± 1.0	NB
N	<i>Cladopodiella francisci</i>	Holt's Notchwort				S1S2	6 Not Assessed	1	96.2 ± 1.0	NB
N	<i>Harpanthus flotovianus</i>	Great Mountain Flapwort				S1S2	6 Not Assessed	1	92.2 ± 1.0	NB
N	<i>Jungermannia obovata</i>	Egg Flapwort				S1S2	6 Not Assessed	1	19.4 ± 0.0	NB
N	<i>Pallavicinia lyellii</i>	Lyell's Ribbonwort				S1S2	6 Not Assessed	2	22.8 ± 1.0	NB
N	<i>Reboulia hemisphaerica</i>	Purple-margined Liverwort				S1S2	6 Not Assessed	1	76.4 ± 1.0	NB
N	<i>Brachythecium acuminatum</i>	Acuminate Ragged Moss				S1S2	5 Undetermined	6	64.7 ± 100.0	NB
N	<i>Bryum salinum</i>	a Moss				S1S2	2 May Be At Risk	2	31.3 ± 1.0	NB
N	<i>Campylium radicale</i>	Long-stalked Fine Wet Moss				S1S2	5 Undetermined	1	85.8 ± 1.0	NB
N	<i>Tortula obtusifolia</i>	a Moss				S1S2	2 May Be At Risk	1	52.5 ± 0.0	NB
N	<i>Distichium inclinatum</i>	Inclined Iris Moss				S1S2	2 May Be At Risk	5	96.0 ± 0.0	NB
N	<i>Ditrichum pallidum</i>	Pale Cow-hair Moss				S1S2	2 May Be At Risk	3	74.2 ± 3.0	NS
N	<i>Drummondia prorepens</i>	a Moss				S1S2	2 May Be At Risk	1	89.0 ± 0.0	NS
N	<i>Hygrohypnum bestii</i>	Best's Brook Moss				S1S2	3 Sensitive	4	81.8 ± 0.0	NB
N	<i>Sphagnum platyphyllum</i>	Flat-leaved Peat Moss				S1S2	5 Undetermined	2	92.8 ± 1.0	NB
N	<i>Timmia norvegica</i>	a moss				S1S2	2 May Be At Risk	3	60.3 ± 0.0	NB
N	<i>Timmia norvegica</i> var. <i>excurrens</i>	a moss				S1S2	2 May Be At Risk	1	96.0 ± 0.0	NB
N	<i>Tomentypnum falcifolium</i>	Sickle-leaved Golden Moss				S1S2	2 May Be At Risk	1	22.9 ± 1.0	NB

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N	<i>Tortella humilis</i>	Small Crisp Moss				S1S2	2 May Be At Risk	4	91.1 ± 0.0	NB
N	<i>Pseudotaxiphyllum distichaceum</i>	a Moss				S1S2	2 May Be At Risk	3	31.3 ± 1.0	NB
N	<i>Hamatocaulis vernicosus</i>	a Moss				S1S2	2 May Be At Risk	1	32.9 ± 100.0	NB
N	<i>Bryohaplocladium microphyllum</i>	Tiny-leaved Haplocladium Moss				S1S2	2 May Be At Risk	1	74.2 ± 3.0	NS
N	<i>Umbilicaria vellea</i>	Grizzled Rocktripe Lichen				S1S2	5 Undetermined	1	96.3 ± 1.0	NB
N	<i>Calypogeia neesiana</i>	Nees' Pouchwort				S1S3	6 Not Assessed	1	30.8 ± 1.0	NB
N	<i>Cephalozia elachista</i>	Spurred Threadwort				S1S3	6 Not Assessed	1	2.5 ± 5.0	NB
N	<i>Porella pinnata</i>	Pinnate Scalewort				S1S3	6 Not Assessed	2	36.9 ± 1.0	NB
N	<i>Amphidium mougeotii</i>	a Moss				S2	3 Sensitive	10	76.1 ± 8.0	NB
N	<i>Anomodon viticulosus</i>	a Moss				S2	2 May Be At Risk	5	7.9 ± 1.0	NB
N	<i>Cirriphyllum piliferum</i>	Hair-pointed Moss				S2	3 Sensitive	2	76.9 ± 0.0	NB
N	<i>Cynodontium strumiferum</i>	Strumose Dogtooth Moss				S2	3 Sensitive	1	76.1 ± 8.0	NB
N	<i>Dicranella palustris</i>	Drooping-Leaved Fork Moss				S2	3 Sensitive	9	53.4 ± 100.0	NB
N	<i>Didymodon ferrugineus</i>	a moss				S2	3 Sensitive	2	29.6 ± 1.0	NB
N	<i>Anomodon tristis</i>	a Moss				S2	2 May Be At Risk	2	77.0 ± 1.0	NB
N	<i>Hypnum pratense</i>	Meadow Plait Moss				S2	3 Sensitive	1	1.1 ± 0.0	NB
N	<i>Isopterygiopsis pulchella</i>	Neat Silk Moss				S2	3 Sensitive	3	95.4 ± 0.0	NB
N	<i>Meesia triquetra</i>	Three-ranked Cold Moss				S2	2 May Be At Risk	1	64.7 ± 100.0	NB
N	<i>Physcomitrium immersum</i>	a Moss				S2	3 Sensitive	6	36.9 ± 1.0	NB
N	<i>Platydictya jungermannioides</i>	False Willow Moss				S2	3 Sensitive	3	92.4 ± 0.0	NB
N	<i>Pohlia elongata</i>	Long-necked Nodding Moss				S2	3 Sensitive	7	91.1 ± 0.0	NB
N	<i>Sphagnum centrale</i>	Central Peat Moss				S2	3 Sensitive	7	77.7 ± 5.0	NS
N	<i>Sphagnum lindbergii</i>	Lindberg's Peat Moss				S2	3 Sensitive	8	9.8 ± 1.0	NB
N	<i>Sphagnum flexuosum</i>	Flexuous Peatmoss				S2	3 Sensitive	1	98.8 ± 0.0	NB
N	<i>Tayloria serrata</i>	Serrate Trumpet Moss				S2	3 Sensitive	5	40.5 ± 1.0	NB
N	<i>Tetradontium brownianum</i>	Little Georgia				S2	3 Sensitive	3	95.6 ± 1.0	NB
N	<i>Tetraplodon mnioides</i>	Entire-leaved Nitrogen Moss				S2	3 Sensitive	3	24.8 ± 0.0	NB
N	<i>Thamnobryum alleghaniense</i>	a Moss				S2	3 Sensitive	6	60.3 ± 0.0	NB
N	<i>Tortula mucronifolia</i>	Mucronate Screw Moss				S2	3 Sensitive	1	7.5 ± 0.0	NB
N	<i>Ulotia phyllantha</i>	a Moss				S2	3 Sensitive	5	31.3 ± 1.0	NB
N	<i>Anomobryum filiforme</i>	a moss				S2	5 Undetermined	5	59.1 ± 0.0	NB
N	<i>Cladonia macrophylla</i>	Fig-leaved Lichen				S2	5 Undetermined	2	99.4 ± 1.0	NB
N	<i>Fuscopannaria leucosticta</i>	Rimmed Shingles Lichen				S2	2 May Be At Risk	28	40.8 ± 0.0	NB
N	<i>Leptogium corticola</i>	Blistered Jellyskin Lichen				S2	2 May Be At Risk	1	80.4 ± 0.0	NB
N	<i>Nephroma laevigatum</i>	Mustard Kidney Lichen				S2	2 May Be At Risk	2	80.8 ± 10.0	NB
N	<i>Andreaea rothii</i>	a Moss				S2?	3 Sensitive	2	28.6 ± 0.0	NB
N	<i>Brachythecium digastrum</i>	a Moss				S2?	3 Sensitive	2	57.3 ± 0.0	NB
N	<i>Bryum pallescens</i>	Pale Bryum Moss				S2?	5 Undetermined	2	7.7 ± 1.0	NB
N	<i>Dichelyma capillaceum</i>	Hairlike Dichelyma Moss				S2?	3 Sensitive	1	98.7 ± 4.0	NB
N	<i>Dicranum spurium</i>	Spurred Broom Moss				S2?	3 Sensitive	2	17.9 ± 0.0	NB
N	<i>Hygrohypnum montanum</i>	a Moss				S2?	3 Sensitive	2	73.6 ± 1.0	NB
N	<i>Schistostega pennata</i>	Luminous Moss				S2?	3 Sensitive	3	53.4 ± 100.0	NB
N	<i>Seligeria campylopoda</i>	a Moss				S2?	3 Sensitive	1	32.9 ± 100.0	NB
N	<i>Seligeria diversifolia</i>	a Moss				S2?	3 Sensitive	2	59.1 ± 0.0	NB
N	<i>Sphagnum</i>	a Peatmoss				S2?	3 Sensitive	2	21.0 ± 10.0	NB

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N	<i>angermanicum</i>									
N	<i>Plagiomnium rostratum</i>	Long-beaked Leafy Moss				S2?	3 Sensitive	6	60.2 ± 0.0	NB
N	<i>Ramalina pollinaria</i>	Chalky Ramalina Lichen				S2?	5 Undetermined	1	99.4 ± 1.0	NB
N	<i>Nephroma arcticum</i>	Arctic Kidney Lichen				S2?	3 Sensitive	1	93.4 ± 1.0	NB
N	<i>Bryum uliginosum</i>	a Moss				S2S3	3 Sensitive	2	30.6 ± 4.0	NB
N	<i>Buxbaumia aphylla</i>	Brown Shield Moss				S2S3	3 Sensitive	2	74.6 ± 15.0	NB
N	<i>Calliergonella cuspidata</i>	Common Large Wetland Moss				S2S3	3 Sensitive	5	7.9 ± 1.0	NB
N	<i>Campylium polygamum</i>	a Moss				S2S3	3 Sensitive	1	93.8 ± 0.0	NB
N	<i>Palustriella falcata</i>	a Moss				S2S3	3 Sensitive	2	90.5 ± 0.0	NB
N	<i>Didymodon rigidulus</i>	Rigid Screw Moss				S2S3	3 Sensitive	9	88.4 ± 8.0	NB
N	<i>Ephemerum serratum</i>	a Moss				S2S3	3 Sensitive	2	74.7 ± 0.0	NB
N	<i>Fissidens bushii</i>	Bush's Pocket Moss				S2S3	3 Sensitive	1	88.7 ± 3.0	NS
N	<i>Orthotrichum speciosum</i>	Showy Bristle Moss				S2S3	5 Undetermined	4	60.9 ± 2.0	NB
N	<i>Pohlia prolifera</i>	Cottony Nodding Moss				S2S3	3 Sensitive	3	95.7 ± 1.0	NB
N	<i>Racomitrium fasciculare</i>	a Moss				S2S3	3 Sensitive	2	68.8 ± 0.0	NB
N	<i>Scorpidium scorpioides</i>	Hooked Scorpion Moss				S2S3	3 Sensitive	4	2.4 ± 0.0	NB
N	<i>Sphagnum subfulvum</i>	a Peatmoss				S2S3	2 May Be At Risk	3	22.9 ± 1.0	NB
N	<i>Taxiphyllum deplanatum</i>	Imbricate Yew-leaved Moss				S2S3	3 Sensitive	1	31.3 ± 1.0	NB
N	<i>Zygodon viridissimus</i>	a Moss				S2S3	2 May Be At Risk	3	70.7 ± 5.0	NB
N	<i>Schistidium agassizii</i>	Elf Bloom Moss				S2S3	3 Sensitive	4	60.9 ± 2.0	NB
N	<i>Loeskeobryum brevirostre</i>	a Moss				S2S3	3 Sensitive	8	80.3 ± 3.0	NS
N	<i>Cyrtomnium hymenophylloides</i>	Short-pointed Lantern Moss				S2S3	3 Sensitive	3	90.5 ± 0.0	NB
N	<i>Cladonia acuminata</i>	Scantly Clad Pixie Lichen				S2S3	5 Undetermined	2	93.2 ± 1.0	NB
N	<i>Cladonia ramulosa</i>	Bran Lichen				S2S3	5 Undetermined	4	97.5 ± 1.0	NB
N	<i>Parmeliopsis ambigua</i>	Green Starburst Lichen				S2S3	5 Undetermined	1	90.8 ± 1.0	NB
N	<i>Sphaerophorus globosus</i>	Northern Coral Lichen				S2S3	3 Sensitive	5	89.5 ± 1.0	NB
N	<i>Cynodontium tenellum</i>	Delicate Dogtooth Moss				S3	3 Sensitive	1	31.3 ± 1.0	NB
N	<i>Hypnum curvifolium</i>	Curved-leaved Plait Moss				S3	3 Sensitive	7	70.7 ± 5.0	NB
N	<i>Tortella fragilis</i>	Fragile Twisted Moss				S3	3 Sensitive	1	96.0 ± 0.0	NB
N	<i>Schistidium maritimum</i>	a Moss				S3	4 Secure	6	31.3 ± 1.0	NB
N	<i>Hymenostylium recurvirostre</i>	Hymenostylium Moss				S3	3 Sensitive	4	95.7 ± 1.0	NB
N	<i>Solorina saccata</i>	Woodland Owl Lichen				S3	5 Undetermined	6	90.8 ± 1.0	NB
N	<i>Normandina pulchella</i>	Rimmed Elf-ear Lichen				S3	5 Undetermined	3	92.0 ± 1.0	NB
N	<i>Cladonia farinacea</i>	Farinose Pixie Lichen				S3	5 Undetermined	2	99.4 ± 1.0	NB
N	<i>Cladonia strepsilis</i>	Olive Cladonia Lichen				S3	4 Secure	1	38.1 ± 0.0	NB
N	<i>Leptogium lichenoides</i>	Tattered Jellyskin Lichen				S3	5 Undetermined	6	96.3 ± 1.0	NB
N	<i>Nephroma bellum</i>	Naked Kidney Lichen				S3	4 Secure	2	92.5 ± 1.0	NB
N	<i>Peltigera degenii</i>	Lustrous Pelt Lichen				S3	5 Undetermined	3	93.0 ± 1.0	NB
N	<i>Leptogium laceroides</i>	Short-bearded Jellyskin Lichen				S3	3 Sensitive	1	98.5 ± 1.0	NB
N	<i>Peltigera membranacea</i>	Membranous Pelt Lichen				S3	5 Undetermined	6	90.8 ± 1.0	NB
N	<i>Cladonia carneola</i>	Crowned Pixie-cup Lichen				S3	5 Undetermined	1	99.4 ± 1.0	NB
N	<i>Cladonia deformis</i>	Lesser Sulphur-cup Lichen				S3	4 Secure	4	90.2 ± 1.0	NB
N	<i>Aulacomnium androgynum</i>	Little Groove Moss				S3?	4 Secure	7	70.7 ± 5.0	NB
N	<i>Dicranella rufescens</i>	Red Forklet Moss				S3?	5 Undetermined	3	85.0 ± 4.0	NB
N	<i>Rhytidiadelphus loreus</i>	Lanky Moss				S3?	2 May Be At Risk	2	88.8 ± 10.0	NB
N	<i>Sphagnum lescurii</i>	a Peatmoss				S3?	5 Undetermined	6	19.9 ± 0.0	NB
N	<i>Stereocaulon</i>	Coralloid Foam Lichen				S3?	5 Undetermined	1	99.4 ± 1.0	NB

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N	<i>subcoralloides</i>									
N	<i>Anomodon rugelii</i>	Rugel's Anomodon Moss				S3S4	3 Sensitive	2	88.7 ± 3.0	NS
N	<i>Barbula convoluta</i>	Lesser Bird's-claw Beard Moss				S3S4	4 Secure	1	88.4 ± 8.0	NB
N	<i>Brachythecium velutinum</i>	Velvet Ragged Moss				S3S4	4 Secure	4	69.6 ± 0.0	NB
N	<i>Dicranella cerviculata</i>	a Moss				S3S4	3 Sensitive	5	31.3 ± 1.0	NB
N	<i>Dicranum majus</i>	Greater Broom Moss				S3S4	4 Secure	9	24.8 ± 0.0	NB
N	<i>Dicranum leioneuron</i>	a Dicranum Moss				S3S4	4 Secure	1	95.9 ± 0.0	NB
N	<i>Encalypta ciliata</i>	Fringed Extinguisher Moss				S3S4	3 Sensitive	1	96.4 ± 0.0	NB
N	<i>Fissidens bryoides</i>	Lesser Pocket Moss				S3S4	4 Secure	2	29.8 ± 5.0	NB
N	<i>Heterocladium dimorphum</i>	Dimorphous Tangle Moss				S3S4	4 Secure	1	60.9 ± 2.0	NB
N	<i>Isopterygiopsis muelleriana</i>	a Moss				S3S4	4 Secure	8	69.6 ± 0.0	NB
N	<i>Myurella julacea</i>	Small Mouse-tail Moss				S3S4	4 Secure	3	76.1 ± 8.0	NB
N	<i>Physcomitrium pyriforme</i>	Pear-shaped Urn Moss				S3S4	3 Sensitive	5	71.5 ± 0.0	NB
N	<i>Pogonatum dentatum</i>	Mountain Hair Moss				S3S4	4 Secure	2	31.3 ± 1.0	NB
N	<i>Sphagnum quinquefarium</i>	Five-ranked Peat Moss				S3S4	4 Secure	1	96.1 ± 0.0	NB
N	<i>Sphagnum torreyanum</i>	a Peatmoss				S3S4	4 Secure	6	9.3 ± 0.0	NB
N	<i>Sphagnum austinii</i>	Austin's Peat Moss				S3S4	4 Secure	1	8.6 ± 1.0	NB
N	<i>Sphagnum contortum</i>	Twisted Peat Moss				S3S4	4 Secure	1	16.8 ± 0.0	NB
N	<i>Splachnum rubrum</i>	Red Collar Moss				S3S4	4 Secure	1	35.1 ± 1.0	NB
N	<i>Tetraphis geniculata</i>	Geniculate Four-tooth Moss				S3S4	4 Secure	7	1.7 ± 0.0	NB
N	<i>Tetraplodon angustatus</i>	Toothed-leaved Nitrogen Moss				S3S4	4 Secure	2	28.9 ± 0.0	NB
N	<i>Weissia controversa</i>	Green-Cushioned Weissia				S3S4	4 Secure	2	83.9 ± 0.0	NS
N	<i>Abietinella abietina</i>	Wiry Fern Moss				S3S4	4 Secure	1	96.0 ± 0.0	NB
N	<i>Trichostomum tenuirostre</i>	Acid-Soil Moss				S3S4	4 Secure	4	69.6 ± 0.0	NB
N	<i>Pannaria rubiginosa</i>	Brown-eyed Shingle Lichen				S3S4	3 Sensitive	2	95.1 ± 1.0	NB
N	<i>Ramalina thrausta</i>	Angelhair Ramalina Lichen				S3S4	5 Undetermined	7	89.5 ± 1.0	NB
N	<i>Hypogymnia vittata</i>	Slender Monk's Hood Lichen				S3S4	4 Secure	18	89.5 ± 1.0	NB
N	<i>Cladonia floerkeana</i>	Gritty British Soldiers Lichen				S3S4	4 Secure	5	38.1 ± 0.0	NB
N	<i>Hypocenomyce friesii</i>	a Lichen				S3S4	5 Undetermined	1	96.3 ± 1.0	NB
N	<i>Melanelia panniformis</i>	Shingled Camouflage Lichen				S3S4	5 Undetermined	3	92.7 ± 1.0	NB
N	<i>Nephroma parile</i>	Powdery Kidney Lichen				S3S4	4 Secure	5	40.7 ± 0.0	NB
N	<i>Protopannaria pezizoides</i>	Brown-gray Moss-shingle Lichen				S3S4	4 Secure	14	72.9 ± 0.0	NB
N	<i>Pseudocyphellaria perpetua</i>	Gilded Specklebelly Lichen				S3S4	3 Sensitive	41	77.5 ± 0.0	NB
N	<i>Pannaria conoplea</i>	Mealy-rimmed Shingle Lichen				S3S4	3 Sensitive	6	80.4 ± 0.0	NB
N	<i>Anaptychia palmulata</i>	Shaggy Fringed Lichen				S3S4	3 Sensitive	1	98.2 ± 1.0	NB
N	<i>Peltigera neopolydactyla</i>	Undulating Pelt Lichen				S3S4	5 Undetermined	5	90.8 ± 1.0	NB
N	<i>Hypocenomyce scalaris</i>	Common Clam Lichen				S3S4	5 Undetermined	1	99.4 ± 1.0	NB
N	<i>Dermatocarpon luridum</i>	Brookside Stippleback Lichen				S3S4	4 Secure	12	40.9 ± 0.0	NB
N	<i>Grimmia anodon</i>	Toothless Grimmiid Moss				SH	5 Undetermined	2	9.1 ± 10.0	NB
N	<i>Leucodon brachypus</i>	a Moss				SH	2 May Be At Risk	6	62.9 ± 100.0	NB
N	<i>Thelia hirtella</i>	a Moss				SH	2 May Be At Risk	2	64.7 ± 100.0	NB
N	<i>Cyrto-hypnum minutulum</i>	Tiny Cedar Moss				SH	2 May Be At Risk	3	95.7 ± 10.0	NB
P	<i>Juglans cinerea</i>	Butternut	Endangered	Endangered	Endangered	S1	1 At Risk	54	22.3 ± 1.0	NB
P	<i>Polemonium</i>	Van Brunt's Jacob's-ladder	Threatened	Threatened	Threatened	S1	1 At Risk	72	27.0 ± 0.0	NB

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P	<i>vanbruntiae</i> <i>Symphotrichum anticostense</i>	Anticosti Aster	Threatened	Threatened	Endangered	S2S3	1 At Risk	4	93.4 ± 0.0	NB
P	<i>Isoetes prototypus</i>	Prototype Quillwort	Special Concern	Special Concern	Endangered	S2	1 At Risk	27	23.9 ± 0.0	NB
P	<i>Pterospora andromedea</i>	Woodland Pinedrops			Endangered	S1	1 At Risk	11	91.2 ± 0.0	NB
P	<i>Cryptotaenia canadensis</i>	Canada Honewort				S1	2 May Be At Risk	1	72.9 ± 1.0	NB
P	<i>Sanicula trifoliata</i>	Large-Fruited Sanicle				S1	2 May Be At Risk	1	40.4 ± 5.0	NB
P	<i>Antennaria parlinii</i>	a Pussytoes				S1	2 May Be At Risk	7	56.6 ± 1.0	NB
P	<i>Antennaria howellii</i>	Pussy-Toes				S1	2 May Be At Risk	4	7.3 ± 1.0	NB
P	<i>ssp. petaloidea</i>					S1	2 May Be At Risk	4	7.3 ± 1.0	NB
P	<i>Bidens discoidea</i>	Swamp Beggarticks				S1	2 May Be At Risk	3	70.0 ± 0.0	NB
P	<i>Pseudognaphalium obtusifolium</i>	Eastern Cudweed				S1	2 May Be At Risk	2	88.7 ± 0.0	NB
P	<i>Helianthus decapetalus</i>	Ten-rayed Sunflower				S1	2 May Be At Risk	13	92.2 ± 0.0	NB
P	<i>Hieracium kalmii</i>	Kalm's Hawkweed				S1	2 May Be At Risk	5	19.7 ± 1.0	NB
P	<i>Hieracium kalmii</i> var. <i>kalmii</i>	Kalm's Hawkweed				S1	2 May Be At Risk	7	20.4 ± 1.0	NB
P	<i>Hieracium paniculatum</i>	Panicled Hawkweed				S1	2 May Be At Risk	17	49.7 ± 0.0	NB
P	<i>Hieracium robinsonii</i>	Robinson's Hawkweed				S1	3 Sensitive	4	90.6 ± 0.0	NB
P	<i>Senecio pseudoarnica</i>	Seabeach Ragwort				S1	2 May Be At Risk	14	80.7 ± 0.0	NB
P	<i>Cardamine parviflora</i> var. <i>arenicola</i>	Small-flowered Bittercress				S1	2 May Be At Risk	14	32.7 ± 0.0	NB
P	<i>Cardamine concatenata</i>	Cut-leaved Toothwort				S1	2 May Be At Risk	1	90.6 ± 1.0	NB
P	<i>Draba arabisans</i>	Rock Whitlow-Grass				S1	2 May Be At Risk	22	18.5 ± 0.0	NB
P	<i>Draba breweri</i> var. <i>cana</i>	Brewer's Whitlow-grass				S1	2 May Be At Risk	10	92.7 ± 0.0	NB
P	<i>Draba glabella</i>	Rock Whitlow-Grass				S1	2 May Be At Risk	10	6.5 ± 1.0	NB
P	<i>Minuartia groenlandica</i>	Greenland Stitchwort				S1	2 May Be At Risk	4	15.3 ± 0.0	NB
P	<i>Chenopodium capitatum</i>	Strawberry-blite				S1	2 May Be At Risk	4	10.3 ± 1.0	NB
P	<i>Chenopodium simplex</i>	Maple-leaved Goosefoot				S1	2 May Be At Risk	9	78.6 ± 1.0	NB
P	<i>Callitriche terrestris</i>	Terrestrial Water-Starwort				S1	5 Undetermined	1	99.5 ± 0.0	NB
P	<i>Triadenum virginicum</i>	Virginia St John's-wort				S1	2 May Be At Risk	2	15.1 ± 0.0	NB
P	<i>Viburnum acerifolium</i>	Maple-leaved Viburnum				S1	2 May Be At Risk	10	94.2 ± 0.0	NB
P	<i>Corema conradii</i>	Broom Crowberry				S1	2 May Be At Risk	1	8.5 ± 10.0	NB
P	<i>Vaccinium boreale</i>	Northern Blueberry				S1	2 May Be At Risk	1	29.5 ± 0.0	NB
P	<i>Vaccinium corymbosum</i>	Highbush Blueberry				S1	3 Sensitive	1	79.5 ± 5.0	NB
P	<i>Chamaesyce polygonifolia</i>	Seaside Spurge				S1	2 May Be At Risk	8	76.6 ± 0.0	NB
P	<i>Desmodium glutinosum</i>	Large Tick-Trefoil				S1	2 May Be At Risk	1	96.7 ± 1.0	NB
P	<i>Lespedeza capitata</i>	Round-headed Bush-clover				S1	2 May Be At Risk	8	70.9 ± 0.0	NB
P	<i>Gentiana rubricaulis</i>	Purple-stemmed Gentian				S1	2 May Be At Risk	13	45.5 ± 0.0	NB
P	<i>Lomatogonium rotatum</i>	Marsh Felwort				S1	2 May Be At Risk	2	57.0 ± 0.0	NB
P	<i>Proserpinaca pectinata</i>	Comb-leaved Mermaidweed				S1	2 May Be At Risk	3	31.8 ± 0.0	NB
P	<i>Pycnanthemum virginianum</i>	Virginia Mountain Mint				S1	2 May Be At Risk	4	39.6 ± 0.0	NB
P	<i>Lysimachia hybrida</i>	Lowland Yellow Loosestrife				S1	2 May Be At Risk	15	90.4 ± 0.0	NB
P	<i>Lysimachia quadrifolia</i>	Whorled Yellow Loosestrife				S1	2 May Be At Risk	16	9.3 ± 1.0	NB
P	<i>Primula laurentiana</i>	Laurentian Primrose				S1	2 May Be At Risk	28	70.3 ± 2.0	NS
P	<i>Ranunculus sceleratus</i>	Cursed Buttercup				S1	2 May Be At Risk	6	6.7 ± 0.0	NB
P	<i>Crataegus jonesiae</i>	Jones' Hawthorn				S1	2 May Be At Risk	5	71.0 ± 0.0	NB

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P	<i>Galium brevipes</i>	Limestone Swamp Bedstraw				S1	2 May Be At Risk	1	68.7 ± 5.0	NB
P	<i>Saxifraga paniculata</i> <i>ssp. neogaea</i>	White Mountain Saxifrage				S1	2 May Be At Risk	24	19.0 ± 10.0	NB
P	<i>Agalinis paupercula</i> <i>var. borealis</i>	Small-flowered Agalinis				S1	2 May Be At Risk	8	28.6 ± 1.0	NB
P	<i>Agalinis tenuifolia</i>	Slender Agalinis				S1	2 May Be At Risk	6	79.7 ± 0.0	NB
P	<i>Gratiola aurea</i>	Golden Hedge-Hyssop				S1	3 Sensitive	3	10.9 ± 5.0	NB
P	<i>Pedicularis canadensis</i>	Canada Lousewort				S1	2 May Be At Risk	20	54.2 ± 0.0	NB
P	<i>Viola sagittata</i> <i>var.</i> <i>ovata</i>	Arrow-Leaved Violet				S1	2 May Be At Risk	36	73.5 ± 0.0	NS
P	<i>Alisma subcordatum</i>	Southern Water Plantain				S1	5 Undetermined	4	35.6 ± 0.0	NB
P	<i>Carex atlantica</i> <i>ssp.</i> <i>atlantica</i>	Atlantic Sedge				S1	2 May Be At Risk	1	76.9 ± 0.0	NB
P	<i>Carex backii</i>	Rocky Mountain Sedge				S1	2 May Be At Risk	6	74.4 ± 0.0	NB
P	<i>Carex cephaloidea</i>	Thin-leaved Sedge				S1	2 May Be At Risk	2	97.7 ± 0.0	NB
P	<i>Carex merritt-feraldii</i>	Merritt Fernald's Sedge				S1	2 May Be At Risk	2	72.8 ± 0.0	NB
P	<i>Carex saxatilis</i>	Russet Sedge				S1	2 May Be At Risk	13	6.7 ± 10.0	NB
P	<i>Carex scirpoidea</i>	Scirpuslike Sedge				S1	2 May Be At Risk	6	71.9 ± 0.0	NB
P	<i>Carex sterilis</i>	Sterile Sedge				S1	2 May Be At Risk	1	94.9 ± 0.0	NB
P	<i>Carex grisea</i>	Inflated Narrow-leaved Sedge				S1	2 May Be At Risk	10	44.2 ± 0.0	NB
P	<i>Cyperus diandrus</i>	Low Flatsedge				S1	2 May Be At Risk	7	79.6 ± 1.0	NB
P	<i>Cyperus lupulinus</i>	Hop Flatsedge				S1	2 May Be At Risk	6	67.3 ± 0.0	NB
P	<i>Cyperus lupulinus</i> <i>ssp.</i> <i>macilentus</i>	Hop Flatsedge				S1	2 May Be At Risk	16	66.0 ± 0.0	NB
P	<i>Eleocharis olivacea</i>	Yellow Spikerush				S1	2 May Be At Risk	4	89.2 ± 1.0	NB
P	<i>Rhynchospora</i> <i>capillacea</i>	Slender Beakrush				S1	2 May Be At Risk	3	92.9 ± 0.0	NB
P	<i>Sisyrinchium</i> <i>angustifolium</i>	Narrow-leaved Blue-eyed-grass				S1	2 May Be At Risk	11	11.0 ± 1.0	NB
P	<i>Juncus greenei</i>	Greene's Rush				S1	2 May Be At Risk	1	41.6 ± 0.0	NB
P	<i>Juncus subtilis</i>	Creeping Rush				S1	2 May Be At Risk	1	47.1 ± 5.0	NB
P	<i>Allium canadense</i>	Canada Garlic				S1	2 May Be At Risk	11	39.9 ± 0.0	NB
P	<i>Goodyera pubescens</i>	Downy Rattlesnake-Plantain				S1	2 May Be At Risk	6	85.4 ± 0.0	NB
P	<i>Malaxis brachypoda</i>	White Adder's-Mouth				S1	2 May Be At Risk	4	79.9 ± 10.0	NB
P	<i>Platanthera flava</i> <i>var.</i> <i>herbiola</i>	Pale Green Orchid				S1	2 May Be At Risk	15	54.5 ± 0.0	NB
P	<i>Platanthera</i> <i>macrophylla</i>	Large Round-Leaved Orchid				S1	2 May Be At Risk	2	73.9 ± 1.0	NB
P	<i>Spiranthes casei</i>	Case's Ladies'-Tresses				S1	2 May Be At Risk	6	91.3 ± 0.0	NB
P	<i>Bromus pubescens</i>	Hairy Wood Brome Grass				S1	5 Undetermined	6	67.6 ± 0.0	NB
P	<i>Cinna arundinacea</i>	Sweet Wood Reed Grass				S1	2 May Be At Risk	22	48.9 ± 0.0	NB
P	<i>Danthonia compressa</i>	Flattened Oat Grass				S1	2 May Be At Risk	8	75.1 ± 1.0	NB
P	<i>Dichanthelium</i> <i>dichotomum</i>	Forked Panic Grass				S1	2 May Be At Risk	19	30.7 ± 1.0	NB
P	<i>Festuca subverticillata</i>	Nodding Fescue				S1	2 May Be At Risk	1	99.4 ± 1.0	NS
P	<i>Glyceria obtusa</i>	Atlantic Manna Grass				S1	2 May Be At Risk	6	36.3 ± 0.0	NB
P	<i>Sporobolus compositus</i>	Rough Dropseed				S1	2 May Be At Risk	17	92.5 ± 0.0	NB
P	<i>Potamogeton friesii</i>	Fries' Pondweed				S1	2 May Be At Risk	6	6.9 ± 5.0	NB
P	<i>Potamogeton nodosus</i>	Long-leaved Pondweed				S1	2 May Be At Risk	4	72.7 ± 0.0	NB
P	<i>Potamogeton</i> <i>strictifolius</i>	Straight-leaved Pondweed				S1	2 May Be At Risk	2	25.6 ± 0.0	NB
P	<i>Xyris difformis</i>	Bog Yellow-eyed-grass				S1	5 Undetermined	3	14.9 ± 0.0	NB
P	<i>Asplenium ruta-muraria</i> <i>var. cryptolepis</i>	Wallrue Spleenwort				S1	2 May Be At Risk	3	18.5 ± 0.0	NB
P	<i>Cystopteris laurentiana</i>	Laurentian Bladder Fern				S1	2 May Be At Risk	1	73.9 ± 1.0	NB
P	<i>Botrychium oneidense</i>	Blunt-lobed Moonwort				S1	2 May Be At Risk	4	53.4 ± 0.0	NB
P	<i>Botrychium rugulosum</i>	Rugulose Moonwort				S1	2 May Be At Risk	1	76.6 ± 1.0	NB

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)	Prov
P	<i>Schizaea pusilla</i>	Little Curlygrass Fern				S1	2 May Be At Risk	27	9.0 ± 0.0	NB
P	<i>Hieracium kalmii</i> var. <i>fasciculatum</i>	Kalm's Hawkweed				S1?	5 Undetermined	6	70.3 ± 0.0	NB
P	<i>Cuscuta campestris</i>	Field Dodder				S1?	2 May Be At Risk	3	72.0 ± 10.0	NB
P	<i>Drosera rotundifolia</i> var. <i>comosa</i>	Round-leaved Sundew				S1?	5 Undetermined	5	52.8 ± 1.0	NB
P	<i>Carex laxiflora</i>	Loose-Flowered Sedge				S1?	5 Undetermined	2	76.2 ± 5.0	NS
P	<i>Wolffia columbiana</i>	Columbian Watermeal				S1?	2 May Be At Risk	5	69.3 ± 0.0	NB
P	<i>Rumex aquaticus</i> var. <i>fenestratus</i>	Western Dock				S1S2	2 May Be At Risk	1	78.8 ± 1.0	NB
P	<i>Saxifraga virginensis</i>	Early Saxifrage				S1S2	2 May Be At Risk	14	91.2 ± 0.0	NB
P	<i>Potamogeton bicupulatus</i>	Snailseed Pondweed				S1S2	2 May Be At Risk	5	26.3 ± 0.0	NB
P	<i>Selaginella rupestris</i>	Rock Spikemoss				S1S2	2 May Be At Risk	27	74.0 ± 1.0	NB
P	<i>Thelypteris simulata</i>	Bog Fern				S1S2	2 May Be At Risk	7	71.9 ± 0.0	NB
P	<i>Cuscuta cephalanthi</i>	Buttonbush Dodder				S1S3	2 May Be At Risk	2	8.1 ± 1.0	NB
P	<i>Listera australis</i>	Southern Twayblade			Endangered	S2	1 At Risk	15	82.9 ± 0.0	NB
P	<i>Osmorhiza longistylis</i>	Smooth Sweet Cicely				S2	3 Sensitive	3	73.9 ± 0.0	NB
P	<i>Sanicula odorata</i>	Clustered Sanicle				S2	2 May Be At Risk	1	98.4 ± 0.0	NB
P	<i>Pseudognaphalium macounii</i>	Macoun's Cudweed				S2	3 Sensitive	8	8.3 ± 0.0	NB
P	<i>Solidago simplex</i> var. <i>racemosa</i>	Sticky Goldenrod				S2	2 May Be At Risk	12	92.0 ± 0.0	NB
P	<i>Ionactis linariifolius</i>	Stiff Aster				S2	3 Sensitive	1	89.9 ± 0.0	NB
P	<i>Symphotrichum racemosum</i>	Small White Aster				S2	3 Sensitive	8	40.9 ± 0.0	NB
P	<i>Impatiens pallida</i>	Pale Jewelweed				S2	2 May Be At Risk	3	72.4 ± 0.0	NB
P	<i>Alnus serrulata</i>	Smooth Alder				S2	3 Sensitive	28	48.9 ± 0.0	NB
P	<i>Arabis drummondii</i>	Drummond's Rockcress				S2	3 Sensitive	20	7.4 ± 1.0	NB
P	<i>Sagina nodosa</i>	Knotted Pearlwort				S2	3 Sensitive	15	31.4 ± 1.0	NB
P	<i>Sagina nodosa</i> ssp. <i>borealis</i>	Knotted Pearlwort				S2	3 Sensitive	2	14.8 ± 0.0	NB
P	<i>Stellaria longifolia</i>	Long-leaved Starwort				S2	3 Sensitive	6	7.5 ± 10.0	NB
P	<i>Atriplex franktonii</i>	Frankton's Saltbush				S2	4 Secure	3	50.6 ± 1.0	NB
P	<i>Chenopodium rubrum</i>	Red Pigweed				S2	3 Sensitive	4	4.7 ± 0.0	NB
P	<i>Hypericum dissimulatum</i>	Disguised St John's-wort				S2	3 Sensitive	6	47.4 ± 1.0	NB
P	<i>Triosteum aurantiacum</i>	Orange-fruited Tinker's Weed				S2	3 Sensitive	6	93.1 ± 0.0	NB
P	<i>Viburnum lentago</i>	Nannyberry				S2	4 Secure	82	79.4 ± 0.0	NB
P	<i>Viburnum recognitum</i>	Northern Arrow-Wood				S2	4 Secure	138	52.8 ± 0.0	NB
P	<i>Astragalus eucosmus</i>	Elegant Milk-vetch				S2	2 May Be At Risk	10	29.7 ± 0.0	NB
P	<i>Oxytropis campestris</i> var. <i>johannensis</i>	Field Locoweed				S2	3 Sensitive	7	18.1 ± 50.0	NB
P	<i>Quercus macrocarpa</i>	Bur Oak				S2	2 May Be At Risk	48	7.4 ± 1.0	NB
P	<i>Gentiana linearis</i>	Narrow-Leaved Gentian				S2	3 Sensitive	5	85.4 ± 5.0	NB
P	<i>Myriophyllum humile</i>	Low Water Milfoil				S2	3 Sensitive	5	63.0 ± 0.0	NB
P	<i>Proserpinaca palustris</i> var. <i>crebra</i>	Marsh Mermaidweed				S2	3 Sensitive	21	38.0 ± 0.0	NB
P	<i>Hedeoma pulegioides</i>	American False Pennyroyal				S2	4 Secure	60	4.2 ± 0.0	NB
P	<i>Nuphar lutea</i> ssp. <i>rubrodisca</i>	Red-disked Yellow Pond-lily				S2	3 Sensitive	10	12.5 ± 1.0	NB
P	<i>Orobancha uniflora</i>	One-Flowered Broomrape				S2	3 Sensitive	13	20.0 ± 2.0	NB
P	<i>Polygala paucifolia</i>	Fringed Milkwort				S2	3 Sensitive	16	53.4 ± 1.0	NB
P	<i>Polygala senega</i>	Seneca Snakeroot				S2	3 Sensitive	2	97.8 ± 1.0	NB
P	<i>Polygonum amphibium</i> var. <i>emersum</i>	Water Smartweed				S2	3 Sensitive	39	33.2 ± 0.0	NB
P	<i>Polygonum careyi</i>	Carey's Smartweed				S2	3 Sensitive	15	30.0 ± 5.0	NB

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)	Prov
P	<i>Podostemum ceratophyllum</i>	Horn-leaved Riverweed				S2	3 Sensitive	22	44.8 ± 0.0	NB
P	<i>Anemone multifida</i>	Cut-leaved Anemone				S2	3 Sensitive	1	93.3 ± 0.0	NB
P	<i>Hepatica nobilis</i> var. <i>obtusa</i>	Round-lobed Hepatica				S2	3 Sensitive	36	45.2 ± 1.0	NB
P	<i>Ranunculus flabellaris</i>	Yellow Water Buttercup				S2	4 Secure	17	45.7 ± 0.0	NB
P	<i>Ranunculus longirostris</i>	Eastern White Water-Crowfoot				S2	5 Undetermined	5	65.3 ± 1.0	NB
P	<i>Crataegus scabrida</i>	Rough Hawthorn				S2	3 Sensitive	7	18.4 ± 0.0	NB
P	<i>Crataegus succulenta</i>	Fleshy Hawthorn				S2	3 Sensitive	1	85.8 ± 5.0	NB
P	<i>Cephalanthus occidentalis</i>	Common Buttonbush				S2	3 Sensitive	39	61.7 ± 0.0	NB
P	<i>Salix candida</i>	Sage Willow				S2	3 Sensitive	3	93.8 ± 1.0	NB
P	<i>Agalinis neoscotica</i>	Nova Scotia Agalinis				S2	3 Sensitive	31	70.8 ± 0.0	NB
P	<i>Euphrasia randii</i>	Rand's Eyebright				S2	2 May Be At Risk	23	14.7 ± 0.0	NB
P	<i>Scrophularia lanceolata</i>	Lance-leaved Figwort				S2	3 Sensitive	5	28.1 ± 5.0	NB
P	<i>Dirca palustris</i>	Eastern Leatherwood				S2	2 May Be At Risk	5	91.3 ± 0.0	NB
P	<i>Phryma leptostachya</i>	American Lopseed				S2	3 Sensitive	2	95.9 ± 1.0	NB
P	<i>Verbena urticifolia</i>	White Vervain				S2	2 May Be At Risk	12	91.3 ± 1.0	NB
P	<i>Viola novae-angliae</i>	New England Violet				S2	3 Sensitive	5	32.8 ± 0.0	NB
P	<i>Symplocarpus foetidus</i>	Eastern Skunk Cabbage				S2	3 Sensitive	91	12.7 ± 1.0	NB
P	<i>Carex comosa</i>	Bearded Sedge				S2	2 May Be At Risk	5	75.2 ± 0.0	NS
P	<i>Carex granularis</i>	Limestone Meadow Sedge				S2	3 Sensitive	8	72.8 ± 5.0	NB
P	<i>Carex gynocrates</i>	Northern Bog Sedge				S2	3 Sensitive	5	75.1 ± 1.0	NB
P	<i>Carex hirtifolia</i>	Pubescent Sedge				S2	3 Sensitive	3	47.4 ± 0.0	NB
P	<i>Carex livida</i> var. <i>radicaulis</i>	Livid Sedge				S2	3 Sensitive	1	8.3 ± 2.0	NB
P	<i>Carex plantaginea</i>	Plantain-Leaved Sedge				S2	3 Sensitive	1	94.3 ± 0.0	NB
P	<i>Carex prairea</i>	Prairie Sedge				S2	3 Sensitive	1	81.2 ± 5.0	NS
P	<i>Carex rostrata</i>	Narrow-leaved Beaked Sedge				S2	3 Sensitive	2	76.2 ± 0.0	NB
P	<i>Carex salina</i>	Saltmarsh Sedge				S2	3 Sensitive	2	6.7 ± 1.0	NB
P	<i>Carex sprengei</i>	Longbeak Sedge				S2	3 Sensitive	3	68.5 ± 0.0	NB
P	<i>Carex tenuiflora</i>	Sparse-Flowered Sedge				S2	2 May Be At Risk	11	71.1 ± 0.0	NB
P	<i>Carex albicans</i> var. <i>emmonsii</i>	White-tinged Sedge				S2	3 Sensitive	4	17.2 ± 0.0	NB
P	<i>Cyperus squarrosus</i>	Awned Flatsedge				S2	3 Sensitive	31	37.3 ± 0.0	NB
P	<i>Eriophorum gracile</i>	Slender Cottongrass				S2	2 May Be At Risk	8	68.7 ± 0.0	NB
P	<i>Blysmus rufus</i>	Red Bulrush				S2	3 Sensitive	3	75.5 ± 0.0	NB
P	<i>Elodea nuttallii</i>	Nuttall's Waterweed				S2	3 Sensitive	8	32.1 ± 0.0	NB
P	<i>Allium tricoccum</i>	Wild Leek				S2	2 May Be At Risk	12	30.6 ± 0.0	NB
P	<i>Najas gracillima</i>	Thread-Like Naiad				S2	3 Sensitive	11	36.5 ± 0.0	NB
P	<i>Calypso bulbosa</i> var. <i>americana</i>	Calypso				S2	2 May Be At Risk	3	13.6 ± 0.0	NB
P	<i>Coeloglossum viride</i> var. <i>virescens</i>	Long-bracted Frog Orchid				S2	2 May Be At Risk	5	41.9 ± 5.0	NB
P	<i>Cypripedium parviflorum</i> var. <i>makasin</i>	Small Yellow Lady's-Slipper				S2	2 May Be At Risk	5	2.3 ± 1.0	NB
P	<i>Spiranthes lucida</i>	Shining Ladies'-Tresses				S2	3 Sensitive	13	29.4 ± 0.0	NB
P	<i>Spiranthes ochroleuca</i>	Yellow Ladies'-tresses				S2	2 May Be At Risk	10	77.3 ± 5.0	NB
P	<i>Dichanthelium linearifolium</i>	Narrow-leaved Panic Grass				S2	3 Sensitive	15	44.9 ± 0.0	NB
P	<i>Elymus canadensis</i>	Canada Wild Rye				S2	2 May Be At Risk	13	70.7 ± 1.0	NB
P	<i>Leersia virginica</i>	White Cut Grass				S2	2 May Be At Risk	42	45.5 ± 0.0	NB
P	<i>Piptatherum canadense</i>	Canada Rice Grass				S2	3 Sensitive	5	49.7 ± 0.0	NB

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P	<i>Poa glauca</i>	Glaucous Blue Grass				S2	4 Secure	16	8.3 ± 2.0	NB
P	<i>Puccinellia phryganodes</i>	Creeping Alkali Grass				S2	3 Sensitive	15	27.1 ± 0.0	NB
P	<i>Schizachyrium scoparium</i>	Little Bluestem				S2	3 Sensitive	42	31.8 ± 0.0	NB
P	<i>Zizania aquatica</i> var. <i>aquatica</i>	Indian Wild Rice				S2	5 Undetermined	5	48.8 ± 0.0	NB
P	<i>Potamogeton vaseyi</i>	Vasey's Pondweed				S2	3 Sensitive	4	6.9 ± 1.0	NB
P	<i>Asplenium trichomanes</i>	Maidenhair Spleenwort				S2	3 Sensitive	17	4.7 ± 0.0	NB
P	<i>Woodwardia virginica</i>	Virginia Chain Fern				S2	3 Sensitive	14	75.3 ± 1.0	NB
P	<i>Woodsia alpina</i>	Alpine Cliff Fern				S2	3 Sensitive	8	19.0 ± 0.0	NB
P	<i>Selaginella selaginoides</i>	Low Spikemoss				S2	3 Sensitive	12	8.3 ± 6.0	NB
P	<i>Toxicodendron radicans</i>	Poison Ivy				S2?	3 Sensitive	15	31.0 ± 0.0	NB
P	<i>Symphotrichum novi-belgii</i> var. <i>crenifolium</i>	New York Aster				S2?	5 Undetermined	8	9.3 ± 0.0	NB
P	<i>Humulus lupulus</i> var. <i>lupuloides</i>	Common Hop				S2?	3 Sensitive	4	80.7 ± 0.0	NB
P	<i>Rubus recurvicaulis</i>	Arching Dewberry				S2?	4 Secure	5	17.9 ± 5.0	NB
P	<i>Galium obtusum</i>	Blunt-leaved Bedstraw				S2?	4 Secure	4	49.0 ± 1.0	NB
P	<i>Salix myricoides</i>	Bayberry Willow				S2?	3 Sensitive	8	72.8 ± 0.0	NB
P	<i>Carex vacillans</i>	Estuarine Sedge				S2?	3 Sensitive	4	63.8 ± 1.0	NB
P	<i>Platanthera huronensis</i>	Fragrant Green Orchid				S2?	5 Undetermined	2	88.5 ± 0.0	NB
P	<i>Solidago altissima</i>	Tall Goldenrod				S2S3	4 Secure	6	29.0 ± 1.0	NB
P	<i>Barbarea orthoceras</i>	American Yellow Rocket				S2S3	3 Sensitive	2	78.8 ± 10.0	NB
P	<i>Ceratophyllum echinatum</i>	Prickly Hornwort				S2S3	3 Sensitive	16	28.4 ± 0.0	NB
P	<i>Callitriche hermaphroditica</i>	Northern Water-starwort				S2S3	4 Secure	10	34.4 ± 1.0	NB
P	<i>Lonicera oblongifolia</i>	Swamp Fly Honeysuckle				S2S3	3 Sensitive	16	11.1 ± 6.0	NB
P	<i>Elatine americana</i>	American Waterwort				S2S3	3 Sensitive	8	10.0 ± 1.0	NB
P	<i>Bartonia paniculata</i>	Branched Bartonia				S2S3	3 Sensitive	5	15.3 ± 0.0	NB
P	<i>Bartonia paniculata</i> ssp. <i>iodandra</i>	Branched Bartonia				S2S3	3 Sensitive	36	8.8 ± 0.0	NB
P	<i>Geranium robertianum</i>	Herb Robert				S2S3	4 Secure	28	8.4 ± 1.0	NB
P	<i>Myriophyllum quitense</i>	Andean Water Milfoil				S2S3	4 Secure	71	6.3 ± 0.0	NB
P	<i>Epilobium coloratum</i>	Purple-veined Willowherb				S2S3	3 Sensitive	7	10.2 ± 1.0	NB
P	<i>Rumex pallidus</i>	Seabeach Dock				S2S3	3 Sensitive	6	13.0 ± 0.0	NB
P	<i>Rubus pensilvanicus</i>	Pennsylvania Blackberry				S2S3	4 Secure	15	14.7 ± 0.0	NB
P	<i>Galium labradoricum</i>	Labrador Bedstraw				S2S3	3 Sensitive	7	52.5 ± 1.0	NB
P	<i>Valeriana uliginosa</i>	Swamp Valerian				S2S3	3 Sensitive	1	86.8 ± 1.0	NB
P	<i>Carex adusta</i>	Lesser Brown Sedge				S2S3	4 Secure	7	5.9 ± 1.0	NB
P	<i>Corallorhiza maculata</i> var. <i>occidentalis</i>	Spotted Coralroot				S2S3	3 Sensitive	4	72.8 ± 0.0	NB
P	<i>Corallorhiza maculata</i> var. <i>maculata</i>	Spotted Coralroot				S2S3	3 Sensitive	3	83.0 ± 1.0	NB
P	<i>Listera auriculata</i>	Auricled Twayblade				S2S3	3 Sensitive	9	3.2 ± 1.0	NB
P	<i>Spiranthes cernua</i>	Nodding Ladies'-Tresses				S2S3	3 Sensitive	22	41.5 ± 0.0	NB
P	<i>Eragrostis pectinacea</i>	Tufted Love Grass				S2S3	4 Secure	14	47.5 ± 1.0	NB
P	<i>Stuckenia filiformis</i> ssp. <i>alpina</i>	Thread-leaved Pondweed				S2S3	3 Sensitive	7	8.3 ± 0.0	NB
P	<i>Potamogeton praelongus</i>	White-stemmed Pondweed				S2S3	4 Secure	12	8.3 ± 1.0	NB
P	<i>Isoetes acadensis</i>	Acadian Quillwort				S2S3	3 Sensitive	9	39.7 ± 0.0	NB
P	<i>Ophioglossum pusillum</i>	Northern Adder's-tongue				S2S3	3 Sensitive	9	4.9 ± 1.0	NB
P	<i>Botrychium</i>	Swamp Moonwort				S2S3	3 Sensitive	1	88.7 ± 0.0	NB

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P	<i>tenebrosus</i>									
P	<i>Panax trifolius</i>	Dwarf Ginseng				S3	3 Sensitive	15	17.2 ± 0.0	NB
P	<i>Artemisia campestris</i>	Field Wormwood				S3	4 Secure	25	67.6 ± 0.0	NB
P	<i>Artemisia campestris ssp. caudata</i>	Field Wormwood				S3	4 Secure	78	62.2 ± 0.0	NB
P	<i>Erigeron hyssopifolius</i>	Hyssop-leaved Fleabane				S3	4 Secure	53	13.3 ± 0.0	NB
P	<i>Prenanthes racemosa</i>	Glaucous Rattlesnakeroot				S3	4 Secure	67	4.3 ± 0.0	NB
P	<i>Tanacetum bipinnatum ssp. huronense</i>	Lake Huron Tansy				S3	4 Secure	20	15.3 ± 1.0	NB
P	<i>Symphotrichum boreale</i>	Boreal Aster				S3	3 Sensitive	11	29.3 ± 0.0	NB
P	<i>Betula pumila</i>	Bog Birch				S3	4 Secure	21	60.2 ± 1.0	NB
P	<i>Arabis glabra</i>	Tower Mustard				S3	5 Undetermined	1	81.5 ± 0.0	NB
P	<i>Arabis hirsuta var. pycnocarpa</i>	Western Hairy Rockcress				S3	4 Secure	18	7.4 ± 0.0	NB
P	<i>Cardamine maxima</i>	Large Toothwort				S3	4 Secure	29	10.4 ± 0.0	NB
P	<i>Subularia aquatica var. americana</i>	Water Awlwort				S3	4 Secure	14	27.2 ± 0.0	NB
P	<i>Lobelia cardinalis</i>	Cardinal Flower				S3	4 Secure	357	47.9 ± 0.0	NB
P	<i>Stellaria humifusa</i>	Saltmarsh Starwort				S3	4 Secure	7	6.2 ± 0.0	NB
P	<i>Hudsonia tomentosa</i>	Woolly Beach-heath				S3	4 Secure	3	17.7 ± 0.0	NB
P	<i>Cornus amomum ssp. obliqua</i>	Pale Dogwood				S3	3 Sensitive	194	31.1 ± 0.0	NB
P	<i>Crassula aquatica</i>	Water Pygmyweed				S3	4 Secure	10	46.8 ± 0.0	NB
P	<i>Rhodiola rosea</i>	Roseroot				S3	4 Secure	58	8.0 ± 5.0	NB
P	<i>Penthorum sedoides</i>	Ditch Stonecrop				S3	4 Secure	69	38.0 ± 0.0	NB
P	<i>Elatine minima</i>	Small Waterwort				S3	4 Secure	29	13.3 ± 5.0	NB
P	<i>Astragalus alpinus var. brunetianus</i>	Alpine Milk-Vetch				S3	4 Secure	3	92.0 ± 0.0	NB
P	<i>Hedysarum alpinum</i>	Alpine Sweet-vetch				S3	4 Secure	2	30.0 ± 0.0	NB
P	<i>Gentianella amarella ssp. acuta</i>	Northern Gentian				S3	4 Secure	6	7.0 ± 0.0	NB
P	<i>Geranium bicknellii</i>	Bicknell's Crane's-bill				S3	4 Secure	8	3.8 ± 5.0	NB
P	<i>Myriophyllum farwellii</i>	Farwell's Water Milfoil				S3	4 Secure	23	13.3 ± 0.0	NB
P	<i>Myriophyllum heterophyllum</i>	Variable-leaved Water Milfoil				S3	4 Secure	51	13.4 ± 0.0	NB
P	<i>Myriophyllum verticillatum</i>	Whorled Water Milfoil				S3	4 Secure	21	13.1 ± 1.0	NB
P	<i>Stachys tenuifolia</i>	Smooth Hedge-Nettle				S3	3 Sensitive	12	31.4 ± 0.0	NB
P	<i>Teucrium canadense</i>	Canada Germander				S3	3 Sensitive	5	75.8 ± 1.0	NS
P	<i>Utricularia radiata</i>	Little Floating Bladderwort				S3	4 Secure	38	2.4 ± 0.0	NB
P	<i>Nuphar lutea ssp. pumila</i>	Small Yellow Pond-lily				S3	4 Secure	15	8.3 ± 0.0	NB
P	<i>Epilobium hornemannii</i>	Hornemann's Willowherb				S3	4 Secure	6	24.8 ± 0.0	NB
P	<i>Epilobium hornemannii ssp. hornemannii</i>	Hornemann's Willowherb				S3	4 Secure	1	92.9 ± 0.0	NB
P	<i>Epilobium strictum</i>	Downy Willowherb				S3	4 Secure	24	9.2 ± 5.0	NB
P	<i>Polygala sanguinea</i>	Blood Milkwort				S3	3 Sensitive	15	56.3 ± 0.0	NB
P	<i>Polygonum arifolium</i>	Halberd-leaved Tearthumb				S3	4 Secure	20	45.8 ± 0.0	NB
P	<i>Polygonum punctatum</i>	Dotted Smartweed				S3	4 Secure	2	70.5 ± 0.0	NB
P	<i>Polygonum punctatum var. confertiflorum</i>	Dotted Smartweed				S3	4 Secure	15	69.2 ± 2.0	NB
P	<i>Polygonum scandens</i>	Climbing False Buckwheat				S3	4 Secure	34	31.1 ± 0.0	NB
P	<i>Littorella uniflora</i>	American Shoreweed				S3	4 Secure	20	23.4 ± 0.0	NB
P	<i>Primula mistassinica</i>	Mistassini Primrose				S3	4 Secure	12	0.4 ± 1.0	NB
P	<i>Pyrola minor</i>	Lesser Pyrola				S3	4 Secure	4	27.9 ± 0.0	NB
P	<i>Clematis occidentalis</i>	Purple Clematis				S3	4 Secure	24	10.0 ± 5.0	NB

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P	<i>Ranunculus gmelinii</i>	Gmelin's Water Buttercup				S3	4 Secure	8	48.8 ± 0.0	NB
P	<i>Thalictrum venulosum</i>	Northern Meadow-rue				S3	4 Secure	77	16.1 ± 5.0	NB
P	<i>Amelanchier canadensis</i>	Canada Serviceberry				S3	4 Secure	16	19.1 ± 1.0	NB
P	<i>Rosa palustris</i>	Swamp Rose				S3	4 Secure	35	3.6 ± 1.0	NB
P	<i>Rubus occidentalis</i>	Black Raspberry				S3	4 Secure	19	50.3 ± 0.0	NB
P	<i>Sanguisorba canadensis</i>	Canada Burnet				S3	4 Secure	2	99.1 ± 0.0	NB
P	<i>Galium boreale</i>	Northern Bedstraw				S3	4 Secure	9	22.3 ± 1.0	NB
P	<i>Salix interior</i>	Sandbar Willow				S3	4 Secure	27	62.0 ± 0.0	NB
P	<i>Salix nigra</i>	Black Willow				S3	3 Sensitive	124	6.8 ± 1.0	NB
P	<i>Salix pedicellaris</i>	Bog Willow				S3	4 Secure	47	15.1 ± 1.0	NB
P	<i>Comandra umbellata</i>	Bastard's Toadflax				S3	4 Secure	1	75.1 ± 10.0	NB
P	<i>Parnassia glauca</i>	Fen Grass-of-Parnassus				S3	4 Secure	1	90.0 ± 10.0	NB
P	<i>Limosella australis</i>	Southern Mudwort				S3	4 Secure	10	79.2 ± 0.0	NB
P	<i>Veronica serpyllifolia ssp. humifusa</i>	Thyme-Leaved Speedwell				S3	4 Secure	4	83.9 ± 100.0	NB
P	<i>Boehmeria cylindrica</i>	Small-spike False-nettle				S3	3 Sensitive	129	48.4 ± 0.0	NB
P	<i>Pilea pumila</i>	Dwarf Clearweed				S3	4 Secure	30	40.7 ± 0.0	NB
P	<i>Viola adunca</i>	Hooked Violet				S3	4 Secure	8	64.9 ± 1.0	NB
P	<i>Viola nephrophylla</i>	Northern Bog Violet				S3	4 Secure	8	4.1 ± 0.0	NB
P	<i>Carex arcta</i>	Northern Clustered Sedge				S3	4 Secure	50	48.5 ± 0.0	NB
P	<i>Carex atratiformis</i>	Scabrous Black Sedge				S3	4 Secure	1	8.3 ± 0.0	NB
P	<i>Carex capillaris</i>	Hairlike Sedge				S3	4 Secure	10	8.3 ± 2.0	NB
P	<i>Carex chordorrhiza</i>	Creeping Sedge				S3	4 Secure	20	36.4 ± 1.0	NB
P	<i>Carex conoidea</i>	Field Sedge				S3	4 Secure	30	6.9 ± 1.0	NB
P	<i>Carex eburnea</i>	Bristle-leaved Sedge				S3	4 Secure	10	90.7 ± 0.0	NB
P	<i>Carex exilis</i>	Coastal Sedge				S3	4 Secure	86	2.4 ± 0.0	NB
P	<i>Carex garberi</i>	Garber's Sedge				S3	3 Sensitive	2	29.2 ± 0.0	NB
P	<i>Carex haydenii</i>	Hayden's Sedge				S3	4 Secure	40	9.2 ± 1.0	NB
P	<i>Carex lupulina</i>	Hop Sedge				S3	4 Secure	110	30.8 ± 0.0	NB
P	<i>Carex michauxiana</i>	Michaux's Sedge				S3	4 Secure	62	2.5 ± 0.0	NB
P	<i>Carex ormostachya</i>	Necklace Spike Sedge				S3	4 Secure	7	60.5 ± 1.0	NB
P	<i>Carex rosea</i>	Rosy Sedge				S3	4 Secure	23	29.1 ± 0.0	NB
P	<i>Carex tenera</i>	Tender Sedge				S3	4 Secure	48	30.5 ± 0.0	NB
P	<i>Carex tuckermanii</i>	Tuckerman's Sedge				S3	4 Secure	70	30.8 ± 0.0	NB
P	<i>Carex vaginata</i>	Sheathed Sedge				S3	3 Sensitive	9	80.9 ± 0.0	NB
P	<i>Carex wiegandii</i>	Wiegand's Sedge				S3	4 Secure	38	2.0 ± 0.0	NB
P	<i>Carex recta</i>	Estuary Sedge				S3	4 Secure	9	11.6 ± 0.0	NB
P	<i>Cyperus dentatus</i>	Toothed Flatsedge				S3	4 Secure	146	14.3 ± 0.0	NB
P	<i>Cyperus esculentus</i>	Perennial Yellow Nutsedge				S3	4 Secure	42	40.5 ± 0.0	NB
P	<i>Eleocharis intermedia</i>	Matted Spikerush				S3	4 Secure	3	87.1 ± 0.0	NB
P	<i>Eleocharis quinqueflora</i>	Few-flowered Spikerush				S3	4 Secure	4	16.9 ± 0.0	NB
P	<i>Rhynchospora capitellata</i>	Small-headed Beakrush				S3	4 Secure	8	46.0 ± 0.0	NB
P	<i>Rhynchospora fusca</i>	Brown Beakrush				S3	4 Secure	36	2.4 ± 0.0	NB
P	<i>Trichophorum clintonii</i>	Clinton's Clubrush				S3	4 Secure	30	13.3 ± 0.0	NB
P	<i>Schoenoplectus fluviatilis</i>	River Bulrush				S3	3 Sensitive	58	11.8 ± 0.0	NB
P	<i>Schoenoplectus torreyi</i>	Torrey's Bulrush				S3	4 Secure	31	5.7 ± 0.0	NB
P	<i>Lemna trisulca</i>	Star Duckweed				S3	4 Secure	22	19.7 ± 1.0	NB
P	<i>Triantha glutinosa</i>	Sticky False-Asphodel				S3	4 Secure	8	29.2 ± 0.0	NB
P	<i>Cypripedium reginae</i>	Showy Lady's-Slipper				S3	3 Sensitive	20	1.4 ± 0.0	NB
P	<i>Liparis loeselii</i>	Loesel's Twayblade				S3	4 Secure	16	5.3 ± 0.0	NB
P	<i>Platanthera blephariglottis</i>	White Fringed Orchid				S3	4 Secure	52	79.0 ± 0.0	NB

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)	Prov
P	<i>Platanthera grandiflora</i>	Large Purple Fringed Orchid				S3	3 Sensitive	31	6.3 ± 1.0	NB
P	<i>Bromus latiglumis</i>	Broad-Grummed Brome				S3	3 Sensitive	2	47.5 ± 0.0	NB
P	<i>Calamagrostis pickeringii</i>	Pickering's Reed Grass				S3	4 Secure	105	3.7 ± 0.0	NB
P	<i>Dichanthelium depauperatum</i>	Starved Panic Grass				S3	4 Secure	27	46.9 ± 0.0	NB
P	<i>Muhlenbergia richardsonii</i>	Mat Muhly				S3	4 Secure	9	92.2 ± 0.0	NB
P	<i>Heteranthera dubia</i>	Water Stargrass				S3	4 Secure	59	7.6 ± 0.0	NB
P	<i>Potamogeton obtusifolius</i>	Blunt-leaved Pondweed				S3	4 Secure	16	15.6 ± 0.0	NB
P	<i>Potamogeton richardsonii</i>	Richardson's Pondweed				S3	3 Sensitive	16	8.3 ± 1.0	NB
P	<i>Xyris montana</i>	Northern Yellow-Eyed-Grass				S3	4 Secure	27	3.7 ± 0.0	NB
P	<i>Zannichellia palustris</i>	Horned Pondweed				S3	4 Secure	5	6.1 ± 0.0	NB
P	<i>Adiantum pedatum</i>	Northern Maidenhair Fern				S3	4 Secure	7	7.3 ± 1.0	NB
P	<i>Cryptogramma stelleri</i>	Steller's Rockbrake				S3	4 Secure	2	27.4 ± 1.0	NB
P	<i>Asplenium trichomanes-ramosum</i>	Green Spleenwort				S3	4 Secure	18	0.5 ± 1.0	NB
P	<i>Dryopteris fragrans</i> var. <i>remotiuscula</i>	Fragrant Wood Fern				S3	4 Secure	25	4.7 ± 0.0	NB
P	<i>Dryopteris goldiana</i>	Goldie's Woodfern				S3	3 Sensitive	5	95.5 ± 5.0	NB
P	<i>Woodsia glabella</i>	Smooth Cliff Fern				S3	4 Secure	40	37.6 ± 1.0	NB
P	<i>Equisetum palustre</i>	Marsh Horsetail				S3	4 Secure	6	74.5 ± 10.0	NB
P	<i>Isoetes tuckermanii</i>	Tuckerman's Quillwort				S3	4 Secure	28	22.3 ± 0.0	NB
P	<i>Lycopodium sabinifolium</i>	Ground-Fir				S3	4 Secure	11	6.4 ± 1.0	NB
P	<i>Huperzia appalachiana</i>	Appalachian Fir-Clubmoss				S3	3 Sensitive	16	9.2 ± 1.0	NB
P	<i>Botrychium dissectum</i>	Cut-leaved Moonwort				S3	4 Secure	26	7.1 ± 0.0	NB
P	<i>Botrychium lanceolatum</i> var. <i>angustisegmentum</i>	Lance-Leaf Grape-Fern				S3	3 Sensitive	7	4.5 ± 0.0	NB
P	<i>Botrychium simplex</i>	Least Moonwort				S3	4 Secure	9	71.8 ± 0.0	NB
P	<i>Polypodium appalachianum</i>	Appalachian Polypody				S3	4 Secure	15	7.5 ± 1.0	NB
P	<i>Utricularia resupinata</i>	Inverted Bladderwort				S3?	4 Secure	19	2.6 ± 0.0	NB
P	<i>Crataegus submollis</i>	Quebec Hawthorn				S3?	3 Sensitive	18	7.3 ± 1.0	NB
P	<i>Mertensia maritima</i>	Sea Lungwort				S3S4	4 Secure	29	9.9 ± 2.0	NB
P	<i>Lobelia kalmii</i>	Brook Lobelia				S3S4	4 Secure	18	10.3 ± 1.0	NB
P	<i>Suaeda calceoliformis</i>	Horned Sea-blite				S3S4	4 Secure	6	7.9 ± 1.0	NB
P	<i>Myriophyllum sibiricum</i>	Siberian Water Milfoil				S3S4	4 Secure	29	6.1 ± 0.0	NB
P	<i>Stachys pilosa</i>	Hairy Hedge-Nettle				S3S4	5 Undetermined	5	52.7 ± 1.0	NB
P	<i>Utricularia gibba</i>	Humped Bladderwort				S3S4	4 Secure	32	2.4 ± 0.0	NB
P	<i>Rumex maritimus</i>	Sea-Side Dock				S3S4	4 Secure	1	70.6 ± 1.0	NB
P	<i>Potentilla arguta</i>	Tall Cinquefoil				S3S4	4 Secure	32	29.2 ± 0.0	NB
P	<i>Rubus chamaemorus</i>	Cloudberry				S3S4	4 Secure	56	4.0 ± 0.0	NB
P	<i>Geocaulon lividum</i>	Northern Comandra				S3S4	4 Secure	9	8.7 ± 0.0	NB
P	<i>Juniperus horizontalis</i>	Creeping Juniper				S3S4	4 Secure	23	6.9 ± 1.0	NB
P	<i>Cladium mariscoides</i>	Smooth Twigrush				S3S4	4 Secure	40	3.7 ± 0.0	NB
P	<i>Eriophorum russeolum</i>	Russet Cottongrass				S3S4	4 Secure	5	6.4 ± 1.0	NB
P	<i>Triglochin gaspensis</i>	Gasp Arrowgrass				S3S4	4 Secure	18	6.8 ± 1.0	NB
P	<i>Spirodela polyrrhiza</i>	Great Duckweed				S3S4	4 Secure	36	38.7 ± 0.0	NB
P	<i>Corallorhiza maculata</i>	Spotted Coralroot				S3S4	3 Sensitive	15	9.2 ± 1.0	NB
P	<i>Calamagrostis stricta</i>	Slim-stemmed Reed Grass				S3S4	4 Secure	4	7.3 ± 2.0	NB
P	<i>Distichlis spicata</i>	Salt Grass				S3S4	4 Secure	3	78.4 ± 0.0	NB
P	<i>Potamogeton oakesianus</i>	Oakes' Pondweed				S3S4	4 Secure	49	5.1 ± 0.0	NB

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)	Prov
P	<i>Montia fontana</i>	Water Blinks				SH	2 May Be At Risk	1	54.0 ± 1.0	NB
P	<i>Solidago caesia</i>	Blue-stemmed Goldenrod				SX	0.1 Extirpated	2	10.3 ± 1.0	NB
P	<i>Celastrus scandens</i>	Climbing Bittersweet				SX	0.1 Extirpated	2	89.7 ± 100.0	NB
P	<i>Carex swanii</i>	Swan's Sedge				SX	0.1 Extirpated	59	74.6 ± 0.0	NS

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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.

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F-2 - Habitat Comparison Table

TABLE F-1: SPECIES HABITAT COMPARISON

Common Name	Scientific Name	Preferred Habitat	Habitat Present
Fauna			
Bank Swallow	<i>Riparia riparia</i>	The Bank Swallow breeds in a wide variety of natural and artificial sites with vertical banks, including riverbanks, lake and ocean bluffs, aggregate pits, road cuts, and stock piles of soil. Sand-silt substrates are preferred for excavating nest burrows. Breeding sites tend to be somewhat ephemeral due to the dynamic nature of bank erosion. Breeding sites are often situated near open terrestrial habitat used for aerial foraging (e.g., grasslands, meadows, pastures, and agricultural cropland). Large wetlands are used as communal nocturnal roost sites during post-breeding, migration, and wintering periods. (1)	No
Barn Swallow	<i>Hirundo rustica</i>	Before European colonization, Barn Swallows nested mostly in caves, holes, crevices and ledges in cliff faces. Following European settlement, they shifted largely to nesting in and on artificial structures, including barns and other outbuildings, garages, houses, bridges, and road culverts. Barn Swallows prefer various types of open habitats for foraging, including grassy fields, pastures, various kinds of agricultural crops, lake and river shorelines, cleared rights-of-way, cottage areas and farmyards, islands, wetlands, and subarctic tundra. (1)	No
Black-billed Cuckoo	<i>Coccyzus erythrophthalmus</i>	Found in woodlands and thickets that contain aspen, poplar, birch, sugar maple, hickory, hawthorn, and willow. More likely to be seen in deciduous stands opposed to coniferous (2).	Yes
Black-crowned Night-heron	<i>Nycticorax nycticorax</i>	Often found perched on tree limbs or concealed among foliage and branches. They forage in the evening and at night, in water, on mudflats, and on land. They tend to roost and nest in groups, but forage on their own. Habitats include estuaries, marshes, streams, lakes and reservoirs (2).	No
Bobolink	<i>Dolichonyx oryzivorus</i>	Prefer to nest in tall grass, but also tend to nest in forage crops such as hayfields and pastures. Also found in small grain fields, restored surface mining sites and irrigated fields (1).	No
Brown Thrasher	<i>Toxostoma rufum</i>	Nest in thickets, hedgerows, edges of forests and overgrown clearings in deciduous forests. This species can be found in woodlands with cottonwood, willow, or dogwood. Rarely breed in backyards and gardens (2).	Yes
Brown-headed Cowbird	<i>Molothrus ater</i>	This species can be found in grasslands with lowland and scattered trees and woodland edges, brushy thickets, fields, pastures, orchards, and residential areas. These birds avoid forests (2).	No
Bufflehead	<i>Bucephala albeola</i>	Bufflehead dive underwater to catch aquatic invertebrates. Mostly widespread in winter, when they move south to coasts and large bodies of water, particularly shallow saltwater bays. They breed near lakes in northern forests where conifers mix with poplars or aspens. They nest in tree cavities, especially old Northern Flicker holes (2).	No
Canada Warbler	<i>Wilsonia canadensis</i>	The Canada Warbler is found in a variety of forest types, but it is most abundant in wet, mixed deciduous-coniferous forest with a well-developed shrub layer. It is also found in riparian shrub forests on slopes and in ravines and in old-growth forests with canopy openings and a high density of shrubs, as well as in stands regenerating after natural disturbances, such as forest fires, or anthropogenic disturbances, such as logging. (1)	Yes
Cliff Swallow	<i>Petrochelidon pyrrhonota</i>	They nest on buildings, bridges and other man-made structures. Live in grasslands, towns, broken forest and river edges. Forage near a water source and open fields or pastures (2).	No
Common Eider	<i>Somateria mollissima</i>	Rocky coasts, shoals, islands. Very close to coastlines at all seasons. For nesting favors islands or coasts with rocky shorelines, either barren or forested. At other seasons on shallow oceanic waters, usually not far from shore. Rarely on fresh water. (3)	No
Common Nighthawk	<i>Chordeiles minor</i>	The Common Nighthawk nests in a wide range of open, vegetation-free habitats, including dunes, beaches, recently harvested forests, burnt-over areas, logged areas, rocky outcrops, rocky barrens, grasslands, pastures, peat bogs, marshes, lakeshores, and river banks. This species also inhabits mixed and coniferous forests. (1)	Yes
Crowberry Blue	<i>Plebejus idas empetri</i>	Inhabits openings in mixed evergreen forests, bogs, wet meadows and seeps. They feed on nectar from yarrow, dogbane, orange hawkweed and various types of clover (4).	No
Evening Grosbeak	<i>Coccothraustes vespertinus</i>	Breed in mature and second-growth coniferous forests and nest in deciduous woodlands, parks, and orchards. They winter in both coniferous and deciduous forest and also urban and suburban areas (2).	No
Gadwall	<i>Anas strepera</i>	Breed mainly in the Great Plains and prairies. On migration and in winter, look for Gadwall in reservoirs, ponds, fresh and salt water marshes, city parks, sewage ponds, or muddy edges of estuaries (2).	No
House Wren	<i>Troglodytes aedon</i>	House Wrens have large geographic range, and they live in many habitats that feature trees, shrubs and tangles interspersed with clearings. Examples range from eastern deciduous forests and southern swamps to western conifer forests and aspen groves. These cavity nesters thrive around buildings, yards, farms and other human habitations(2).	No
Killdeer	<i>Charadrius vociferus</i>	Prefer open areas like sandbars, mudflats, and grazed fields. They live in lawns, driveways, sports fields and golf courses (2).	No
Lesser Scaup	<i>Aythya affinis</i>	During migration and winter, they form large flocks on lakes, bays, rivers and large wetlands. During winter, they live on lakes, reservoirs, coastal bays and estuaries. During the breeding season, they are more commonly found in marshes of northern North America where they nest (2).	No
Long-eared Owl	<i>Asio otus</i>	Roost in dense vegetation and forage in open grasslands and shrublands. They also forage in open coniferous or deciduous woodlands (2).	No
Monarch	<i>Danaus plexippus</i>	Prefer open habitats such as fields, meadows, weedy areas, marshes and roadsides (4).	No
Northern Dusky Salamander	<i>Desmognathus fuscus</i>	Adults are mainly found on land, but are always close to small groundwater fed streams, seeps and springs. They live under rocks, logs or leaf litter within or near water (5).	Yes
Northern Mockingbird	<i>Mimus polyglottos</i>	Can be found in areas with open ground as well as with shrubby vegetation such as hedges, fruiting bushes and thickets. While foraging, they prefer grassy areas (2).	No
Northern Pintail	<i>Anas acuta</i>	Nest in open areas with shallow, seasonal wetlands and low vegetation. They winter in shallow inland freshwater and intertidal habitats (2).	No
Northern Shoveler	<i>Anas clypeata</i>	They breed in shallow, open wetlands and winter in both freshwater and saline marshes (2).	Yes

TABLE F-1: SPECIES HABITAT COMPARISON

Common Name	Scientific Name	Preferred Habitat	Habitat Present
Pectoral Sandpiper	<i>Calidris melanotos</i>	During migration, they may be found across North America. They primarily breed on wet tundra. In winter, this species inhabits wet grasslands and marshes, almost always in freshwater. During migration, these Sandpipers may be found in salt marshes near tall grasses (6).	No
Pine Siskin	<i>Carduelis pinus</i>	This species nests in open coniferous or mixed forests, but they will also nest in parks, cemeteries and suburban woodlands. They forage in open forest canopies where cone seeds are abundant (2).	Yes
Red Crossbill	<i>Loxia curvirostra</i>	Favor pine stands. Mature spruce and fir forests are also important habitat. Timber harvesting is negatively impacting their population (1).	No
Red-breasted Merganser	<i>Mergus serrator</i>	Lakes, open water; in winter, coastal bays. During nesting season around lakes and rivers, within the northern forest. In winter mostly on coastal waters, including bays, estuaries, and open ocean; a few winter on ice-free reservoirs and large rivers. (3)	No
Red-headed Woodpecker	<i>Melanerpes erythrocephalus</i>	Live in pine savannahs and other open forests with clear understories. Open pine plantations, treerows in agricultural areas, and standing timber in beaver swamps and other wetlands (2).	No
Ring-billed Gull	<i>Larus delawarensis</i>	Found around urban, suburban and agricultural areas. On the coasts, they inhabit estuaries, beaches, mudflats and coastal waters (2).	No
Saltmarsh Hydrobe	<i>Spurwinkia salsa</i>	Confined to inundated marshes with varying salinities. This species is threatened by development (7).	No
Shortnose Sturgeon	<i>Acipenser brevirostrum</i>	Within the Saint John River, they occur primarily in the freshwater and tidal areas of the lower river and its tributaries. Shortnose Sturgeon generally overwinter in the lower tidal reaches of the Saint John River. Adults migrate upstream to spawn in freshwater (6).	No
Spotted Sandpiper	<i>Actitis macularius</i>	Pebbly lake shores, ponds, streamsides; in winter, also seashores. Breeds near the edge of fresh water in a wide variety of settings, including lakes, ponds, rivers, streams, in either open or wooded country. In migration and winter also found along coast on mudflats, beaches, breakwaters; also on such inland habitats as sewage ponds, irrigation ditches. (3)	Yes
Swamp Spreadwing	<i>Lestes vigilax</i>	Usually found at vegetated ponds, marshes, stream backwaters and boggy lakes (8).	No
Turkey Vulture	<i>Cathartes aura</i>	Found in open areas including farmland, roadsides and landfills. They roost in trees, on rocks and other excluded high spots at night (2).	No
Willow Flycatcher	<i>Empidonax traillii</i>	Occupy areas with willows or other shrubs near standing or running water. They may also breed in drier scrubby areas. They winter in shrubby clearings, pastures and woodland edges near water (2).	Yes
Wilson's Phalarope	<i>Phalaropus tricolor</i>	Breed in wetlands, upland shrubby areas, marshes and roadside ditches. During migration, they may stop at saline lakes in western North America, and coastal marshes and sewage ponds. They winter in high Andean salt lakes and wetlands in South America (2).	No
Location Sensitive Species			
Bald Eagle	<i>Haliaeetus leucocephalus</i>	Nest in forests located next to large water bodies and avoid heavily developed areas when possible. May forage around fish processing plants, landfills, and below dams. Perch in tall deciduous or coniferous trees that allow them to view their surroundings (2).	Yes
-	<i>Bat Hibernaculum</i>	A bat hibernaculum is a site where bats hibernate over winter. Most often caves or abandoned mines and may contain both rare and non-rare species (9).	No
Eastern Painted Turtle	<i>Chrysemys picta picta</i>	Lives in permanent and temporary water bodies including rivers, marshes, and brackish water. They prefer densely vegetated water with little or no flow. They forage on most animal or vegetable matter (10).	No
Peregrine Falcon - anatum/tundrius pop.	<i>Falco Peregrinus pop. 1</i>	Lakeshores, river valleys, river mouths, urban areas and open fields (11).	No
Wood Turtle	<i>Glyptemys insculpta</i>	Road networks and agricultural practices are the largest threat to the population. They prefer clear, hard-bottomed streams and rivers as well as the adjoining forest, woodland and some fields. Deep pools with permanent flow are critical for hibernation (10).	Yes

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APPENDIX G

VEC: Wetlands and Vegetation

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1.0 RATIONALE FOR THE VALUED ENVIRONMENTAL COMPONENT (VEC)

Wetlands offer biologically diverse ecosystems that support a wide variety of vegetation and animal species. Furthermore, wetlands provide positive hydrological functions and support water quality processes and habitat functions. In New Brunswick, wetlands are regulated under the *Clean Water Act - Watercourse and Wetland Alteration Regulation* administered by the New Brunswick Department of Environment and Local Government (NBDELG). Vegetation is also included in this valued environmental component (VEC) and is primarily focused on flora Species at Risk (SAR) and Species of Conservation Concern (SOCC).

In order to assess any influence of the Project on wetlands and vegetation, three components have been identified for the VEC:

- *Wetlands* are lands where the water table is 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, 2002);
- *Flora SAR* include vegetation species that have a protective status under Schedule 1 of the federal *Species at Risk Act (SARA)* or are protected under the provincial *New Brunswick Species At Risk Act (NBSAR)*; and
- *Flora SOCC* are species not protected by federal or provincial legislation but are:
 - Considered rare in New Brunswick with an Atlantic Canada Conservation Data Centre (ACCDC) rank of S1 (imperiled) to S3 (vulnerable); and/or
 - Ranked At Risk, May Be At Risk or Sensitive by the New Brunswick Department of Energy and Resource Development (NBDERD).

2.0 BOUNDARIES FOR THE ENVIRONMENTAL EFFECTS ASSESSMENT

2.1 Spatial Boundaries

The assessment of wetlands and vegetation has been completed for three spatial boundaries:

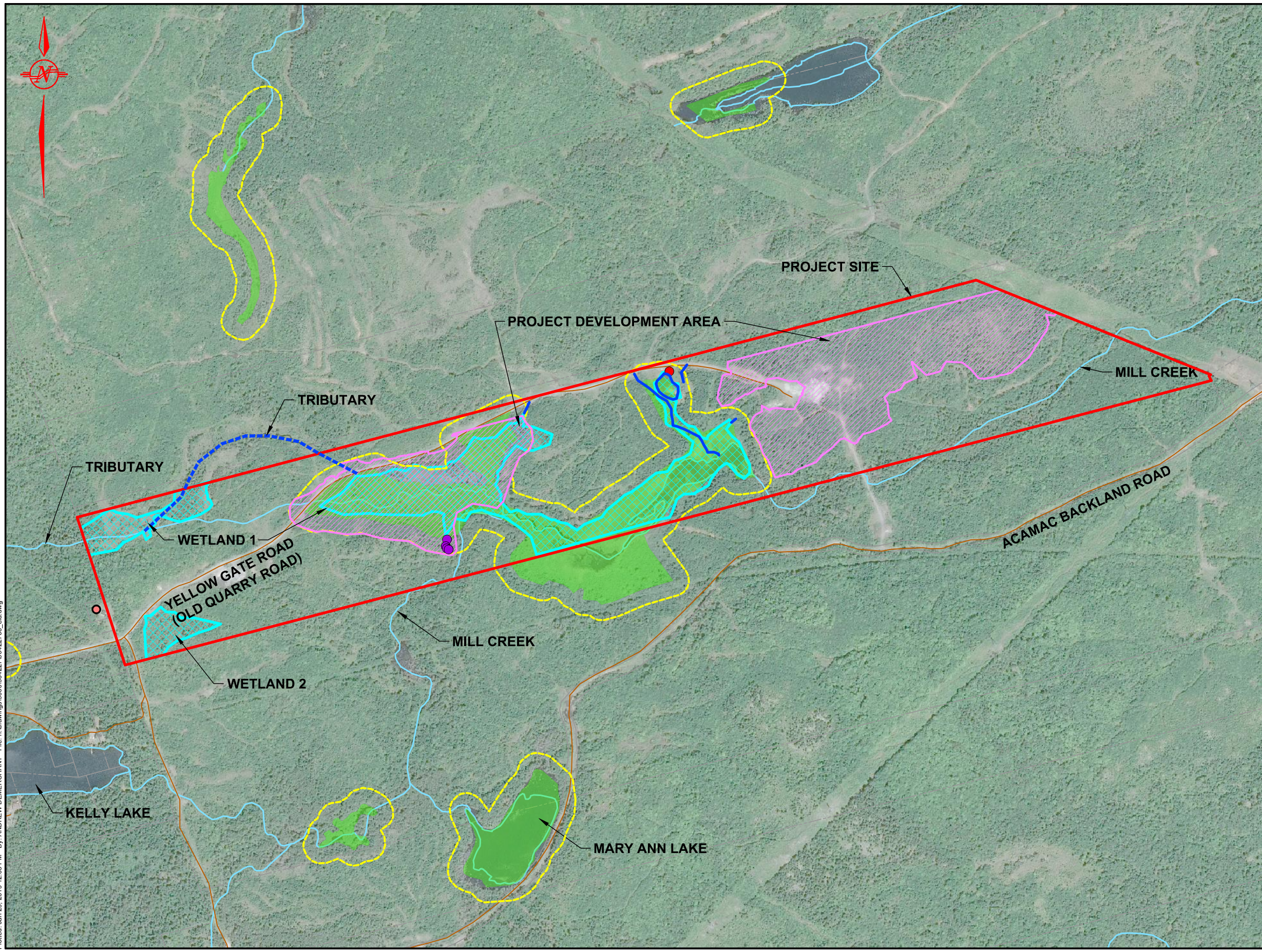
- The Project Development Area (PDA) is defined as footprint of ground disturbance required for the Project activities (portion of PID 00289595; Figure G-1);
- The Project Site is defined as the southwestern portion of PID 00289595 as investigated during the baseline environmental studies (Figure G-1); and
- The Assessment Area encompasses a 5 kilometre (km) radius of the PDA where flora SAR and SOCC have been recorded.

2.2 Temporal Boundaries

The assessment of wetlands and vegetation has been completed for the following temporal boundaries:

- The construction phase of the Project;
- The operational phase of the Project; and
- The reclamation phase of the Project.

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LEGEND

- REGULATED WETLAND (GeoNB)
- 30m WETLAND BUFFER
- DELINEATED WETLAND
- ASPLENIUM TRICHOMANES-RAM
- SPIRANTHES CERNUA
- FIELD DELINEATED DRAINAGE CHANNEL
- FIELD DELINEATED WATERCOURSE
- MAPPED WATERCOURSE

Drawn By	Checked By
AGSD	JH
Calculations By	Checked By

Date
JAN, 2019

Project
ENVIRONMENTAL IMPACT ASSESSMENT
CRANE MOUNTAIN LANDFILL CLAY AND
AGGREGATE QUARRY

Drawing
WETLAND AND VEGETATION VEC
SPATIAL BOUNDARIES

Scale
1:7500

File No.	Drawing	Revision No.
90422706	G-1	0



3.0 METHODOLOGY

A two-phased approach was used to determine the existing wetland and vegetation conditions and any potential interaction with the Project, including:

- A desktop review of all existing information for wetlands, flora SAR and flora SOCC; and
- Field investigations to delineate wetlands and survey vegetation within the Project Site.

Specific to the Environmental Impact Assessment (EIA) process, potential interactions or effects of the Project on wetlands and vegetation have been identified and are discussed. Where residual effects are anticipated, the proposed methods for mitigating the potential effects have been presented.

3.1 Wetlands

3.1.1 Desktop Review

In New Brunswick, regulated wetlands are identified using an online predictive mapping tool, (GeoNB), developed by the NBDELG and the NBDERD. The regulated features include the mapped wetland boundary and the 30-metre wetland buffer. Prior to completing any field investigations, the GeoNB mapping was reviewed for the presence of any regulated wetlands or provincially significant wetlands within the Project Site.

3.1.2 Field Study

GEMTEC personnel visited the site on September 20, September 25, October 9, and October 26, 2018, for the purposes of assessing the wetland conditions within the Project Site. During the field investigation, GEMTEC biologists identified the location, boundaries and characteristics of all encountered wetlands. Delineations were recorded using handheld Global Positioning System (GPS) units and photos were taken.

To determine the wetland boundaries, the assessor used accepted industry standards as described by the Army Corps of Engineers in the "*Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region*". The field information was recorded on the New Brunswick Department of Environment Wetland Delineation Data Sheets, supplied by NBDELG.

Each delineated wetland that could be potentially impacted by the Project was assessed for ecosystem function using the Wetland Ecosystem Services Protocol for Atlantic Canada (WESP-AC). WESP-AC is a rapid assessment tool for determining function and value of tidal or non-tidal wetlands throughout temperate North America. WESP-AC uses three multiple choice forms to generate scores from 0 to 10 and ratings of Lower, Moderate or Higher, for each wetland function and benefit. The function describes the ecological process that a particular wetland conducts within the environment and the higher rated wetland functions are discussed in this

report. The benefit score is not discussed as it describes the context within which the function is being performed. It is important to note that not all “high-functioning” wetlands are healthy and/or intact and no single wetland can rate highly in all functions as many functions operate naturally in opposing directions.

3.2 Vegetation

3.2.1 Desktop Review

A data request was submitted to the ACCDC for a 5 km radius of the Project Site (*i.e.*, the Assessment Area). The ACCDC report provides the location of flora SAR and SOCC, any location sensitive species and information on protected or managed natural areas. The ACCDC report was reviewed prior to completing any field investigations to determine the potential for any vegetation SAR and/or SOCC to occur within the Project Site.

3.2.2 Field Study

Senior Terrestrial Ecologist Derrick Mitchell of Boreal Environmental conducted a vegetation survey at the Project Site on September 20, October 8, and October 9, 2018. The vegetation survey included traversing the entire Project Site with special attention given to habitats with an elevated potential for SAR and SOCC (*e.g.*, wetlands, bedrock outcrops, watercourse banks, *etc.*). Any incidental sighting or evidence of flora and critical habitat for SAR was recorded during the survey. For the purposes of this assessment, critical habitat is defined as the habitat necessary for the survival or recovery of a listed, endangered, threatened or extirpated species in Schedule 1 of *SARA* and as identified in the recovery strategy or action plan for a given listed species.

4.0 DESCRIPTION OF EXISTING ENVIRONMENT

4.1 Wetlands

Two wetlands were encountered within the Project Site during the field investigations (Figure G-1), including one mapped and regulated wetland (Wetland 1). A description of the encountered wetlands is presented below.

Wetland 1 is a mapped and regulated wetland on PID 00289595 and PID 00455493. Approximately 7.8 hectares (ha) of this 10.2 ha regulated wetland falls within the Project Site (PID 00289595), and 4.8 ha of this regulated wetland falls within the Clay PDA (Figure G-1). The remaining wetland area is located outside the Project Site. The field delineation is generally consistent with the wetland boundaries presented on GeoNB mapping, with the exception of a forested swamp that is located north of Yellow Gate Road (herein referred to, and known locally as “Old Quarry Road”; Figure G-1).

An unnamed tributary of Delaney Lake (herein referred to as the “Tributary”) flows through the northern portion of Wetland 1 and under Old Quarry Road via a culvert, and then south and east through the southern portion of Wetland 1 (Figure G-1). Mill Creek enters the southern wetland boundary and flows east to converge with the Tributary (Figure G-1). The watercourses and roadside ditching along Old Quarry Road likely influence water inputs into the wetland, as well as the steep surrounding topography that directs overland flow into the wetland area.

Dominant flora species in the northern portion of Wetland 1 (forested swamp) include Eastern White Cedar (*Thuja occidentalis*) and Speckled Alder (*Alnus incana*; Photo 1, Attachment G-1), and the dominant vegetation species in the southern portion of Wetland 1 (open water complex with shrub/forested fringe) included Speckled Alder, Glossy Buckthorn (*Frangula alnus*), Yellow-Green Sedge (*Carex flava*), and Three-Seeded Sedge (*Carex trisperma*; Photo 2, Attachment G-1). A beaver dam is located at the eastern portion of the wetland, creating an impoundment (Photo 3, Attachment G-1). The higher rated functions of Wetland 1, as per WESP-AC, are:

- Water cooling;
- Phosphorus retention;
- Organic nutrient export;
- Resident fish habitat;
- Aquatic invertebrate habitat;
- Amphibian & turtle habitat;
- Waterbird feeding habitat;
- Waterbird nesting habitat;
- Songbird, raptor, & mammal habitat;
- Pollinator habitat; and
- Native plant habitat.

Wetland 2 is an unregulated, forested swamp that adjoins Old Quarry Road in the western portion of the Project Site (0.4 ha; Figure G-1). Roadside ditching that adjoins the western boundary of the wetland and the steep surrounding topography likely influence the hydrology of the wetland. Dominant flora species include Eastern White Cedar and Wild Raisin (*Viburnum nudum*; Photo 4, Appendix G-1). Wetland 2 and adjoining areas will not be altered during any phase of the Project; therefore, WESP-AC was not conducted.

The NBDELG wetland datasheets and WESP-AC scores are presented in Attachment G-2. The entire WESP-AC electronic package is available upon request.

4.2 Vegetation

A total of 158 flora species were observed within the Project Site during the 2018 field investigation. A complete list of encountered vegetation is presented in Attachment G-3, and it should be noted that this list may not be comprehensive because the field investigation was conducted late in the growing season after many of the vegetation within the Project Site had senesced or flowered. The Project Site was found to be relatively species diverse which is likely due to the calcium rich soils and bedrock geology (*i.e.*, limestone).

The ACCDC report identified 31 flora species (26 vascular plants and 5 nonvascular plants) as occurring within the Assessment Area. The ACCDC report and a Species Habitat Comparison table (Table G-4-1) outlining the species and their habitat requirements is presented in Attachment G-4.

A description of the wildlife habitat based on forest composition and an effects assessment is presented in Appendix F and is not discussed in this VEC assessment.

4.2.1 Flora Species at Risk and Critical Habitat

The ACCDC had no records of flora SAR occurring within the Assessment Area and no flora SAR were encountered within the Project Site during the field investigations. In addition, no critical habitat was identified within the Project Site during the 2018 field investigations.

Due to the timing of the 2018 field investigations (*i.e.*, late season) an additional vegetation survey will be undertaken by the Fundy Regional Service Commission (FRSC) during the 2019 growing season to ensure any earlier maturing flora are noted. The results of that survey will be submitted to NBDELG as an addendum to this EIA document.

4.2.2 Flora Species of Conservation Concern

During the 2018 field investigations, two flora SOCC were identified within the Project Site, Green Spleenwort (*Asplenium trichomanes-ramosum*) and Nodding Lady's Tresses (*Spiranthes cernus*).

Green Spleenwort is listed as S3 by ACCDC and has a NBDERD rank of Secure. Approximately 22 specimens of Green Spleenwort were recorded in an Eastern White Cedar habitat near Mill

Creek, within Wetland 1 (Photo 5, Attachment G-1; Figure G-1). All specimens were encountered on steep faced bedrock outcrops, and were concentrated on small ledges and cracks where a thin layer of soil had developed. Since the Green Spleenwort population is located outside the PDA and upgradient of the Project, it is not anticipated that the Project will have negative effects on this population.

Nodding Lady's Tresses is listed as S2 by ACCDC and has a NBDERD rank of Sensitive. One specimen Nodding Lady's Tresses was encountered adjacent to a sparsely vegetated area on Old Quarry Road (Figure G-1). This species prefers roadside and disturbed areas that are in a regenerative state and not subjected to frequent disturbance or heavy traffic. The Nodding Lady's Tresses encountered may be impacted by Project activities such as roadway enhancement and hauling activities. However, roadside habitat, specifically old logging roads and skidder trails, is not limiting in this area. In addition, given the late season field investigations, the population of this species is likely higher than the survey results would suggest.

The ACCDC lists 31 flora species considered to be SOCC that are known to occur in the Assessment Area. Five of the SOCC species were reported to occur in close proximity (less than 2 km) to the Project Site (ACCDC, 2018). These species include:

- Genuculate Four-Tooth Moss (*Tetraphis geniculata*);
- Green Spleenwort;
- Meadow Plait Moss (*Hypnum pratense*);
- Mistassini Primrose (*Primula mistassinica*); and
- Showy Lady's-Slipper (*Cypripedium reginae*).

Genuculate Four-Tooth Moss (*Tetraphis geniculata*) is ranked S3S4 (vulnerable or apparently secure) by the ACCDC and 'Secure' by NBDERD. Genuculate Four-Tooth Moss generally occurs on the cut of broken ends of decayed logs and stumps in old-growth stands of Spruce (*Picea spp.*), Hemlock (*Tsuga spp.*) and Douglas Fir (*Pseudotsuga menziesii*; USA Forest Service, 2005). There is one record of this species in the ACCDC report, located along Route 177, north of the Project Site.

Three locations for Green Spleenwort were indicated in the ACCDC report; one near Boar's Head Nature Preserve on the east side of the Saint John River, one near Green Head Cove on the east side the Saint John River, and one near Acamac Backland Road, approximately 650 metres from the field identified specimens on the Project Site.

Meadow Plait Moss (*Hypnum pratense*) is ranked S2 (rare) by the ACCDC and 'Sensitive' by NBDERD, indicating a potential population decrease in New Brunswick. Meadow Plait Moss occurs in exposed locations including rich fens, sedge meadows and natural seeps (Montana Field Guides, 2018). One location for this species is indicated in the ACCDC report near Acamac Backland Road.

Mistassini Primrose (*Primula mistassinica*) is ranked S3 (uncommon) by ACCDC; however, NBDERD has ranked this species as 'Secure'. Mistassini Primrose occurs on ridges, ledges and shores of rivers and lakes (Go Botany, 2018). Two locations for this species were indicated in the ACCDC report; one near Boar's Head Nature Preserve on the east side of the Saint John River and one near Acamac Backland Road in Saint John.

Showy Lady's Slipper (*Cypripedium reginae*) is ranked S3 (uncommon) by ACCDC and 'Sensitive' by NBDERD. Showy Lady's Slipper occurs in calcareous bogs, fens, boggy meadows and edges of swamps (Hinds, H., 2000). Only one location for this species is indicated in the ACCDC report near Acamac Backland Road.

Twelve additional SOCC were recorded within the Assessment Area and have habitat requirements similar to those observed within the Project Site (*i.e.*, wetland edges, rocky slopes, stream edges). These species include:

- American False Pennyroyal (*Hedeoma pulegioides*);
- Bicknell's Crane's-bill (*Geranium bicknellii*);
- Glaucous Rattlesnakeroot (*Prenanthes racemose*);
- Maidenhair Spleenwort (*Asplenium trichomanes*);
- Michaux's Sedge (*Carex michauxiana*);
- Northern Adder's-tongue (*Ophioglossum pusillum*);
- Northern Yellow-Eyed-Grass (*Xyris montana*);
- Small Yellow Lady's-Slipper (*Cypripedium parviflorum var. makasin*);
- Smooth Twigrush (*Cladium mariscoides*);
- Swamp Rose (*Rosa palustris*);
- Three-Ranked Moss (*Calliergon triarium*); and
- Wiegand's Sedge (*Carex wiegandii*).

The preferred habitat descriptions for all SOCC are presented in Table G-4-1 in Attachment G-4.

Due to the seasonal timing of the vegetation survey, an additional survey will be undertaken by the FRSC during the 2019 growing season. The results of that survey will be submitted to NBDELG as an addendum to this EIA document.

5.0 SUMMARY OF POTENTIAL EFFECTS

5.1 Wetland Potential Effects

The identified potential effects to wetlands as a result of the Project are detailed below.

Erosion and/or sedimentation could occur in disturbed areas and stockpiles created during the construction phase. Vegetation clearing and ground disturbance may also increase the potential for erosion and sediment release into the wetland habitat, which may result in the degradation of existing wetland vegetation, a change in nutrient inputs and/or changes in wetland function.

There is also a potential for contaminants to be released into wetland habitat through spills of fuels and lubricants from equipment during all phases of the Project.

During the operational phase, Project activities may alter wetland habitat within the Project Site in several direct ways.

A portion of Wetland 1 (approximately 4.8 ha) will be removed within the Clay PDA as an estimated approximately 250,000 cubic metres (m³) of clay is excavated over the life of the Landfill (projected Landfill life until 2048). It is estimated that approximately 22,000 m³ (approximately 40,000 tonnes) will be extracted every three to four years for new Landfill disposal cell construction. The alteration of the wetland will be in phases and not all at once. The exact footprint within the wetland that will be directly affected is unknown, and will depend on ground conditions such as clay thickness and quality, which will be evaluated throughout the Project. A Watercourse and Wetland Alteration (WAWA) permit may be obtained from NBDELG prior to any work within the Wetland 1 regulated boundaries and the 30-metre regulated buffer. All on-site work will be conducted to comply with the conditions of the WAWA.

The clay pit activities undertaken during the operational phase of the Project may result in the indirect loss of wetland habitat area and/or function of Wetland 1 (regulated) downgradient of the PDA due to the re-alignment of the Tributary channel. Until final engineering plans have been developed, the actual extent of any wetland alteration downgradient is unknown.

In addition, operational open pit activities such as excavation, crushing and de-watering may increase the potential for sediment release into wetland habitats.

During the reclamation phase of the Project, the exhausted clay open pits and sedimentation pond will potentially interact with wetlands VEC via the impoundment of surface water. Although the pits/pond will be partially infilled (sloped) by on-site overburden and stockpiled material, it is expected that the remaining open pits will naturally impound water (*i.e.*, precipitation/snowmelt) to provide aquatic habitat features and may be enhanced to provide wetland compensation opportunities.

Since Wetland 2 is outside the PDA and any area of potential Project influence, it is unlikely there will be any adverse effects to this wetland. Therefore, no further discussion on effects to Wetland 2 is presented in this VEC assessment.

5.2 Vegetation Potential Effects

There are a number of identified potential effects to vegetation as a result of the Project.

No flora SAR were identified within the Project Site during the 2018 field investigations. Therefore, it is not anticipated that there will be any adverse effects to flora SAR populations as a result of this Project. An additional vegetation survey will be completed during the 2019 growing season by a qualified botanist to ensure that early flowering flora are noted at the Project Site. Potential adverse effects to flora SAR are not discussed further in this VEC assessment.

Two flora SOCC were identified within the Project Site during the 2018 survey. The population of Green Spleenwort is not located within the PDA or any area of potential Project influence. The specimens of Nodding Lady's Tresses may be impacted by Project activities but its preferred habitat is not limiting.

The Project Site provides suitable habitat for 12 flora SOCC that the ACCDC database identified within the Assessment Area. Construction activities, such as clearing, grubbing, excavation, and grading will alter the habitats within the Project Site. However, the habitat is not limiting within the area and similar conditions were observed on adjoining properties.

There is also the potential for the introduction of invasive plant species to the Project Site via construction equipment, machinery and/or workers.

5.3 Accidents, Malfunctions and Unplanned Events

There is a potential for accidents to occur during all phases of the Project. Accidents that may impact wetlands and vegetation within the Project Site include:

- Fire;
- Failure of sedimentation and erosion controls structures; and
- Accidental release of chemicals or petroleum products.

6.0 PROPOSED MITIGATION MEASURES

The potential effects and proposed mitigation measures to minimize the potential effects to wetland habitat and vegetation during all phases of the Project are summarized in Table G-1. An Environmental Management Plan (EMP) will be developed prior to the commencement of the Project.

Table G-1 Summary of Mitigation Measures for Wetlands and Vegetation

Project Component	Summary of Potential Interaction	Mitigation Measures
Wetlands	All Project Phases (Construction, Operational, Reclamation) and Accidents, Malfunctions and Unplanned Events	
	Increased potential for contaminants to be released into water and/or soil through spills of fuels and lubricants from construction equipment.	<ul style="list-style-type: none"> • No chemical or petroleum storage will occur within 30-metres of a regulated area (<i>i.e.</i>, wetland, watercourses, <i>etc.</i>); • Equipment will be kept in good working order; and • Emergency and spill response procedures will be in place prior to construction activities as per the EMP.
	Increased potential for fire outbreak.	<ul style="list-style-type: none"> • Emergency and spill response procedures will be in place prior to construction as outlined in an EMP.
Ground disturbing work, including: vegetation clearing/grubbing; site preparation; and road bed enhancement; blasting, excavating, <i>etc.</i> may increase the potential for erosion and sediment release into wetlands.	<ul style="list-style-type: none"> • Erosion and sediment control (ESC) structures will be properly installed around the work area prior to commencement of any on-site activities. All structures will be inspected regularly to ensure that they are functioning as intended; • At the first evidence that runoff of sediment is starting to occur, Project work will temporarily cease. All siltation prevention devices shall be inspected and monitored; any necessary repairs will be made such that they accomplish their intended function prior to work commencing; • Once the Project work is complete, all exposed, erodible soil will be permanently stabilized against erosion (<i>i.e.</i>, riprap, mulch, hydroseed, <i>etc.</i>); and • Existing vegetation will be retained whenever possible and tree/vegetation clearing will be kept to a minimum. 	

Table G-1 Summary of Mitigation Measures for Wetlands and Vegetation

Project Component	Summary of Potential Interaction	Mitigation Measures
Wetlands	Operational Phase Only	
	<p>A portion of Wetland 1 will be altered during the clay extraction activities.</p>	<ul style="list-style-type: none"> • A WAWA permit may be obtained from NBDELG prior to any work within the Wetland 1 regulated boundaries and the 30-metre regulated buffer. All on-site work will be conducted to comply with the conditions of the WAWA; • A Wetland Compensation Plan will be developed for any permanent loss of wetland area, pending the determination of the final Project footprint; • Any change in surface water drainage will be designed to minimize the effects to hydrological regimes within the Project Site; and • Efforts will be made to maintain a vegetated buffer and/or berm between the active work area and the remaining portion of Wetland 1 outside the PDA.
	<p>The operational activities (<i>i.e.</i>, excavation, blasting, crushing, de-watering, <i>etc.</i>) may increase the potential for sediment release into wetland habitat.</p>	<ul style="list-style-type: none"> • A sedimentation pond will be constructed within the PDA. All de-watering activities will be directed to the sedimentation pond for proper settling of suspended sediments prior to discharging into the environment; and • ESC structures will be properly installed around the work area prior to commencement of any operational activities. All structures will be inspected regularly to ensure that they are functioning as intended.
<p>The natural impoundment of water within the reclaimed pits may provide aquatic habitat and opportunities for wetland compensation projects.</p>	<ul style="list-style-type: none"> • The edges of these features (excluding any remaining rock faces) will be graded to a natural slope to allow wildlife access and drainage when clay extraction activities are not on-going. 	

Table G-1 Summary of Mitigation Measures for Wetlands and Vegetation

Project Component	Summary of Potential Interaction	Mitigation Measures
Vegetation	All Project Phases (Construction, Operational, Reclamation)	
	Potential habitat for vegetation SOCC was identified within the Project Site could be altered or destroyed during the Project activities.	<ul style="list-style-type: none"> • A botanist will visit the Project Site during the 2019 established growing season to conduct a flora survey targeting rare species known to occur in the area; and • Existing vegetation will be retained whenever possible and tree/vegetation clearing will be kept to a minimum.
	Introduction of invasive plant species via Project equipment, machinery and/or workers.	<ul style="list-style-type: none"> • Any re-vegetation efforts will be completed using native vegetation species; and • All machinery will be thoroughly washed prior to being mobilized to the Project Site.
	Accidents, Malfunctions and Unplanned Events	
	Increased potential for fire outbreak.	<ul style="list-style-type: none"> • Emergency and spill response procedures will be in place prior to construction as outlined in an EMP.
	Ground disturbing work, including: vegetation clearing/grubbing; site preparation; and road bed enhancement; excavating, etc. may increase the potential for erosion and sediment release into vegetation communities.	<ul style="list-style-type: none"> • Silt fencing, check dams and/or other appropriate ESC structures will be properly installed around the work area prior to commencement of any on-site activities. All structures will be inspected regularly to ensure that they are functioning as intended; • At the first evidence that runoff of sediment is starting to occur, Project work will temporarily cease. All siltation prevention devices shall be inspected and monitored; any necessary repairs will be made such that they accomplish their intended function prior to work commencing; • Once the Project work is complete, all exposed, erodible soil will be permanently stabilized against erosion (<i>i.e.</i>, riprap, mulch, hydroseed, etc.); and • Existing vegetation will be retained whenever possible and tree/vegetation clearing will be kept to a minimum.

7.0 SUMMARY OF POTENTIAL SIGNIFICANT RESIDUAL EFFECTS

A significant residual effect to the wetland VEC can be defined as the permanent, uncompensated loss of a regulated wetland as a result of the Project activities.

A significant residual effect to the vegetation VEC can be defined as any reduction in vegetation SAR populations or critical habitat for the identified vegetation SAR, or any effect on SOCC that would threaten the long-term viability of the population in the region.

The Project will result in a direct loss of wetland habitat within the Clay PDA and will be compensated at a 2:1 ratio. Therefore, the overall residual impact to wetlands during Project activities is not considered to be significant. The implementation of proposed mitigation measures will minimize any risk to remaining wetland habitats within the Project Site. Additionally, a WAWA permit may be obtained prior to any Project work within 30-metres of a regulated wetland.

The Project will result in the loss of habitat that is suitable for vegetation SOCC. However, the loss of habitat is not expected to impact any vegetation species at a population level. With the implementation of the proposed mitigation measures, the overall residual impact to vegetation communities during the Project is not considered to be significant. It should be noted that an additional flora survey will be completed during the 2019 growing season, and the findings of that survey may require amended mitigation measures relative to the Project phases.

8.0 REFERENCES

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ATTACHMENTS

G-1 - Wetland Photos



Photo 1: View of the northern portion of Wetland 1 (October 9, 2018).



Photo 2: View of the southern portion of Wetland 1 (September 25, 2018).



Photo 3: View of the beaver dam at the eastern boundary of Wetland 1 (September 25, 2018).



Photo 4: View of Wetland 2 (October 9, 2018).



Photo 5: View of Green Spleenwort (*Asplenium trichomanes-ramosum*) in the southern portion of the Project Site (September 20, 2018).



G-2 - Wetland Datasheets and WESP-AC Information

Project Site: Crane Mountain Clay Source Development Date: October 9, 2018 Sample Point: Wetland 1
 Applicant/Owner: John Law Corp. Field Investigator(s): Jennifer Hachey & Jenna McCoy
 County: Saint John County Coordinates: 45.268539, -66.185005
 PID: 00289595 Do normal environmental conditions exist on-site? Yes No
 if no explain:
Atypical Situation? Yes No Explain:
Is this a potential Problem Area? Yes No Explain:

Wetland Determination
 (Check One Only For Each Criteria)
 Dominant Hydrophytic Vegetation (50/20 rule) Yes No
 Wetland Hydrology Yes No
 Hydric Soils Yes No
Wetland Determination Yes No
Wetland Type: Swamp Complex
Rational for Determination: There are two distinct habitats within the wetland: a forested area with a water table near the surface (forested swamp), and an open water wetland.

Vegetation

Tree Stratum: (Plot size: 30m)	% Cover	Dominant	Indicator
1. <i>Betula alba</i>	5		FAC +
2. <i>Betula populifolia</i>	10	X	FAC
3. -			
4. -			
5. -			
	15	= Total Cover	
Shrub Stratum: (Plot size: 15m)	% Cover	Dominant	Indicator
1. <i>Alnus incana</i>	20	X	FACW
2. <i>Rhamnus frangula</i>	5		FAC
3. <i>Viburnum nudum</i>	5		OBL
4. -			
5. -			
	30	= Total Cover	
Herb Stratum: (Plot size: 1.5m)	% Cover	Dominant	Indicator
1. <i>Asteraceae</i> sp.	10	X	NA
2. <i>Carex flava</i>	10	X	OBL
3. <i>Carex trisperma</i>	10	X	OBL
4. <i>Rubus idaeus</i>	5		FAC-
5. -			
6. -			
7. -			
8. -			
9. -			
10. -			
	35	= Total Cover	

Dominance Test Worksheet
 # of Dominant Species that are OBL, FACW, FAC: (A) 4
 Total # of Dominant Species across all strata: (B) 5
 % of Dominant Species that are OBL, FACW, FAC: (A/B) 80

Prevalence Index Worksheet:
 Total % Cover of: Multiply by:
 OBL Species: - x 1 = -
 FACW Species: - x 1 = -
 FAC Species: - x 1 = -
 FACU Species: - x 1 = -
 Column Totals: - x 1 = -
Prevalence Index = B/A = -

Hydrophytic Vegetation Indicators:
 Rapid Test for Hydrophytic Vegetation
 Dominance Test is > 50%
 Prevalence Index is ≤ 3.0¹
 Morphological Adaptations¹ (explain)
 Problematic Hydrophytic Vegetation¹ (explain)
¹Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? Yes No

Comments: NA - unable to species identify; therefore, indicator could not be determined.

Hydrology

Primary Hydrological Indicators: (minimum of one is required; check all that apply)

<input checked="" type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Water Stained Leaves (B9)
<input checked="" type="checkbox"/> High Water Table (A2)	<input checked="" type="checkbox"/> Aquatic Fauna (B13)
<input checked="" type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Marl Deposits (B15)
<input type="checkbox"/> Water Marks (B1)	<input type="checkbox"/> Hydrogen Sulfide Odor (C1)
<input type="checkbox"/> Sediment Deposits (B2)	<input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3)
<input type="checkbox"/> Drift Deposits (B3)	<input type="checkbox"/> Presence of Reduced Iron (C4)
<input type="checkbox"/> Algal Mat or Crust (B4)	<input type="checkbox"/> Recent Iron reduction in tilled Soils (C6)
<input type="checkbox"/> Iron Deposits (B5)	<input type="checkbox"/> Thin Muck Surface (C7)
<input checked="" type="checkbox"/> Inundation Visible on Aerial Imagery (B7)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)	

Secondary Indicators: (minimum of two required)

<input type="checkbox"/> Surface Soil Cracks (B6)	<input checked="" type="checkbox"/> Stunted or Stressed Plants (D1)
<input checked="" type="checkbox"/> Drainage Patterns (B10)	<input checked="" type="checkbox"/> Geomorphic Position (D2)
<input type="checkbox"/> Moss Trim Lines (B16)	<input type="checkbox"/> Shallow Aquitard (D3)
<input checked="" type="checkbox"/> Dry-Season Water Table (C2)	<input type="checkbox"/> Microtopographic Relief (D4)
<input type="checkbox"/> Crayfish Burrows (C8)	<input checked="" type="checkbox"/> FAC-Neutral Test (D5)
<input checked="" type="checkbox"/> Saturation Visible on Aerial Imagery (C9)	

Field Observations:

Surface Water Present? Yes No Depth: Varying

Water Table Present? Yes No Depth: 25cm

Saturation Present? Yes No Depth: 25cm

Wetland Hydrology Present? Yes No

Comments:

Soil Profile

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators)

Depth (cm)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-35	Organics							

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

²Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

<input checked="" type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Sandy Redox (S5)
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Stripped Matrix (S6)
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Dark Surfaces (S7)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Polyvalue Below Surface (S8)
<input type="checkbox"/> Stratified Layers (A5)	<input type="checkbox"/> Thin Dark Surface (S9)
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Depleted Matrix (F3)
<input type="checkbox"/> Sandy Mucky Mineral (S1)	<input type="checkbox"/> Redox Dark Surface (F6)
<input type="checkbox"/> 5cm Mucky Peat or Peat (S3)	<input type="checkbox"/> Depleted Dark Surface (F7)
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> Redox Depressions (F8)

Restrictive Layer (if observed): Type: _____ Depth: _____

Hydric Soil Present? Yes No

Comments:

Project Site: Crane Mountain Clay Source Development Date: October 9, 2018 Sample Point: Upland 1
 Applicant/Owner: John Law Corp. Field Investigator(s): Jennifer Hachey & Jenna McCoy
 County: Saint John County Coordinates: 45.268400, -66.182048
 PID: 00289595 Do normal environmental conditions exist on-site? Yes No
 if no explain:
Atypical Situation? Yes No
Is this a potential Problem Area? Yes No

Wetland Determination
 (Check One Only For Each Criteria)
 Dominant Hydrophytic Vegetation (50/20 rule) Yes No
 Wetland Hydrology Yes No
 Hydric Soils Yes No
Wetland Type: -
Rational for Determination: Yes No

Vegetation					
Tree Stratum: (Plot size: 30m)	% Cover	Dominant	Indicator	Dominance Test Worksheet	
1. <i>Acer rubrum</i>	10	X	FAC	# of Dominant Species that are OBL, FACW, FAC:	(A) 2
2. <i>Betula papyrifera</i>	5		FACU	Total # of Dominant Species across all strata:	(B) 4
3. <i>Betula populifolia</i>	5		FAC	% of Dominant Species that are OBL, FACW, FAC:	(A/B) 50
4. -				Prevalence Index Worksheet:	
5. -				Total % Cover of:	Multiply by:
	20	= Total Cover		OBL Species: - x 1 = -	
Shrub Stratum: (Plot size: 15m)	% Cover	Dominant	Indicator	FACW Species: - x 1 = -	
1. <i>Alnus incana</i>	3	X	FACW	FAC Species: - x 1 = -	
2. -				FACU Species: - x 1 = -	
3. -				Column Totals: - x 1 = -	
4. -				Prevalence Index = B/A =	-
5. -				Hydrophytic Vegetation Indicators:	
	3	= Total Cover		<input type="checkbox"/> Rapid Test for Hydrophytic Vegetation	
Herb Stratum: (Plot size: 1.5m)	% Cover	Dominant	Indicator	<input checked="" type="checkbox"/> Dominance Test is > 50%	
1. <i>Asteraceae</i> sp.	5	X	NA	<input type="checkbox"/> Prevalence Index is ≤ 3.0 ¹	
2. <i>Dryopteris</i> sp.	1		NA	<input type="checkbox"/> Morphological Adaptations ¹ (explain)	
3. <i>Osmunda cinnamomea</i>	2		FACW	<input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (explain)	
4. <i>Solidago</i> sp.	5	X	NA	¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic	
5. <i>Thalictrum</i> sp.	3		NA		
6. -					
7. -					
8. -					
9. -					
10. -					
	16	= Total Cover			

Hydrophytic Vegetation Present? Yes No

Comments FAC species indicate that they occur in wetlands 50% of the time.
 NA - unable to species identify; therefore, indicator could not be determined.

Hydrology

Primary Hydrological Indicators: (minimum of one is required; check all that apply)

- | | |
|--|---|
| <input type="checkbox"/> Surface Water (A1) | <input type="checkbox"/> Water Stained Leaves (B9) |
| <input type="checkbox"/> High Water Table (A2) | <input type="checkbox"/> Aquatic Fauna (B13) |
| <input type="checkbox"/> Saturation (A3) | <input type="checkbox"/> Marl Deposits (B15) |
| <input type="checkbox"/> Water Marks (B1) | <input type="checkbox"/> Hydrogen Sulfide Odor (C1) |
| <input type="checkbox"/> Sediment Deposits (B2) | <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) |
| <input type="checkbox"/> Drift Deposits (B3) | <input type="checkbox"/> Presence of Reduced Iron (C4) |
| <input type="checkbox"/> Algal Mat or Crust (B4) | <input type="checkbox"/> Recent Iron reduction in tilled Soils (C6) |
| <input type="checkbox"/> Iron Deposits (B5) | <input type="checkbox"/> Thin Muck Surface (C7) |
| <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) | <input type="checkbox"/> Other (Explain in Remarks) |
| <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8) | |

Secondary Indicators: (minimum of two required)

- | | |
|--|--|
| <input type="checkbox"/> Surface Soil Cracks (B6) | <input type="checkbox"/> Stunted or Stressed Plants (D1) |
| <input type="checkbox"/> Drainage Patterns (B10) | <input type="checkbox"/> Geomorphic Position (D2) |
| <input type="checkbox"/> Moss Trim Lines (B16) | <input type="checkbox"/> Shallow Aquitard (D3) |
| <input type="checkbox"/> Dry-Season Water Table (C2) | <input type="checkbox"/> Microtopographic Relief (D4) |
| <input type="checkbox"/> Crayfish Burrows (C8) | <input type="checkbox"/> FAC-Neutral Test (D5) |
| <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) | |

Field Observations:

Surface Water Present? Yes No Depth: _____
 Water Table Present? Yes No Depth: _____
 Saturation Present? Yes No Depth: _____

Wetland Hydrology Present? Yes No

Comments: _____

Soil Profile

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators)

Depth (cm)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-3	Organics	100						
3-20	7.5 YR 3/2	100					Sandy silt	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

²Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

- | | |
|--|---|
| <input type="checkbox"/> Histosol (A1) | <input type="checkbox"/> Sandy Redox (S5) |
| <input type="checkbox"/> Histic Epipedon (A2) | <input type="checkbox"/> Stripped Matrix (S6) |
| <input type="checkbox"/> Black Histic (A3) | <input type="checkbox"/> Dark Surfaces (S7) |
| <input type="checkbox"/> Hydrogen Sulfide (A4) | <input type="checkbox"/> Polyvalue Below Surface (S8) |
| <input type="checkbox"/> Stratified Layers (A5) | <input type="checkbox"/> Thin Dark Surface (S9) |
| <input type="checkbox"/> Depleted Below Dark Surface (A11) | <input type="checkbox"/> Loamy Gleyed Matrix (F2) |
| <input type="checkbox"/> Thick Dark Surface (A12) | <input type="checkbox"/> Depleted Matrix (F3) |
| <input type="checkbox"/> Sandy Mucky Mineral (S1) | <input type="checkbox"/> Redox Dark Surface (F6) |
| <input type="checkbox"/> 5cm Mucky Peat or Peat (S3) | <input type="checkbox"/> Depleted Dark Surface (F7) |
| <input type="checkbox"/> Sandy Gleyed Matrix (S4) | <input type="checkbox"/> Redox Depressions (F8) |

Restrictive Layer (if observed): Type: Rock Depth: 20cm

Hydric Soil Present? Yes No

Comments: _____

Project Site: Crane Mountain Clay Source Development Date: October 9, 2018 Sample Point: Wetland 2
 Applicant/Owner: John Law Corp. Field Investigator(s): Jennifer Hachey & Jenna McCoy
 County: Saint John County Coordinates: 45.266481, -66.189940
 PID: 00289595 Do normal environmental conditions exist on-site? Yes No
 if no explain:
Atypical Situation? Yes No Explain:
Is this a potential Problem Area? Yes No Explain:

Wetland Determination
 (Check One Only For Each Criteria)
 Dominant Hydrophytic Vegetation (50/20 rule) Yes No
 Wetland Hydrology Yes No
 Hydric Soils Yes No
Wetland Type: Forested Swamp Yes No
Rational for Determination:

Vegetation				Dominance Test Worksheet	
Tree Stratum: (Plot size: 30m)				# of Dominant Species that are OBL, FACW, FAC:	(A) 4
1. <i>Abies balsamea</i>	40	X	FAC	Total # of Dominant Species across all strata:	(B) 5
2. <i>Thuja occidentalis</i>	15		FACW	% of Dominant Species that are OBL, FACW, FAC:	(A/B) 80
3. -				Prevalence Index Worksheet:	
4. -				Total % Cover of:	Multiply by:
5. -				OBL Species: - x 1 = -	
	55	= Total Cover		FACW Species: - x 1 = -	
Shrub Stratum: (Plot size: 15m)				FAC Species: - x 1 = -	
1. <i>Abies balsamea</i>	5		FAC	FACU Species: - x 1 = -	
2. <i>Thuja occidentalis</i>	15	X	FACW	Column Totals: - x 1 = -	
3. <i>Typha sp.</i>	2		NA	Prevalence Index = B/A =	-
4. <i>Viburnum nudum</i>	10	X	OBL	Hydrophytic Vegetation Indicators:	
5. -				<input type="checkbox"/> Rapid Test for Hydrophytic Vegetation	
	32	= Total Cover		<input checked="" type="checkbox"/> Dominance Test is > 50%	
Herb Stratum: (Plot size: 1.5m)				<input type="checkbox"/> Prevalence Index is ≤ 3.0 ¹	
1. <i>Cornus canadensis</i>	3		FAC-	<input type="checkbox"/> Morphological Adaptations ¹ (explain)	
2. <i>Fragaria virginiana</i>	5	X	FACU	<input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (explain)	
3. <i>Linnaea borealis</i>	2		FAC	¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic	
4. <i>Rubus acaulis</i>	T		NI		
5. <i>Rubus chamaemorus</i>	5	X	FACW		
6. -					
7. -					
8. -					
9. -					
10. -					
	15	= Total Cover			

Hydrophytic Vegetation Present? Yes No

Comments: NA - unable to species identify; therefore, indicator could not be determined.

Hydrology

Primary Hydrological Indicators: (minimum of one is required; check all that apply)

- | | |
|---|---|
| <input checked="" type="checkbox"/> Surface Water (A1) | <input type="checkbox"/> Water Stained Leaves (B9) |
| <input checked="" type="checkbox"/> High Water Table (A2) | <input type="checkbox"/> Aquatic Fauna (B13) |
| <input checked="" type="checkbox"/> Saturation (A3) | <input type="checkbox"/> Marl Deposits (B15) |
| <input type="checkbox"/> Water Marks (B1) | <input type="checkbox"/> Hydrogen Sulfide Odor (C1) |
| <input type="checkbox"/> Sediment Deposits (B2) | <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) |
| <input type="checkbox"/> Drift Deposits (B3) | <input type="checkbox"/> Presence of Reduced Iron (C4) |
| <input type="checkbox"/> Algal Mat or Crust (B4) | <input type="checkbox"/> Recent Iron reduction in tilled Soils (C6) |
| <input type="checkbox"/> Iron Deposits (B5) | <input type="checkbox"/> Thin Muck Surface (C7) |
| <input checked="" type="checkbox"/> Inundation Visible on Aerial Imagery (B7) | <input type="checkbox"/> Other (Explain in Remarks) |
| <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8) | |

Secondary Indicators: (minimum of two required)

- | | |
|--|--|
| <input type="checkbox"/> Surface Soil Cracks (B6) | <input type="checkbox"/> Stunted or Stressed Plants (D1) |
| <input checked="" type="checkbox"/> Drainage Patterns (B10) | <input type="checkbox"/> Geomorphic Position (D2) |
| <input type="checkbox"/> Moss Trim Lines (B16) | <input type="checkbox"/> Shallow Aquitard (D3) |
| <input checked="" type="checkbox"/> Dry-Season Water Table (C2) | <input checked="" type="checkbox"/> Microtopographic Relief (D4) |
| <input type="checkbox"/> Crayfish Burrows (C8) | <input checked="" type="checkbox"/> FAC-Neutral Test (D5) |
| <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) | |

Field Observations:

Surface Water Present? Yes No Depth: Varying
 Water Table Present? Yes No Depth: 19cm
 Saturation Present? Yes No Depth: 19cm

Wetland Hydrology Present? Yes No

Comments:

Soil Profile

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators)

Depth (cm)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-30	Organic	100						Organic muck

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

²Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

- | | |
|--|---|
| <input checked="" type="checkbox"/> Histosol (A1) | <input type="checkbox"/> Sandy Redox (S5) |
| <input type="checkbox"/> Histic Epipedon (A2) | <input type="checkbox"/> Stripped Matrix (S6) |
| <input type="checkbox"/> Black Histic (A3) | <input type="checkbox"/> Dark Surfaces (S7) |
| <input type="checkbox"/> Hydrogen Sulfide (A4) | <input type="checkbox"/> Polyvalue Below Surface (S8) |
| <input type="checkbox"/> Stratified Layers (A5) | <input type="checkbox"/> Thin Dark Surface (S9) |
| <input type="checkbox"/> Depleted Below Dark Surface (A11) | <input type="checkbox"/> Loamy Gleyed Matrix (F2) |
| <input type="checkbox"/> Thick Dark Surface (A12) | <input type="checkbox"/> Depleted Matrix (F3) |
| <input type="checkbox"/> Sandy Mucky Mineral (S1) | <input type="checkbox"/> Redox Dark Surface (F6) |
| <input type="checkbox"/> 5cm Mucky Peat or Peat (S3) | <input type="checkbox"/> Depleted Dark Surface (F7) |
| <input type="checkbox"/> Sandy Gleyed Matrix (S4) | <input type="checkbox"/> Redox Depressions (F8) |

Restrictive Layer (if observed): Type: _____ Depth: _____

Hydric Soil Present? Yes No

Comments:

Project Site: Crane Mountain Clay Source Development Date: October 9, 2018 Sample Point: Upland 2
 Applicant/Owner: John Law Corp. Field Investigator(s): Jennifer Hachey & Jenna McCoy
 County: Saint John County Coordinates: 45.266487, -66.189966
 PID: 00289595 Do normal environmental conditions exist on-site? Yes No
 if no explain:
Atypical Situation? Yes No
Is this a potential Problem Area? Yes No

Wetland Determination
 (Check One Only For Each Criteria)
 Dominant Hydrophytic Vegetation (50/20 rule) Yes No
 Wetland Hydrology Yes No
 Hydric Soils Yes No
Wetland Type: -
Rational for Determination:

Wetland Determination
 Yes No

Vegetation								
Tree Stratum: (Plot size: 30m)				% Cover	Dominant	Indicator	Dominance Test Worksheet	
1. <i>Abies balsamea</i>	7	X	FAC			# of Dominant Species that are OBL, FACW, FAC: (A) 5		
2. <i>Acer rubrum</i>	5	X	FAC			Total # of Dominant Species across all strata: (B) 6		
3. <i>Betula papyrifera</i>	5	X	FAC+			% of Dominant Species that are OBL, FACW, FAC: (A/B) 83		
4. <i>Betula populifolia</i>	5	X	FAC			Prevalence Index Worksheet:		
5. <i>Populus tremula</i>	3		FACU			Total % Cover of: Multiply by:		
	<u>25</u>	= Total Cover				OBL Species: - x 1 = -		
Shrub Stratum: (Plot size: 15m)				% Cover	Dominant	Indicator	FACW Species: - x 1 = -	
1. <i>Abies balsamea</i>	5	X	FAC			FAC Species: - x 1 = -		
2. -						FACU Species: - x 1 = -		
3. -						Column Totals: - x 1 = -		
4. -						Prevalence Index = B/A = -		
5. -								
	<u>5</u>	= Total Cover						
Herb Stratum: (Plot size: 1.5m)				% Cover	Dominant	Indicator		
1. Aster sp.	15	X	NA					
2. <i>Cornus canadensis</i>	5		FAC-					
3. <i>Dryopteris</i> sp.	2		FACW					
4. <i>Fragaria virginiana</i>	2		FACU					
5. -								
6. -								
7. -								
8. -								
9. -								
10. -								
	<u>24</u>	= Total Cover						

- Hydrophytic Vegetation Indicators:**
- Rapid Test for Hydrophytic Vegetation
 - Dominance Test is > 50%
 - Prevalence Index is ≤ 3.0¹
 - Morphological Adaptations¹ (explain)
 - Problematic Hydrophytic Vegetation¹ (explain)
- ¹Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? Yes No

Comments FAC species indicate that they occur in wetlands 50% of the time.
 NA - unable to species identify; therefore, indicator cannot be determined.

Hydrology

Primary Hydrological Indicators: (minimum of one is required; check all that apply)

- | | |
|--|---|
| <input type="checkbox"/> Surface Water (A1) | <input type="checkbox"/> Water Stained Leaves (B9) |
| <input type="checkbox"/> High Water Table (A2) | <input type="checkbox"/> Aquatic Fauna (B13) |
| <input type="checkbox"/> Saturation (A3) | <input type="checkbox"/> Marl Deposits (B15) |
| <input type="checkbox"/> Water Marks (B1) | <input type="checkbox"/> Hydrogen Sulfide Odor (C1) |
| <input type="checkbox"/> Sediment Deposits (B2) | <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) |
| <input type="checkbox"/> Drift Deposits (B3) | <input type="checkbox"/> Presence of Reduced Iron (C4) |
| <input type="checkbox"/> Algal Mat or Crust (B4) | <input type="checkbox"/> Recent Iron reduction in tilled Soils (C6) |
| <input type="checkbox"/> Iron Deposits (B5) | <input type="checkbox"/> Thin Muck Surface (C7) |
| <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) | <input type="checkbox"/> Other (Explain in Remarks) |
| <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8) | |

Secondary Indicators: (minimum of two required)

- | | |
|--|--|
| <input type="checkbox"/> Surface Soil Cracks (B6) | <input type="checkbox"/> Stunted or Stressed Plants (D1) |
| <input type="checkbox"/> Drainage Patterns (B10) | <input type="checkbox"/> Geomorphic Position (D2) |
| <input type="checkbox"/> Moss Trim Lines (B16) | <input type="checkbox"/> Shallow Aquitard (D3) |
| <input type="checkbox"/> Dry-Season Water Table (C2) | <input type="checkbox"/> Microtopographic Relief (D4) |
| <input type="checkbox"/> Crayfish Burrows (C8) | <input type="checkbox"/> FAC-Neutral Test (D5) |
| <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) | |

Field Observations:

Surface Water Present? Yes No Depth: _____
 Water Table Present? Yes No Depth: _____
 Saturation Present? Yes No Depth: _____

Wetland Hydrology Present? Yes No

Comments: _____

Soil Profile

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators)

Depth (cm)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-3	Organics	100						
3-30	7.5 YR 3/2	100					Sandy silt	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains

²Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

- | | |
|--|---|
| <input type="checkbox"/> Histosol (A1) | <input type="checkbox"/> Sandy Redox (S5) |
| <input type="checkbox"/> Histic Epipedon (A2) | <input type="checkbox"/> Stripped Matrix (S6) |
| <input type="checkbox"/> Black Histic (A3) | <input type="checkbox"/> Dark Surfaces (S7) |
| <input type="checkbox"/> Hydrogen Sulfide (A4) | <input type="checkbox"/> Polyvalue Below Surface (S8) |
| <input type="checkbox"/> Stratified Layers (A5) | <input type="checkbox"/> Thin Dark Surface (S9) |
| <input type="checkbox"/> Depleted Below Dark Surface (A11) | <input type="checkbox"/> Loamy Gleyed Matrix (F2) |
| <input type="checkbox"/> Thick Dark Surface (A12) | <input type="checkbox"/> Depleted Matrix (F3) |
| <input type="checkbox"/> Sandy Mucky Mineral (S1) | <input type="checkbox"/> Redox Dark Surface (F6) |
| <input type="checkbox"/> 5cm Mucky Peat or Peat (S3) | <input type="checkbox"/> Depleted Dark Surface (F7) |
| <input type="checkbox"/> Sandy Gleyed Matrix (S4) | <input type="checkbox"/> Redox Depressions (F8) |

Restrictive Layer (if observed): Type: Rock Depth: 30cm

Hydric Soil Present? Yes No

Comments: _____

Cover Page: Basic Description of Assessment	WESP-AC version 2
Site Name:	Crane Mountain Clay Source Development
Investigator Name:	Jennifer Hachey + Jenna McCoy
Date of Field Assessment:	September 25, 2018
Nearest Town:	Saint John, New Brunswick
Latitude (decimal degrees):	45.271062
Longitude (decimal degrees):	-66.173611
Is a map based on a formal on-site wetland delineation available?	Yes
Approximate size of the Assessment Area (AA, in hectares):	9
AA as percent of entire wetland (approx.). Attach sketch map if AA is smaller than the entire contiguous wetland.	90%
What percent (approx.) of the wetland were you able to visit?	90%
What percent (approx.) of the AA were you able to visit?	100%
Were you able to ask the site owner/manager about any of the questions?	No
Indicate here if you intentionally surveyed for rare plants, calciphile plants, or rare animals:	Yes
Have you attended a WESP-AC training session? If so, indicate approximate month & year.	July, 2016
How many wetlands have you assessed previously using WESP-AC? (approx.)	50+
Comments about the site or this WESP-AC assessment (attach extra page if desired):	Wetland boundaries extend beyond the Assessment Area.

Assessment Area (AA) Results:

Wetland ID: Crane Mountain Clay Source Development

Date: September 25, 2018

Observer: Jennifer Hachey + Jenna McCoy

Latitude & Longitude (decimal degrees): 45.271062, -66.173611

Scores will appear below after data are entered in worksheets OF, F, and S. See Manual for definitions and descriptions of how scores were computed.

Wetland Functions or Other Attributes:	Function Score (Normalised)	Function Rating	Benefits Score (Normalised)	Benefits Rating	Function Score (raw)	Benefits Score (raw)
Water Storage & Delay (WS)	1.62	Lower	0.52	Lower	2.98	0.60
Stream Flow Support (SFS)	4.79	Moderate	5.87	Moderate	2.56	3.42
Water Cooling (WC)	5.45	Higher	4.10	Moderate	3.63	2.47
Sediment Retention & Stabilisation (SR)	1.96	Moderate	7.05	Moderate	4.50	4.28
Phosphorus Retention (PR)	4.52	Higher	6.62	Higher	6.11	6.32
Nitrate Removal & Retention (NR)	1.68	Lower	10.00	Higher	4.87	10.00
Carbon Sequestration (CS)	4.12	Moderate			6.34	
Organic Nutrient Export (OE)	8.81	Higher			7.01	
Anadromous Fish Habitat (FA)	0.00	Lower	0.00	Lower	0.00	0.00
Resident Fish Habitat (FR)	9.54	Higher	3.07	Moderate	5.68	2.18
Aquatic Invertebrate Habitat (INV)	10.00	Higher	7.67	Higher	7.66	5.38
Amphibian & Turtle Habitat (AM)	7.04	Higher	6.81	Higher	7.02	6.22
Waterbird Feeding Habitat (WBF)	6.98	Higher	5.00	Moderate	5.56	5.00
Waterbird Nesting Habitat (WBN)	6.92	Higher	5.00	Moderate	5.91	5.00
Songbird, Raptor, & Mammal Habitat (SBM)	9.79	Higher	5.00	Moderate	8.12	5.00
Pollinator Habitat (POL)	9.82	Higher	3.33	Moderate	7.91	3.33
Native Plant Habitat (PH)	7.47	Higher	7.44	Higher	6.10	6.45
Public Use & Recognition (PU)			0.91	Lower		0.98
Wetland Sensitivity (Sens)			7.72	Higher		4.52
Wetland Ecological Condition (EC)			4.34	Moderate		6.74
Wetland Stressors (STR) (higher score means more stress)			6.55	Higher		4.67
Summary Ratings for Grouped Functions:						
HYDROLOGIC Group (WS)	10.00	Higher	0.52	Lower	2.98	0.60
WATER QUALITY SUPPORT Group (max+avg/2 of SR, PR, NR, CS)	3.62	Moderate	8.94	Higher	5.90	8.43
AQUATIC SUPPORT Group (max+avg/2 of SFS, INV, OE, WC)	8.63	Higher	6.78	Higher	6.43	4.57
AQUATIC HABITAT Group (max+avg/2 of FA, FR, AM, WBF, WBN)	7.82	Higher	5.39	Moderate	5.93	4.95
TRANSITION HABITAT Group (max+avg/2 of SBM, PH, POL)	9.42	Higher	6.35	Higher	7.74	5.69
WETLAND CONDITION (EC)			4.34	Moderate		6.74
WETLAND RISK (average of Sensitivity & Stressors)			7.14	Higher		4.59

NOTE: A score of 0 does not mean the function or benefit is absent from the wetland. It means only that this wetland has a capacity that is equal or less than the lowest-scoring one, for that function or benefit, from among the 98 NB calibration wetlands that were assessed previously.



G-3 - Flora Inventory List

Scientific Name	Common Name	S-Rank	NBDERD General Staus
<i>Abies balsamea</i>	Balsam Fir	S5	Secure
<i>Acer pensylvanicum</i>	Striped Maple	S5	Secure
<i>Acer platanoides</i>	Norway Maple	SNA	Exotic
<i>Acer rubrum</i>	Red Maple	S5	Secure
<i>Acer saccharinum</i>	Silver Maple	S4	Secure
<i>Agrostis gigantea</i>	Redtop	SNA	Exotic
<i>Alnus incana</i>	Speckled Alder	S5	Secure
<i>Ambrosia artemisiifolia</i>	Common Ragweed	S5	Secure
<i>Amelanchier spp</i>	NA	NA	NA
<i>Ammophila breviligulata</i>	American Beach Grass	S5	Secure
<i>Anaphalis margaritacea</i>	Pearly Everlasting	S5	Secure
<i>Aralia nudicaulis</i>	Wild Sarsaparilla	S5	Secure
<i>Arctium lappa</i>	Great Burdock	SNA	Exotic
<i>Arctium vulgare</i>	European Burdock	SNA	Exotic
<i>Argentina anserina</i>	Common Silverweed	S5	Secure
<i>Arisaema triphyllum</i>	Jack-in-the-pulpit	S5	Secure
<i>Asclepias syriaca</i>	Common Milkweed	S4S5	Secure
<i>Athyrium filix-femina</i>	Common Lady Fern	S5	Secure
<i>Atriplex acadensis</i>	Maritime Saltbush	S4?	Secure
<i>Betula alleghaniensis</i>	Yellow Birch	S5	Secure
<i>Betula papyrifera</i>	Paper Birch	S5	Secure
<i>Betula populifolia</i>	Gray Birch	S5	Secure
<i>Bidens frondosa</i>	Devil's Beggarticks	S5	Secure
<i>Calamagrostis canadensis</i>	Bluejoint Reed Grass	S5	Secure
<i>Calystegia sepium</i>	Hedge False Bindweed	S5	Secure
<i>Carex arctata</i>	Black Sedge	S5	Secure
<i>Carex crawfordii</i>	Crawford's Sedge	S5	Secure
<i>Carex deweyana</i>	Dewey's Sedge	S5	Secure
<i>Carex gynandra</i>	Nodding Sedge	S5	Secure
<i>Carex intumescens</i>	Bladder Sedge	S5	Secure
<i>Carex projecta</i>	Necklace Sedge	S5	Secure
<i>Carex pseudocyperus</i>	Cyperuslike Sedge	S5	Secure
<i>Carex scoparia</i>	Broom Sedge	S5	Secure
<i>Carex trisperma</i>	Three-seeded Sedge	S5	Secure
<i>Chimaphila umbellata</i>	Common Pipsissewa	S5	Secure
<i>Clematis virginiana</i>	Virginia Clematis	S5	Secure
<i>Clintonia borealis</i>	Yellow Bluebead Lily	S5	Secure
<i>Comptonia peregrina</i>	Sweet-fern	S5	Secure
<i>Cornus canadensis</i>	Bunchberry	S5	Secure
<i>Cornus sericea</i>	Red Osier Dogwood	S5	Secure
<i>Corylus cornuta</i>	Beaked Hazel	S5	Secure
<i>Crataegus spp</i>	NA	NA	NA
<i>Danthonia spicata</i>	Poverty Oat Grass	S5	Secure
<i>Diervilla lonicera</i>	Northern Bush Honeysuckle	S5	Secure
<i>Doellingeria umbellata</i>	Hairy Flat-top White Aster	S5	Secure
<i>Dryopteris carthusiana</i>	Spinulose Wood Fern	S5	Secure

Scientific Name	Common Name	S-Rank	NBDERD General Staus
<i>Dryopteris cristata</i>	Crested Wood Fern	S5	Secure
<i>Dryopteris intermedia</i>	Evergreen Wood Fern	S5	Secure
<i>Echinochloa crus-galli</i>	Large Barnyard Grass	SNA	Exotic
<i>Eleocharis acicularis</i>	Needle Spikerush	S5	Secure
<i>Epilobium leptophyllum</i>	Bog Willowherb	S5	Secure
<i>Equisetum arvense</i>	Field Horsetail	S5	Secure
<i>Equisetum fluviatile</i>	Water Horsetail	S5	Secure
<i>Eupatorium maculatum</i>	Spotted Joe-pye-weed	S5	Secure
<i>Euphrasia nemorosa</i>	Common Eyebright	SNA	Exotic
<i>Eurybia macrophylla</i>	Large-leaved Aster	S5	Secure
<i>Fragaria virginiana</i>	Wild Strawberry	S5	Secure
<i>Frangula alnus</i>	Glossy Buckthorn	SNA	Exotic
<i>Fraxinus americana</i>	White Ash	S4S5	Secure
<i>Galium mollugo</i>	Smooth Bedstraw	SNA	Exotic
<i>Gaultheria procumbens</i>	Eastern Teaberry	S5	Secure
<i>Gaylussacia baccata</i>	Black Huckleberry	S5	Secure
<i>Glyceria melicaria</i>	Slender Manna Grass	S5	Secure
<i>Glyceria striata</i>	Fowl Manna Grass	S5	Secure
<i>Gymnocarpium dryopteris</i>	Common Oak Fern	S5	Secure
<i>Hieracium caespitosum</i>	Field Hawkweed	SNA	Exotic
<i>Hieracium murorum</i>	Wall Hawkweed	SNA	Exotic
<i>Hypericum boreale</i>	Northern St John's-Wort	S5	Secure
<i>Hypericum perforatum</i>	Common St. John's-wort	SNA	Exotic
<i>Juncus brevicaudatus</i>	Narrow-Panicled Rush	S5	Secure
<i>Juncus effusus</i>	Soft Rush	S5	Secure
<i>Juncus gerardii</i>	Black-Grass Rush	S5	Secure
<i>Juncus tenuis</i>	Slender Rush	S5	Secure
<i>Kalmia angustifolia</i>	Sheep Laurel	S5	Secure
<i>Larix laricina</i>	Tamarack	S5	Secure
<i>Leontodon autumnalis</i>	Fall Dandelion	SNA	Exotic
<i>Linnaea borealis</i>	Twinflower	S5	Secure
<i>Lonicera canadensis</i>	Canada Fly Honeysuckle	S5	Secure
<i>Lupinus polyphyllus</i>	Large-Leaved Lupine	SNA	Exotic
<i>Lycopodium annotinum</i>	Stiff Clubmoss	S5	Secure
<i>Lycopodium dendroideum</i>	Round-branched Tree-clubmo	S5	Secure
<i>Lysimachia terrestris</i>	Swamp Yellow Loosestrife	S5	Secure
<i>Lythrum salicaria</i>	Purple Loosestrife	SNA	Exotic
<i>Maianthemum canadense</i>	Wild Lily-of-The-Valley	S5	Secure
<i>Matricaria discoidea</i>	Pineapple Weed	SNA	Exotic
<i>Matricaria discoidea</i>	Pineapple Weed	SNA	Exotic
<i>Mentha arvensis</i>	Wild Mint	S5	Secure
<i>Mitchella repens</i>	Partridgeberry	S5	Secure
<i>Monotropa hypopithys</i>	Pinesap	S4	Secure
<i>Monotropa uniflora</i>	Indian Pipe	S5	Secure
<i>Myrica gale</i>	Sweet Gale	S5	Secure
<i>Nemopanthus mucronatus</i>	Mountain Holly	S5	Secure

Scientific Name	Common Name	S-Rank	NBDERD General Staus
<i>Onoclea sensibilis</i>	Sensitive Fern	S5	Secure
<i>Osmunda cinnamomea</i>	Cinnamon Fern	S5	Secure
<i>Osmunda claytoniana</i>	Interrupted Fern	S5	Secure
<i>Osmunda regalis</i>	Royal Fern	S5	Secure
<i>Oxalis montana</i>	Common Wood Sorrel	S5	Secure
<i>Parthenocissus quinquefolia</i>	Virginia Creeper	SNA	Exotic
<i>Phalaris arundinacea</i>	Reed Canary Grass	S5	Secure
<i>Phegopteris connectilis</i>	Northern Beech Fern	S5	Secure
<i>Picea glauca</i>	White Spruce	S5	Secure
<i>Picea rubens</i>	Red Spruce	S5	Secure
<i>Pinus strobus</i>	Eastern White Pine	S5	Secure
<i>Plantago lanceolata</i>	English Plantain	SNA	Exotic
<i>Plantago major</i>	Common Plantain	SNA	Exotic
<i>Plantago maritima</i>	Seaside Plantain	S5	Secure
<i>Poa compressa</i>	Canada Blue Grass	SNA	Exotic
<i>Poa pratensis</i>	Kentucky Blue Grass	S5	Secure
<i>Populus balsamifera</i>	Balsam Poplar	S5	Secure
<i>Populus grandidentata</i>	Large-toothed Aspen	S5	Secure
<i>Populus tremuloides</i>	Trembling Aspen	S5	Secure
<i>Potamogeton spp</i>	Pondweed	NA	NA
<i>Potentilla simplex</i>	Old Field Cinquefoil	S5	Secure
<i>Prunella vulgaris</i>	Common Self-heal	S5	Secure
<i>Prunus serotina</i>	Black Cherry	S5	Secure
<i>Prunus virginiana</i>	Chokecherry	S5	Secure
<i>Pteridium aquilinum</i>	Bracken Fern	S5	Secure
<i>Pyrola elliptica</i>	Shinleaf	S5	Secure
<i>Ranunculus repens</i>	Creeping Buttercup	SNA	Exotic
<i>Ribes hirtellum</i>	Smooth Gooseberry	S5	Secure
<i>Rosa virginiana</i>	Virginia Rose	S5	Secure
<i>Rubus allegheniensis</i>	Alleghaney Blackberry	S5	Secure
<i>Rubus idaeus</i>	Red Raspberry	S5	Secure
<i>Rubus pubescens</i>	Dwarf Red Raspberry	S5	Secure
<i>Rumex crispus</i>	Curled Dock	SNA	Exotic
<i>Salix bebbiana</i>	Bebb's Hybrid Willow	SNA	Not Assessed
<i>Salix discolor</i>	Pussy Willow	S5	Secure
<i>Schoenoplectus tabernaemontana</i>	Softstem Bulrush	S5	Secure
<i>Scirpus cyperinus</i>	Common Woolly Bulrush	S5	Secure
<i>Scirpus hattorianus</i>	Mosquito Bulrush	S5	Secure
<i>Senecio vulgaris</i>	Common Ragwort	SNA	Exotic
<i>Silene vulgaris</i>	Bladder Campion	SNA	Exotic
<i>Solanum dulcamara</i>	Bittersweet Nightshade	SNA	Exotic
<i>Solidago bicolor</i>	White Goldenrod	S5	Secure
<i>Solidago canadensis</i>	Canada Goldenrod	S5	Secure
<i>Solidago rugosa</i>	Rough-stemmed Goldenrod	S5	Secure
<i>Solidago sempervirens</i>	Seaside Goldenrod	S5	Secure
<i>Sonchus arvensis</i>	Field Sow Thistle	SNA	Exotic

Scientific Name	Common Name	S-Rank	NBDERD General Staus
<i>Sparganium eurycarpum</i>	Broad-fruited Burreed	S4S5	Secure
<i>Spartina pectinata</i>	Prairie Cord Grass	S5	Secure
<i>Spiraea alba</i>	White Meadowsweet	S5	Secure
<i>Symphotrichum lateriflorum</i> var.	Calico Aster	SNR	Undetermined
<i>Symphotrichum novi-belgii</i>	New York Aster	S5	Secure
<i>Tanacetum vulgare</i>	Common Tansy	SNA	Exotic
<i>Taraxacum officinale</i>	Common Dandelion	SNA	Exotic
<i>Taxus canadensis</i>	Canada Yew	S5	Secure
<i>Thalictrum pubescens</i>	Tall Meadow-Rue	S5	Secure
<i>Thelypteris noveboracensis</i>	New York Fern	S5	Secure
<i>Thuja occidentalis</i>	Eastern White Cedar	S5	Secure
<i>Triadenum fraseri</i>	Fraser's Marsh St John's-wort	S5	Secure
<i>Trientalis borealis</i>	Northern Starflower	S5	Secure
<i>Trifolium arvense</i>	Rabbit's-foot Clover	SNA	Exotic
<i>Trifolium hybridum</i>	Alsike Clover	SNA	Exotic
<i>Trifolium pratense</i>	Red Clover	SNA	Exotic
<i>Trifolium repens</i>	White Clover	SNA	Exotic
<i>Tsuga canadensis</i>	Eastern Hemlock	S5	Secure
<i>Tussilago farfara</i>	Coltsfoot	SNA	Exotic
<i>Typha latifolia</i>	Broad-leaved Cattail	S5	Secure
<i>Ulmus americana</i>	White Elm	S4	Secure
<i>Vaccinium myrtilloides</i>	Velvet-leaved Blueberry	S5	Secure
<i>Vaccinium vitis-idaea</i>	Mountain Cranberry	S4S5	Secure
<i>Verbascum thapsus</i>	Common Mullein	SNA	Exotic
<i>Veronica officinalis</i>	Common Speedwell	S5	Exotic
<i>Viburnum lantanoides</i>	Hobblebush	S5	Secure
<i>Viburnum nudum</i>	Northern Wild Raisin	S5	Secure
<i>Viburnum opulus</i>	Highbush Cranberry	S4	Secure
<i>Vicia cracca</i>	Tufted Vetch	SNA	Exotic
<i>Viola cucullata</i>	Marsh Blue Violet	S5	Secure
<i>Zizania palustris</i>	Northern Wild Rice	S4	Secure



**G-4 - ACCDC Report
Habitat Comparison Table (Table G-4-1)**

DATA REPORT 6203: Saint John, NB

Prepared 17 September 2018
by J. Churchill, Data Manager

CONTENTS OF REPORT

1.0 Preface

- 1.1 Data List
- 1.2 Restrictions
- 1.3 Additional Information
- Map 1: Buffered Study Area

2.0 Rare and Endangered Species

- 2.1 Flora
- 2.2 Fauna
- Map 2: Flora and Fauna

3.0 Special Areas

- 3.1 Managed Areas
- 3.2 Significant Areas
- Map 3: Special Areas

4.0 Rare Species Lists

- 4.1 Fauna
- 4.2 Flora
- 4.3 Location Sensitive Species
- 4.4 Source Bibliography

5.0 Rare Species within 100 km

- 5.1 Source Bibliography



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
StJohnNB_6203ob.xls	All Rare and legally protected <i>Flora and Fauna</i> in your study area
StJohnNB_6203ob100km.xls	A list of Rare and legally protected <i>Flora and Fauna</i> within 100 km of your study area
StJohnNB_6203ma.xls	All <i>Managed Areas</i> in your study area
StJohnNB_6203ff.xls	Rare and common <i>Freshwater Fish</i> in your study area (DFO database)

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

Tel: (506) 364-2658

sean.blaney@accdc.ca

Animals (Fauna)

John Klymko, Zoologist

Tel: (506) 364-2660

john.klymko@accdc.ca

Plant Communities

Sarah Robinson, Community Ecologist

Tel: (506) 364-2664

sarah.robinson@accdc.ca

Data Management, GIS

James Churchill, Data Manager

Tel: (902) 679-6146

james.churchill@accdc.ca

Billing

Jean Breau

Tel: (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: Duncan Bayne

(902) 648-3536

Duncan.Bayne@novascotia.ca

Western: Sarah Spencer

(902) 634-7555

Sarah.Spencer@novascotia.ca

Central: Shavonne Meyer

(902) 893-6350

Shavonne.Meyer@novascotia.ca

Central: Kimberly George

(902) 890-1046

Kimberly.George@novascotia.ca

Eastern: Lisa Doucette

(902) 863-4513

Lisa.Doucette@novascotia.ca

Eastern: Terry Power

(902) 563-3370

Terrance.Power@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

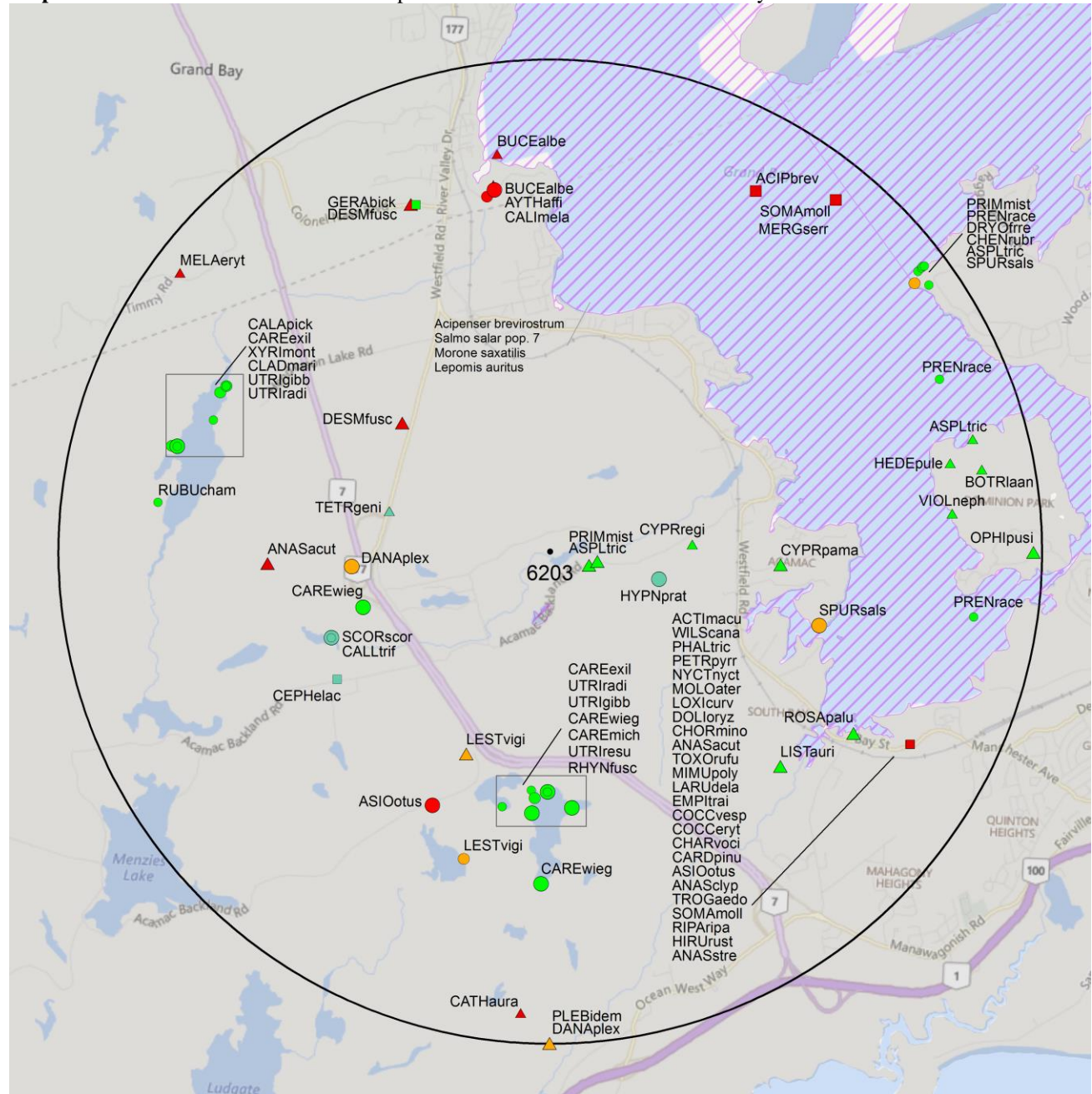
2.1 FLORA

The study area contains 45 records of 26 vascular, 5 records of 5 nonvascular flora (Map 2 and attached: *ob.xls).

2.2 FAUNA

The study area contains 67 records of 33 vertebrate, 9 records of 4 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.



- RESOLUTION**
- 4.7 within 50s of kilometers
 - 4.0 within 10s of kilometers
 - 3.7 within 5s of kilometers
 - △ 3.0 within kilometers
 - △ 2.7 within 500s of meters
 - ◇ 2.0 within 100s of meters
 - ◇ 1.7 within 10s of meters

- HIGHER TAXON**
- vertebrate fauna
 - invertebrate fauna
 - vascular flora
 - nonvascular flora

3.0 SPECIAL AREAS

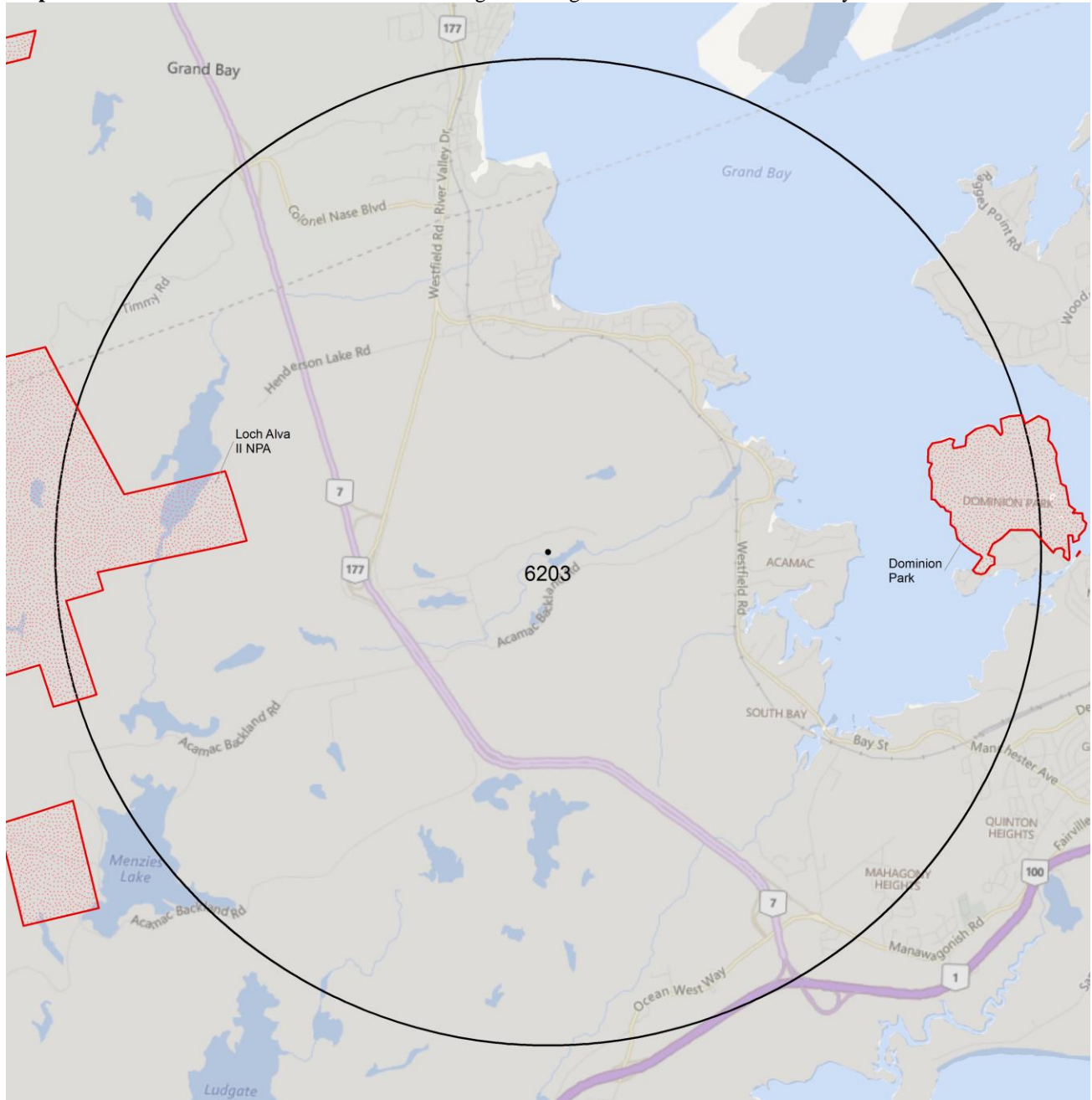
3.1 MANAGED AREAS

The GIS scan identified 2 managed areas in the vicinity of the study area (Map 3 and attached file: *ma*.xls).

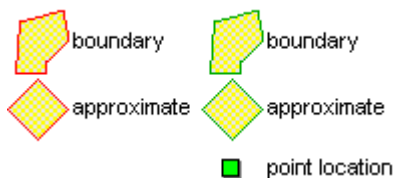
3.2 SIGNIFICANT AREAS

The GIS scan identified no biologically significant sites in the vicinity of the study area (Map 3).

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



MANAGED AREAS SIGNIFIKAINT AREAS



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 (\pm 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	Prov GS Rank	# recs	Distance (km)
N	<i>Calliergon trifarium</i>	Three-ranked Moss				S1?	2 May Be At Risk	1	2.4 \pm 0.0
N	<i>Cephaloziella elachista</i>	Spurred Threadwort				S1S3	6 Not Assessed	1	2.5 \pm 5.0
N	<i>Hypnum pratense</i>	Meadow Plait Moss				S2	3 Sensitive	1	1.1 \pm 0.0
N	<i>Scorpidium scorpioides</i>	Hooked Scorpion Moss				S2S3	3 Sensitive	1	2.4 \pm 0.0
N	<i>Tetraphis geniculata</i>	Geniculate Four-tooth Moss				S3S4	4 Secure	1	1.7 \pm 0.0
P	<i>Chenopodium rubrum</i>	Red Pigweed				S2	3 Sensitive	1	4.7 \pm 0.0
P	<i>Hedeoma pulegioides</i>	American False Pennyroyal				S2	4 Secure	1	4.2 \pm 0.0
P	<i>Cypripedium parviflorum var. makasin</i>	Small Yellow Lady's-Slipper				S2	2 May Be At Risk	1	2.3 \pm 1.0
P	<i>Asplenium trichomanes</i>	Maidenhair Spleenwort				S2	3 Sensitive	2	4.7 \pm 0.0
P	<i>Listera auriculata</i>	Auricled Twayblade				S2S3	3 Sensitive	1	3.2 \pm 1.0
P	<i>Ophioglossum pusillum</i>	Northern Adder's-tongue				S2S3	3 Sensitive	1	4.9 \pm 1.0
P	<i>Prenanthes racemosa</i>	Glaucous Rattlesnakeroot				S3	4 Secure	3	4.3 \pm 0.0
P	<i>Geranium bicknellii</i>	Bicknell's Crane's-bill				S3	4 Secure	1	3.8 \pm 5.0
P	<i>Utricularia radiata</i>	Little Floating Bladderwort				S3	4 Secure	3	2.4 \pm 0.0
P	<i>Primula mistassinica</i>	Mistassini Primrose				S3	4 Secure	2	0.4 \pm 1.0
P	<i>Rosa palustris</i>	Swamp Rose				S3	4 Secure	1	3.6 \pm 1.0
P	<i>Viola nephrophylla</i>	Northern Bog Violet				S3	4 Secure	1	4.1 \pm 0.0
P	<i>Carex exilis</i>	Coastal Sedge				S3	4 Secure	4	2.4 \pm 0.0
P	<i>Carex michauxiana</i>	Michaux's Sedge				S3	4 Secure	1	2.5 \pm 0.0
P	<i>Carex wiegandii</i>	Wiegand's Sedge				S3	4 Secure	3	2.0 \pm 0.0
P	<i>Rhynchospora fusca</i>	Brown Beakrush				S3	4 Secure	4	2.4 \pm 0.0
P	<i>Cypripedium reginae</i>	Showy Lady's-Slipper				S3	3 Sensitive	1	1.4 \pm 0.0
P	<i>Calamagrostis pickingeringii</i>	Pickering's Reed Grass				S3	4 Secure	1	3.7 \pm 0.0
P	<i>Xyris montana</i>	Northern Yellow-Eyed-Grass				S3	4 Secure	1	3.7 \pm 0.0
P	<i>Asplenium trichomanes-ramosum</i>	Green Spleenwort				S3	4 Secure	3	0.5 \pm 1.0
P	<i>Dryopteris fragrans var. remotiuscula</i>	Fragrant Wood Fern				S3	4 Secure	2	4.7 \pm 0.0
P	<i>Botrychium lanceolatum var. angustisegmentum</i>	Lance-Leaf Grape-Fern				S3	3 Sensitive	1	4.5 \pm 0.0
P	<i>Utricularia resupinata</i>	Inverted Bladderwort				S3?	4 Secure	1	2.6 \pm 0.0
P	<i>Utricularia gibba</i>	Humped Bladderwort				S3S4	4 Secure	2	2.4 \pm 0.0
P	<i>Rubus chamaemorus</i>	Cloudberry				S3S4	4 Secure	1	4.0 \pm 0.0
P	<i>Cladium mariscoides</i>	Smooth Twigrush				S3S4	4 Secure	2	3.7 \pm 0.0

4.2 FAUNA

	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)
A	<i>Melanerpes erythrocephalus</i>	Red-headed Woodpecker	Endangered	Threatened		SNA	8 Accidental	1	4.7 \pm 0.0
A	<i>Hirundo rustica</i>	Barn Swallow	Threatened	Threatened	Threatened	S2B,S2M	3 Sensitive	3	4.1 \pm 7.0
A	<i>Riparia riparia</i>	Bank Swallow	Threatened	Threatened		S2S3B,S2S3M	3 Sensitive	2	4.1 \pm 7.0
A	<i>Wilsonia canadensis</i>	Canada Warbler	Threatened	Threatened	Threatened	S3B,S3M	1 At Risk	1	4.2 \pm 7.0
A	<i>Dolichonyx oryzivorus</i>	Bobolink	Threatened	Threatened	Threatened	S3B,S3M	3 Sensitive	2	4.2 \pm 7.0
A	<i>Acipenser brevirostrum</i>	Shortnose Sturgeon	Special Concern	Special Concern	Special Concern	S3	3 Sensitive	1	4.2 \pm 10.0
A	<i>Coccythraustes vespertinus</i>	Evening Grosbeak	Special Concern			S3B,S3S4N,SUM	3 Sensitive	1	4.2 \pm 7.0
A	<i>Chordeiles minor</i>	Common Nighthawk	Special Concern	Threatened	Threatened	S3B,S4M	1 At Risk	3	4.2 \pm 7.0
A	<i>Desmognathus fuscus</i>	Northern Dusky Salamander	Not At Risk			S3	3 Sensitive	2	2.0 \pm 1.0
A	<i>Phalaropus tricolor</i>	Wilson's Phalarope				S1B,S1M	3 Sensitive	1	4.2 \pm 7.0

	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)
A	<i>Aythya affinis</i>	Lesser Scaup				S1B,S4M	4 Secure	1	3.7 ± 0.0
A	<i>Nycticorax nycticorax</i>	Black-crowned Night-heron				S1S2B,S1S2M	3 Sensitive	1	4.2 ± 7.0
A	<i>Empidonax traillii</i>	Willow Flycatcher				S1S2B,S1S2M	3 Sensitive	1	4.2 ± 7.0
A	<i>Troglodytes aedon</i>	House Wren				S1S2B,S1S2M	5 Undetermined	2	4.1 ± 7.0
A	<i>Mimus polyglottos</i>	Northern Mockingbird				S2B,S2M	3 Sensitive	4	4.2 ± 7.0
A	<i>Toxostoma rufum</i>	Brown Thrasher				S2B,S2M	3 Sensitive	1	4.2 ± 7.0
A	<i>Anas strepera</i>	Gadwall				S2B,S3M	4 Secure	3	4.1 ± 7.0
A	<i>Asio otus</i>	Long-eared Owl				S2S3	5 Undetermined	2	2.8 ± 0.0
A	<i>Anas clypeata</i>	Northern Shoveler				S2S3B,S2S3M	4 Secure	2	4.2 ± 7.0
A	<i>Petrochelidon pyrrhonota</i>	Cliff Swallow				S2S3B,S2S3M	3 Sensitive	3	4.2 ± 7.0
A	<i>Loxia curvirostra</i>	Red Crossbill				S3	4 Secure	1	4.2 ± 7.0
A	<i>Carduelis pinus</i>	Pine Siskin				S3	4 Secure	2	4.2 ± 7.0
A	<i>Cathartes aura</i>	Turkey Vulture				S3B,S3M	4 Secure	1	4.7 ± 0.0
A	<i>Charadrius vociferus</i>	Killdeer				S3B,S3M	3 Sensitive	3	4.2 ± 7.0
A	<i>Coccyzus erythrophthalmus</i>	Black-billed Cuckoo				S3B,S3M	4 Secure	1	4.2 ± 7.0
A	<i>Molothrus ater</i>	Brown-headed Cowbird				S3B,S3M	2 May Be At Risk	1	4.2 ± 7.0
A	<i>Somateria mollissima</i>	Common Eider				S3B,S4M,S3N	4 Secure	7	4.1 ± 7.0
A	<i>Anas acuta</i>	Northern Pintail				S3B,S5M	3 Sensitive	2	2.9 ± 1.0
A	<i>Mergus serrator</i>	Red-breasted Merganser				S3B,S5M,S4S5N	4 Secure	1	4.6 ± 8.0
A	<i>Bucephala albeola</i>	Bufflehead				S3M,S2N	3 Sensitive	6	3.7 ± 0.0
A	<i>Actitis macularius</i>	Spotted Sandpiper				S3S4B,S5M	4 Secure	3	4.1 ± 7.0
A	<i>Larus delawarensis</i>	Ring-billed Gull				S3S4B,S5M	4 Secure	1	4.2 ± 7.0
A	<i>Calidris melanotos</i>	Pectoral Sandpiper				S3S4M	4 Secure	1	3.7 ± 0.0
I	<i>Danaus plexippus</i>	Monarch	Endangered	Special Concern	Special Concern	S3B,S3M	3 Sensitive	2	2.0 ± 0.0
I	<i>Plebejus idas empetri</i>	Crowberry Blue				S3	4 Secure	1	5.0 ± 1.0
I	<i>Lestes vigilax</i>	Swamp Spreadwing				S3	3 Sensitive	3	2.2 ± 1.0
I	<i>Spurwinkia salsa</i>	Saltmarsh Hydrobe				S3	3 Sensitive	3	2.8 ± 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?
<i>Chrysemys picta picta</i>	Eastern Painted Turtle			YES
<i>Chelydra serpentina</i>	Snapping Turtle	Special Concern	Special Concern	No
<i>Glyptemys insculpta</i>	Wood Turtle	Threatened	Threatened	YES
<i>Haliaeetus leucocephalus</i>	Bald Eagle		Endangered	YES
<i>Falco peregrinus pop. 1</i>	Peregrine Falcon - anatum/tundrius pop.	Special Concern	Endangered	YES
<i>Cicindela marginipennis</i>	Cobblestone Tiger Beetle	Endangered	Endangered	No
<i>Coenonympha nipsisquit</i>	Maritime Ringlet	Endangered	Endangered	No
<i>Bat Hibernaculum</i>		[Endangered] ¹	[Endangered] ¹	YES

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.

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5.0 RARE SPECIES WITHIN 100 KM

A 100 km buffer around the study area contains 34348 records of 148 vertebrate and 1214 records of 74 invertebrate fauna; 6668 records of 361 vascular, 617 records of 178 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 (\pm the precision, in km, of the record).

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)	Prov
A	<i>Myotis lucifugus</i>	Little Brown Myotis	Endangered	Endangered	Endangered	S1	1 At Risk	60	1.9 \pm 1.0	NB
A	<i>Myotis septentrionalis</i>	Northern Long-eared Myotis	Endangered	Endangered	Endangered	S1	1 At Risk	17	4.0 \pm 0.0	NB
A	<i>Perimyotis subflavus</i>	Eastern Pipistrelle	Endangered	Endangered	Endangered	S1	1 At Risk	8	4.0 \pm 0.0	NB
A	<i>Eubalaena glacialis</i>	North Atlantic Right Whale	Endangered	Endangered	Endangered	S1		7	67.9 \pm 1.0	NB
A	<i>Sterna dougallii</i>	Roseate Tern	Endangered	Endangered	Endangered	S1?B,S1?M	1 At Risk	3	53.0 \pm 0.0	NB
A	<i>Charadrius melodus melodus</i>	Piping Plover melodus ssp	Endangered	Endangered	Endangered	S1B,S1M	1 At Risk	23	6.6 \pm 0.0	NB
A	<i>Dermochelys coriacea</i> (Atlantic pop.)	Leatherback Sea Turtle - Atlantic pop.	Endangered	Endangered	Endangered	S1S2N	1 At Risk	4	11.9 \pm 0.0	NB
A	<i>Salmo salar pop. 1</i>	Atlantic Salmon - Inner Bay of Fundy pop.	Endangered	Endangered	Endangered	S2	2 May Be At Risk	53	28.5 \pm 1.0	NB
A	<i>Calidris canutus rufa</i>	Red Knot rufa ssp	Endangered		Endangered	S2M	1 At Risk	377	6.6 \pm 0.0	NB
A	<i>Rangifer tarandus pop. 2</i>	Woodland Caribou (Atlantic-Gasp [r-sie pop.]	Endangered	Endangered	Extirpated	SX	0.1 Extirpated	4	25.1 \pm 5.0	NB
A	<i>Sturnella magna</i>	Eastern Meadowlark	Threatened	Threatened	Threatened	S1B,S1M	2 May Be At Risk	45	29.3 \pm 7.0	NB
A	<i>Ixobrychus exilis</i>	Least Bittern	Threatened	Threatened	Threatened	S1S2B,S1S2M	1 At Risk	29	11.6 \pm 7.0	NB
A	<i>Hylocichla mustelina</i>	Wood Thrush	Threatened	Threatened	Threatened	S1S2B,S1S2M	2 May Be At Risk	189	6.4 \pm 7.0	NB
A	<i>Caprimulgus vociferus</i>	Whip-Poor-Will	Threatened	Threatened	Threatened	S2B,S2M	1 At Risk	86	7.8 \pm 7.0	NB
A	<i>Hirundo rustica</i>	Barn Swallow	Threatened	Threatened	Threatened	S2B,S2M	3 Sensitive	1362	4.1 \pm 7.0	NB
A	<i>Catharus bicknelli</i>	Bicknell's Thrush	Threatened	Special Concern	Threatened	S2B,S2M	1 At Risk	24	7.2 \pm 1.0	NB
A	<i>Glyptemys insculpta</i>	Wood Turtle	Threatened	Threatened	Threatened	S2S3	1 At Risk	96	0.4 \pm 10.0	NB
A	<i>Chaetura pelagica</i>	Chimney Swift	Threatened	Threatened	Threatened	S2S3B,S2M	1 At Risk	447	10.4 \pm 7.0	NB
A	<i>Riparia riparia</i>	Bank Swallow	Threatened	Threatened	Threatened	S2S3B,S2S3M	3 Sensitive	447	4.1 \pm 7.0	NB
A	<i>Acipenser oxyrinchus</i>	Atlantic Sturgeon	Threatened		Threatened	S3	4 Secure	1	44.5 \pm 1.0	NB
A	<i>Wilsonia canadensis</i>	Canada Warbler	Threatened	Threatened	Threatened	S3B,S3M	1 At Risk	868	4.2 \pm 7.0	NB
A	<i>Dolichonyx oryzivorus</i>	Bobolink	Threatened	Threatened	Threatened	S3B,S3M	3 Sensitive	1042	4.2 \pm 7.0	NB
A	<i>Anguilla rostrata</i>	American Eel	Threatened		Threatened	S4	4 Secure	40	5.5 \pm 0.0	NB
A	<i>Osmerus mordax pop. 2</i>	Lake Utopia Smelt large-bodied pop.	Threatened		Threatened			2	48.6 \pm 10.0	NB
A	<i>Coturnicops noveboracensis</i>	Yellow Rail	Special Concern	Special Concern	Special Concern	S1?B,SUM	2 May Be At Risk	3	58.5 \pm 7.0	NB
A	<i>Histrionicus histrionicus pop. 1</i>	Harlequin Duck - Eastern pop.	Special Concern	Special Concern	Endangered	S1B,S1S2N,S2M	1 At Risk	159	25.0 \pm 17.0	NB
A	<i>Falco peregrinus pop. 1</i>	Peregrine Falcon - anatum/tundrius	Special Concern	Special Concern	Endangered	S1B,S3M	1 At Risk	625	4.2 \pm 7.0	NB
A	<i>Asio flammeus</i>	Short-eared Owl	Special Concern	Special Concern	Special Concern	S2B,S2M	3 Sensitive	17	38.6 \pm 7.0	NB
A	<i>Bucephala islandica</i> (Eastern pop.)	Barrow's Goldeneye - Eastern pop.	Special Concern	Special Concern	Special Concern	S2M,S2N	3 Sensitive	56	6.9 \pm 0.0	NB
A	<i>Balaenoptera physalus</i>	Fin Whale - Atlantic pop.	Special Concern	Special Concern	Special Concern	S2S3		5	13.8 \pm 1.0	NB
A	<i>Acipenser brevirostrum</i>	Shortnose Sturgeon	Special Concern	Special Concern	Special Concern	S3	3 Sensitive	7	4.2 \pm 10.0	NB
A	<i>Chelydra serpentina</i>	Snapping Turtle	Special Concern	Special Concern	Special Concern	S3	3 Sensitive	33	26.2 \pm 0.0	NB
A	<i>Euphagus carolinus</i>	Rusty Blackbird	Special Concern	Special Concern	Special Concern	S3B,S3M	2 May Be At Risk	123	7.2 \pm 2.0	NB
A	<i>Contopus cooperi</i>	Olive-sided Flycatcher	Special Concern	Threatened	Threatened	S3B,S3M	1 At Risk	354	6.4 \pm 7.0	NB
A	<i>Coccothraustes vespertinus</i>	Evening Grosbeak	Special Concern			S3B,S3S4N,SUM	3 Sensitive	286	4.2 \pm 7.0	NB
A	<i>Chordeiles minor</i>	Common Nighthawk	Special Concern	Threatened	Threatened	S3B,S4M	1 At Risk	331	4.2 \pm 7.0	NB

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)	Prov
A	<i>Phalaropus lobatus</i>	Red-necked Phalarope	Special Concern			S3M	3 Sensitive	216	6.6 ± 0.0	NB
A	<i>Phocoena phocoena</i> (NW Atlantic pop.)	Harbour Porpoise - Northwest Atlantic pop.	Special Concern	Threatened		S4		231	10.2 ± 0.0	NB
A	<i>Contopus virens</i>	Eastern Wood-Pewee	Special Concern	Special Concern	Special Concern	S4B,S4M	4 Secure	637	6.4 ± 7.0	NB
A	<i>Podiceps auritus</i>	Horned Grebe	Special Concern		Special Concern	S4N,S4M	4 Secure	270	6.3 ± 0.0	NB
A	<i>Odobenus rosmarus rosmarus</i>	Atlantic Walrus	Special Concern		Extirpated	SX		1	77.3 ± 5.0	NS
A	<i>Hemidactylium scutatum</i>	Four-toed Salamander	Not At Risk			S1?	5 Undetermined	11	80.8 ± 0.0	NS
A	<i>Bubo scandiacus</i>	Snowy Owl	Not At Risk			S1N,S2S3M	4 Secure	30	7.5 ± 3.0	NB
A	<i>Accipiter cooperii</i>	Cooper's Hawk	Not At Risk			S1S2B,S1S2M	2 May Be At Risk	18	38.5 ± 7.0	NB
A	<i>Fulica americana</i>	American Coot	Not At Risk			S1S2B,S1S2M	3 Sensitive	8	38.8 ± 7.0	NB
A	<i>Aegolius funereus</i>	Boreal Owl	Not At Risk			S1S2B,SUM	2 May Be At Risk	5	34.6 ± 7.0	NB
A	<i>Sorex dispar</i>	Long-tailed Shrew	Not At Risk	Special Concern		S2	3 Sensitive	2	25.8 ± 1.0	NB
A	<i>Buteo lineatus</i>	Red-shouldered Hawk	Not At Risk	Special Concern		S2B,S2M	2 May Be At Risk	50	24.4 ± 1.0	NB
A	<i>Chlidonias niger</i>	Black Tern	Not At Risk			S2B,S2M	3 Sensitive	136	30.3 ± 7.0	NB
A	<i>Globicephala melas</i>	Long-finned Pilot Whale	Not At Risk			S2S3	3	13.0 ± 1.0	NB	
A	<i>Lynx canadensis</i>	Canadian Lynx	Not At Risk		Endangered	S3	1 At Risk	13	26.2 ± 1.0	NB
A	<i>Desmognathus fuscus</i>	Northern Dusky Salamander	Not At Risk			S3	3 Sensitive	58	2.0 ± 1.0	NB
A	<i>Megaptera novaeangliae</i>	Humpback Whale (NW Atlantic pop.)	Not At Risk	Special Concern		S3		4	67.9 ± 5.0	NB
A	<i>Sterna hirundo</i>	Common Tern	Not At Risk			S3B,SUM	3 Sensitive	280	5.4 ± 10.0	NB
A	<i>Podiceps grisegena</i>	Red-necked Grebe	Not At Risk			S3M,S2N	3 Sensitive	679	7.1 ± 0.0	NB
A	<i>Lagenorhynchus acutus</i>	Atlantic White-sided Dolphin	Not At Risk			S3S4		1	13.0 ± 1.0	NB
A	<i>Haliaeetus leucocephalus</i>	Bald Eagle	Not At Risk		Endangered	S4	1 At Risk	1437	4.2 ± 7.0	NB
A	<i>Canis lupus</i>	Gray Wolf	Not At Risk		Extirpated	SX	0.1 Extirpated	4	5.8 ± 1.0	NB
A	<i>Puma concolor pop. 1</i>	Eastern Cougar	Data Deficient		Endangered	SNA	5 Undetermined	82	17.9 ± 1.0	NB
A	<i>Morone saxatilis</i>	Striped Bass	E,E,SC			S3	2 May Be At Risk	10	9.5 ± 10.0	NB
A	<i>Salvelinus alpinus</i>	Arctic Char				S1	3 Sensitive	3	77.0 ± 0.0	NB
A	<i>Vireo flavifrons</i>	Yellow-throated Vireo				S1?B,S1?M	8 Accidental	16	7.2 ± 1.0	NB
A	<i>Tringa melanoleuca</i>	Greater Yellowlegs				S1?B,S5M	4 Secure	951	6.4 ± 1.0	NB
A	<i>Aythya americana</i>	Redhead				S1B,S1M	8 Accidental	4	10.4 ± 7.0	NB
A	<i>Gallinula chloropus</i>	Common Moorhen				S1B,S1M	3 Sensitive	25	12.8 ± 1.0	NB
A	<i>Grus canadensis</i>	Sandhill Crane				S1B,S1M	8 Accidental	9	30.4 ± 0.0	NB
A	<i>Bartramia longicauda</i>	Upland Sandpiper				S1B,S1M	3 Sensitive	45	34.6 ± 0.0	NB
A	<i>Phalaropus tricolor</i>	Wilson's Phalarope				S1B,S1M	3 Sensitive	58	4.2 ± 7.0	NB
A	<i>Leucophaeus atricilla</i>	Laughing Gull				S1B,S1M	3 Sensitive	83	7.2 ± 1.0	NB
A	<i>Progne subis</i>	Purple Martin				S1B,S1M	2 May Be At Risk	231	10.4 ± 7.0	NB
A	<i>Thryothorus ludovicianus</i>	Carolina Wren				S1B,S1M	8 Accidental	35	10.4 ± 7.0	NB
A	<i>Oxyura jamaicensis</i>	Ruddy Duck				S1B,S2S3M	4 Secure	52	6.3 ± 0.0	NB
A	<i>Uria aalge</i>	Common Murre				S1B,S3N,S3M	4 Secure	122	22.3 ± 15.0	NB
A	<i>Aythya affinis</i>	Lesser Scaup				S1B,S4M	4 Secure	203	3.7 ± 0.0	NB
A	<i>Aythya marila</i>	Greater Scaup				S1B,S4M,S2N	4 Secure	37	6.3 ± 0.0	NB
A	<i>Eremophila alpestris</i>	Horned Lark				S1B,S4N,S5M	2 May Be At Risk	30	6.4 ± 1.0	NB
A	<i>Sterna paradisaea</i>	Arctic Tern				S1B,SUM	2 May Be At Risk	126	27.1 ± 16.0	NB
A	<i>Fratercula arctica</i>	Atlantic Puffin				S1B,SUN,SUM	3 Sensitive	157	22.3 ± 15.0	NB
A	<i>Branta bernicla</i>	Brant				S1N,S2S3M	4 Secure	544	6.3 ± 0.0	NB
A	<i>Chroicocephalus ridibundus</i>	Black-headed Gull				S1N,S2M	3 Sensitive	42	7.2 ± 1.0	NB
A	<i>Butorides virescens</i>	Green Heron				S1S2B,S1S2M	3 Sensitive	22	11.6 ± 7.0	NB
A	<i>Nycticorax nycticorax</i>	Black-crowned Night-heron				S1S2B,S1S2M	3 Sensitive	62	4.2 ± 7.0	NB
A	<i>Empidonax traillii</i>	Willow Flycatcher				S1S2B,S1S2M	3 Sensitive	104	4.2 ± 7.0	NB
A	<i>Stelgidopteryx serripennis</i>	Northern Rough-winged Swallow				S1S2B,S1S2M	2 May Be At Risk	21	9.8 ± 7.0	NB

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)	Prov
A	<i>Troglodytes aedon</i>	House Wren				S1S2B,S1S2M	5 Undetermined	32	4.1 ± 7.0	NB
A	<i>Rissa tridactyla</i>	Black-legged Kittiwake				S1S2B,S4N,S5M	4 Secure	49	34.0 ± 7.0	NB
A	<i>Calidris bairdii</i>	Baird's Sandpiper				S1S2M	3 Sensitive	101	6.3 ± 1.0	NB
A	<i>Cistothorus palustris</i>	Marsh Wren				S2B,S2M	3 Sensitive	89	6.4 ± 7.0	NB
A	<i>Mimus polyglottos</i>	Northern Mockingbird				S2B,S2M	3 Sensitive	155	4.2 ± 7.0	NB
A	<i>Toxostoma rufum</i>	Brown Thrasher				S2B,S2M	3 Sensitive	94	4.2 ± 7.0	NB
A	<i>Pooecetes gramineus</i>	Vesper Sparrow				S2B,S2M	2 May Be At Risk	82	15.4 ± 0.0	NB
A	<i>Anas strepera</i>	Gadwall				S2B,S3M	4 Secure	122	4.1 ± 7.0	NB
A	<i>Alca torda</i>	Razorbill				S2B,S3N,S3M	4 Secure	147	22.3 ± 15.0	NB
A	<i>Pinicola enucleator</i>	Pine Grosbeak				S2B,S4S5N,S4S5M	3 Sensitive	32	37.2 ± 7.0	NB
A	<i>Tringa solitaria</i>	Solitary Sandpiper				S2B,S5M	4 Secure	258	6.3 ± 0.0	NB
A	<i>Oceanodroma leucorhoa</i>	Leach's Storm-Petrel				S2B,SUM	3 Sensitive	125	40.0 ± 0.0	NB
A	<i>Chen caerulescens</i>	Snow Goose				S2M	4 Secure	7	6.3 ± 1.0	NB
A	<i>Phalacrocorax carbo</i>	Great Cormorant				S2N,S2M	4 Secure	312	5.8 ± 3.0	NB
A	<i>Somateria spectabilis</i>	King Eider				S2N,S2M	4 Secure	56	46.0 ± 9.0	NB
A	<i>Larus hyperboreus</i>	Glaucous Gull				S2N,S2M	4 Secure	156	6.3 ± 0.0	NB
A	<i>Asio otus</i>	Long-eared Owl				S2S3	5 Undetermined	19	2.8 ± 0.0	NB
A	<i>Picoides dorsalis</i>	American Three-toed Woodpecker				S2S3	3 Sensitive	10	46.5 ± 7.0	NB
A	<i>Salmo salar</i>	Atlantic Salmon				S2S3	2 May Be At Risk	35	10.8 ± 1.0	NB
A	<i>Anas clypeata</i>	Northern Shoveler				S2S3B,S2S3M	4 Secure	96	4.2 ± 7.0	NB
A	<i>Myiarchus crinitus</i>	Great Crested Flycatcher				S2S3B,S2S3M	3 Sensitive	242	7.2 ± 4.0	NB
A	<i>Petrochelidon pyrrhonota</i>	Cliff Swallow				S2S3B,S2S3M	3 Sensitive	560	4.2 ± 7.0	NB
A	<i>Pluvialis dominica</i>	American Golden-Plover				S2S3M	3 Sensitive	265	6.4 ± 1.0	NB
A	<i>Calcarius lapponicus</i>	Lapland Longspur				S2S3N,SUM	3 Sensitive	38	6.3 ± 1.0	NB
A	<i>Cephus grylle</i>	Black Guillemot				S3	4 Secure	772	6.4 ± 1.0	NB
A	<i>Loxia curvirostra</i>	Red Crossbill				S3	4 Secure	140	4.2 ± 7.0	NB
A	<i>Carduelis pinus</i>	Pine Siskin				S3	4 Secure	310	4.2 ± 7.0	NB
A	<i>Prosopium cylindraceum</i>	Round Whitefish				S3	4 Secure	1	74.9 ± 0.0	NB
A	<i>Salvelinus namaycush</i>	Lake Trout				S3	3 Sensitive	4	11.5 ± 0.0	NB
A	<i>Sorex maritimensis</i>	Maritime Shrew				S3	4 Secure	2	81.2 ± 0.0	NS
A	<i>Eptesicus fuscus</i>	Big Brown Bat				S3	3 Sensitive	48	8.3 ± 1.0	NB
A	<i>Cathartes aura</i>	Turkey Vulture				S3B,S3M	4 Secure	296	4.7 ± 0.0	NB
A	<i>Rallus limicola</i>	Virginia Rail				S3B,S3M	3 Sensitive	119	11.9 ± 7.0	NB
A	<i>Charadrius vociferus</i>	Killdeer				S3B,S3M	3 Sensitive	816	4.2 ± 7.0	NB
A	<i>Tringa semipalmata</i>	Willet				S3B,S3M	3 Sensitive	174	6.6 ± 0.0	NB
A	<i>Coccyzus erythrophthalmus</i>	Black-billed Cuckoo				S3B,S3M	4 Secure	184	4.2 ± 7.0	NB
A	<i>Vireo gilvus</i>	Warbling Vireo				S3B,S3M	4 Secure	232	9.1 ± 7.0	NB
A	<i>Piranga olivacea</i>	Scarlet Tanager				S3B,S3M	4 Secure	130	10.4 ± 7.0	NB
A	<i>Passerina cyanea</i>	Indigo Bunting				S3B,S3M	4 Secure	110	10.1 ± 7.0	NB
A	<i>Molothrus ater</i>	Brown-headed Cowbird				S3B,S3M	2 May Be At Risk	292	4.2 ± 7.0	NB
A	<i>Icterus galbula</i>	Baltimore Oriole				S3B,S3M	4 Secure	196	5.8 ± 2.0	NB
A	<i>Somateria mollissima</i>	Common Eider				S3B,S4M,S3N	4 Secure	1930	4.1 ± 7.0	NB
A	<i>Dendroica tigrina</i>	Cape May Warbler				S3B,S4S5M	4 Secure	143	9.1 ± 7.0	NB
A	<i>Anas acuta</i>	Northern Pintail				S3B,S5M	3 Sensitive	54	2.9 ± 1.0	NB
A	<i>Mergus serrator</i>	Red-breasted Merganser				S3B,S5M,S4S5N	4 Secure	382	4.6 ± 8.0	NB
A	<i>Arenaria interpres</i>	Ruddy Turnstone				S3M	4 Secure	697	6.4 ± 1.0	NB
A	<i>Phalaropus fulicarius</i>	Red Phalarope				S3M	3 Sensitive	120	40.0 ± 0.0	NB
A	<i>Melanitta nigra</i>	Black Scoter				S3M,S1S2N	3 Sensitive	810	6.5 ± 0.0	NB
A	<i>Bucephala albeola</i>	Bufflehead				S3M,S2N	3 Sensitive	1116	3.7 ± 0.0	NB
A	<i>Calidris maritima</i>	Purple Sandpiper				S3M,S3N	4 Secure	251	6.6 ± 0.0	NB
A	<i>Uria lomvia</i>	Thick-billed Murre				S3N,S3M	5 Undetermined	67	18.5 ± 8.0	NB
A	<i>Synaptomys cooperi</i>	Southern Bog Lemming				S3S4	4 Secure	79	29.7 ± 1.0	NB

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A	<i>Tyrannus tyrannus</i>	Eastern Kingbird				S3S4B,S3S4M	3 Sensitive	527	7.0 ± 2.0	NB
A	<i>Actitis macularius</i>	Spotted Sandpiper				S3S4B,S5M	4 Secure	900	4.1 ± 7.0	NB
A	<i>Gallinago delicata</i>	Wilson's Snipe				S3S4B,S5M	4 Secure	683	6.6 ± 0.0	NB
A	<i>Larus delawarensis</i>	Ring-billed Gull				S3S4B,S5M	4 Secure	245	4.2 ± 7.0	NB
A	<i>Dendroica striata</i>	Blackpoll Warbler				S3S4B,S5M	4 Secure	88	11.4 ± 0.0	NB
A	<i>Pluvialis squatarola</i>	Black-bellied Plover				S3S4M	4 Secure	841	6.6 ± 0.0	NB
A	<i>Limosa haemastica</i>	Hudsonian Godwit				S3S4M	4 Secure	92	6.6 ± 0.0	NB
A	<i>Calidris pusilla</i>	Semipalmated Sandpiper				S3S4M	4 Secure	2032	5.7 ± 3.0	NB
A	<i>Calidris melanotos</i>	Pectoral Sandpiper				S3S4M	4 Secure	306	3.7 ± 0.0	NB
A	<i>Calidris alba</i>	Sanderling				S3S4M,S1N	3 Sensitive	846	6.3 ± 1.0	NB
A	<i>Morus bassanus</i>	Northern Gannet				SHB,S5M	4 Secure	829	5.7 ± 0.0	NB
A	<i>Lanius ludovicianus</i>	Loggerhead Shrike				SXB,SXM	1 At Risk	1	85.2 ± 1.0	NB
C	<i>Quercus macrocarpa</i> - <i>Acer rubrum</i> / <i>Onoclea sensibilis</i> - <i>Carex arcta</i> Forest	Bur Oak - Red Maple / Sensitive Fern - Northern Clustered Sedge Forest				S2		1	67.7 ± 0.0	
C	<i>Acer saccharinum</i> / <i>Onoclea sensibilis</i> - <i>Lysimachia terrestris</i> Forest	Silver Maple / Sensitive Fern - Swamp Yellow Loosestrife Forest				S3		1	54.9 ± 0.0	NB
C	<i>Acer saccharum</i> - <i>Fraxinus americana</i> / <i>Polystichum</i> <i>acrostichoides</i> Forest	Sugar Maple - White Ash / Christmas Fern Forest				S3S4		1	31.5 ± 0.0	NB
I	<i>Cicindela marginipennis</i>	Cobblestone Tiger Beetle	Endangered	Endangered	Endangered	S1	1 At Risk	42	71.0 ± 0.0	NB
I	<i>Gomphus ventricosus</i>	Skillet Clubtail	Endangered		Endangered	S1S2	2 May Be At Risk	48	55.8 ± 0.0	NB
I	<i>Danaus plexippus</i>	Monarch	Endangered	Special Concern	Special Concern	S3B,S3M	3 Sensitive	115	2.0 ± 0.0	NB
I	<i>Ophiogomphus howei</i>	Pygmy Snaketail	Special Concern	Special Concern	Special Concern	S2	2 May Be At Risk	14	48.8 ± 0.0	NB
I	<i>Alasmidonta varicosa</i>	Brook Floater	Special Concern		Special Concern	S2	3 Sensitive	1	86.3 ± 0.0	NB
I	<i>Lampsilis cariosa</i>	Yellow Lampmussel	Special Concern	Special Concern	Special Concern	S2	3 Sensitive	100	32.2 ± 1.0	NB
I	<i>Bombus terricola</i>	Yellow-banded Bumblebee	Special Concern		Special Concern	S3?	3 Sensitive	22	45.2 ± 0.0	NB
I	<i>Appalachina sayana</i>	Spike-lip Crater	Not At Risk			S3?		1	14.7 ± 1.0	NB
I	<i>Haematopota rara</i>	Shy Cleg				S1	5 Undetermined	1	83.7 ± 1.0	NB
I	<i>Lycaena dorcas</i>	Dorcas Copper				S1	2 May Be At Risk	1	69.6 ± 0.0	NB
I	<i>Erora laeta</i>	Early Hairstreak				S1	2 May Be At Risk	4	76.1 ± 1.0	NS
I	<i>Arigomphus furcifer</i>	Lilypad Clubtail				S1	5 Undetermined	8	62.0 ± 0.0	NB
I	<i>Polites origenes</i>	Crossline Skipper				S1?	5 Undetermined	5	49.8 ± 0.0	NB
I	<i>Plebejus saepiolus</i>	Greenish Blue				S1S2	4 Secure	3	46.4 ± 0.0	NB
I	<i>Ophiogomphus colubrinus</i>	Boreal Snaketail				S1S2	2 May Be At Risk	36	26.1 ± 1.0	NB
I	<i>Brachyleptura circumdata</i>	a Longhorned Beetle				S2		6	70.0 ± 0.0	NB
I	<i>Satyrrium calanus falacer</i>	Banded Hairstreak				S2	4 Secure	19	77.9 ± 1.0	NS
I	<i>Strymon melinus</i>	Grey Hairstreak				S2	4 Secure	6	13.9 ± 0.0	NB
I	<i>Aeshna clepsydra</i>	Mottled Darner				S2	3 Sensitive	13	10.4 ± 1.0	NB
I	<i>Somatochlora tenebrosa</i>	Clamp-Tipped Emerald				S2	5 Undetermined	7	78.2 ± 0.0	NB
I	<i>Ladona exusta</i>	White Corporal				S2	5 Undetermined	12	37.1 ± 0.0	NB
I	<i>Hetaerina americana</i>	American Rubyspot				S2	3 Sensitive	2	85.6 ± 0.0	NB
I	<i>Ischnura posita</i>	Fragile Forktail				S2	2 May Be At Risk	22	53.2 ± 0.0	NB
I	<i>Callophrys henrici</i>	Henry's Elfin				S2S3	4 Secure	15	76.1 ± 1.0	NS
I	<i>Celithemis martha</i>	Martha's Pennant				S2S3	5 Undetermined	4	5.2 ± 0.0	NB
I	<i>Sphaeroderus nitidicollis</i>	a Ground Beetle				S3	4 Secure	1	70.1 ± 0.0	NB
I	<i>Lepturoopsis biforis</i>	a Longhorned Beetle				S3		1	11.1 ± 1.0	NB

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I	<i>Orthosoma brunneum</i>	a Longhorned Beetle				S3		1	70.2 ± 5.0	NB
I	<i>Elaphrus americanus</i>	a Ground Beetle				S3	4 Secure	1	72.7 ± 0.0	NB
I	<i>Desmocerus palliatus</i>	Elderberry Borer				S3		4	11.1 ± 1.0	NB
I	<i>Agonum excavatum</i>	a Ground Beetle				S3	4 Secure	1	72.7 ± 0.0	NB
I	<i>Clivina americana</i>	a Ground Beetle				S3	4 Secure	1	72.7 ± 0.0	NB
I	<i>Olisthopus parmatus</i>	a Ground Beetle				S3	4 Secure	1	70.1 ± 0.0	NB
I	<i>Paratachys scitulus</i>	a Ground Beetle				S3	5 Undetermined	1	72.7 ± 0.0	NB
I	<i>Coccinella hieroglyphica kirbyi</i>	a Ladybird Beetle				S3	4 Secure	1	11.1 ± 1.0	NB
I	<i>Hippodamia parenthesis</i>	Parenthesis Lady Beetle				S3	4 Secure	2	11.1 ± 1.0	NB
I	<i>Stenocorus vittigera</i>	a Longhorned Beetle				S3		1	72.6 ± 0.0	NB
I	<i>Gnathacmaeops pratensis</i>	a Longhorned Beetle				S3		5	11.1 ± 1.0	NB
I	<i>Pogonocherus mixtus</i>	a Longhorned Beetle				S3		1	11.1 ± 1.0	NB
I	<i>Badister neopulchellus</i>	a Ground Beetle				S3	4 Secure	1	72.7 ± 0.0	NB
I	<i>Calathus gregarius</i>	a Ground Beetle				S3	4 Secure	1	97.0 ± 1.0	NB
I	<i>Saperda lateralis</i>	a Longhorned Beetle				S3		2	9.9 ± 0.0	NB
I	<i>Hesperia sassacus</i>	Indian Skipper				S3	4 Secure	9	76.9 ± 0.0	NB
I	<i>Euphyes bimaculata</i>	Two-spotted Skipper				S3	4 Secure	12	43.4 ± 0.0	NB
I	<i>Lycaena hyllus</i>	Bronze Copper				S3	3 Sensitive	6	15.1 ± 1.0	NB
I	<i>Satyrium acadica</i>	Acadian Hairstreak				S3	4 Secure	23	11.1 ± 1.0	NB
I	<i>Callophrys polios</i>	Hoary Elfin				S3	4 Secure	15	11.1 ± 1.0	NB
I	<i>Plebejus idas empetri</i>	Crowberry Blue				S3	4 Secure	15	5.0 ± 1.0	NB
I	<i>Speyeria aphrodite</i>	Aphrodite Fritillary				S3	4 Secure	29	5.6 ± 1.0	NB
I	<i>Boloria bellona</i>	Meadow Fritillary				S3	4 Secure	40	41.3 ± 0.0	NB
I	<i>Polygonia satyrus</i>	Satyr Comma				S3	4 Secure	14	16.6 ± 1.0	NB
I	<i>Polygonia gracilis</i>	Hoary Comma				S3	4 Secure	7	12.3 ± 7.0	NB
I	<i>Nymphalis l-album</i>	Compton Tortoiseshell				S3	4 Secure	25	9.7 ± 1.0	NB
I	<i>Gomphus vastus</i>	Cobra Clubtail				S3	3 Sensitive	58	37.7 ± 0.0	NB
I	<i>Gomphus abbreviatus</i>	Spine-crowned Clubtail				S3	4 Secure	25	12.9 ± 0.0	NB
I	<i>Gomphaeschna furcillata</i>	Harlequin Darner				S3	5 Undetermined	19	82.2 ± 1.0	NB
I	<i>Dorocordulia lepida</i>	Petite Emerald				S3	4 Secure	38	10.5 ± 0.0	NB
I	<i>Somatochlora cingulata</i>	Lake Emerald				S3	4 Secure	11	10.5 ± 0.0	NB
I	<i>Somatochlora forcipata</i>	Forcipate Emerald				S3	4 Secure	20	70.1 ± 1.0	NB
I	<i>Williamsonia fletcheri</i>	Ebony Boghaunter				S3	4 Secure	9	62.8 ± 0.0	NB
I	<i>Lestes eurinus</i>	Amber-Winged Spreadwing				S3	4 Secure	8	9.0 ± 1.0	NB
I	<i>Lestes vigilax</i>	Swamp Spreadwing				S3	3 Sensitive	38	2.2 ± 1.0	NB
I	<i>Enallagma geminatum</i>	Skimming Bluet				S3	5 Undetermined	12	12.9 ± 0.0	NB
I	<i>Enallagma signatum</i>	Orange Bluet				S3	4 Secure	16	47.4 ± 0.0	NB
I	<i>Stylurus scudderii</i>	Zebra Clubtail				S3	4 Secure	73	37.7 ± 0.0	NB
I	<i>Alasmidonta undulata</i>	Triangle Floater				S3	3 Sensitive	40	12.5 ± 1.0	NB
I	<i>Leptodea ochracea</i>	Tidewater Mucket				S3	4 Secure	60	7.2 ± 1.0	NB
I	<i>Striatura ferrea</i>	Black Striate				S3		1	83.1 ± 1.0	NB
I	<i>Neohelix albolabris</i>	Whitelip				S3		2	60.2 ± 0.0	NB
I	<i>Spurwinkia salsa</i>	Saltmarsh Hydrobe				S3		34	2.8 ± 0.0	NB
I	<i>Pantala hymenaea</i>	Spot-Winged Glider				S3B,S3M	4 Secure	5	10.0 ± 1.0	NB
I	<i>Satyrium liparops strigosum</i>	Striped Hairstreak				S3S4	4 Secure	7	77.3 ± 7.0	NB
I	<i>Cupido comyntas</i>	Eastern Tailed Blue				S3S4	4 Secure	8	20.9 ± 5.0	NB
I	<i>Coccinella transversoguttata richardsoni</i>	Transverse Lady Beetle				SH	2 May Be At Risk	2	6.6 ± 0.0	NB
N	<i>Erioderma mollissimum</i>	Graceful Felt Lichen	Endangered		Endangered	SH	2 May Be At Risk	1	93.2 ± 1.0	NB
N	<i>Erioderma</i>	Boreal Felt Lichen - Atlantic pop.	Endangered	Endangered	Endangered	SH	1 At Risk	3	72.7 ± 1.0	NB

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)	Prov
	<i>pedicellatum</i> (<i>Atlantic pop.</i>)									
N	<i>Peltigera hydrothyria</i>	Eastern Waterfan	Threatened			S1	5 Undetermined	2	93.0 ± 1.0	NB
N	<i>Anzia colpodetes</i>	Black-foam Lichen	Threatened			S1S2	5 Undetermined	1	97.5 ± 1.0	NB
N	<i>Degelia plumbea</i>	BluDegelia plumbeae Felt Lichen	Special Concern	Special Concern	Special Concern	S1	2 May Be At Risk	4	71.5 ± 5.0	NB
N	<i>Pseudevernia cladonia</i>	Ghost Antler Lichen	Not At Risk			S2S3	5 Undetermined	19	20.8 ± 0.0	NB
N	<i>Bryum muehlenbeckii</i>	Muehlenbeck's Bryum Moss				S1	2 May Be At Risk	1	7.3 ± 1.0	NB
N	<i>Didymodon rigidulus</i> var. <i>gracilis</i>	a moss				S1	2 May Be At Risk	1	96.2 ± 1.0	NB
N	<i>Sphagnum macrophyllum</i>	Sphagnum				S1	2 May Be At Risk	2	9.5 ± 0.0	NB
N	<i>Syntrichia ruralis</i>	a Moss				S1	2 May Be At Risk	1	75.0 ± 0.0	NB
N	<i>Coscinodon cribrosus</i>	Sieve-Toothed Moss				S1	2 May Be At Risk	1	8.3 ± 0.0	NB
N	<i>Cladonia metacorallifera</i>	Reptilian Pixie-cup Lichen				S1	5 Undetermined	4	90.2 ± 1.0	NB
N	<i>Peltigera collina</i>	Tree Pelt Lichen				S1	2 May Be At Risk	1	80.8 ± 10.0	NB
N	<i>Peltigera malacea</i>	Veinless Pelt Lichen				S1	5 Undetermined	1	92.7 ± 1.0	NB
N	<i>Bryoria bicolor</i>	Electrified Horsehair Lichen				S1	2 May Be At Risk	1	92.7 ± 1.0	NB
N	<i>Hygrobriella laxifolia</i>	Lax Notchwort				S1?	6 Not Assessed	1	90.3 ± 1.0	NB
N	<i>Atrichum angustatum</i>	Lesser Smoothcap Moss				S1?	2 May Be At Risk	1	88.7 ± 3.0	NS
N	<i>Bartramia ithyphylla</i>	Straight-leaved Apple Moss				S1?	2 May Be At Risk	1	90.3 ± 0.0	NB
N	<i>Calliergon trifarium</i>	Three-ranked Moss				S1?	2 May Be At Risk	1	2.4 ± 0.0	NB
N	<i>Dichelyma falcatum</i>	a Moss				S1?	2 May Be At Risk	2	22.8 ± 1.0	NB
N	<i>Dicranum bonjeanii</i>	Bonjean's Broom Moss				S1?	2 May Be At Risk	1	84.1 ± 1.0	NB
N	<i>Entodon brevisetus</i>	a Moss				S1?	2 May Be At Risk	1	99.8 ± 10.0	NB
N	<i>Eurhynchium hians</i>	Light Beaked Moss				S1?	2 May Be At Risk	3	72.3 ± 0.0	NB
N	<i>Homomallium adnatum</i>	Adnate Hairy-gray Moss				S1?	2 May Be At Risk	2	99.8 ± 10.0	NB
N	<i>Plagiothecium latebricola</i>	Alder Silk Moss				S1?	2 May Be At Risk	2	8.6 ± 0.0	NB
N	<i>Racomitrium ericoides</i>	a Moss				S1?	2 May Be At Risk	1	79.0 ± 3.0	NB
N	<i>Rhytidium rugosum</i>	Wrinkle-leaved Moss				S1?	2 May Be At Risk	2	74.3 ± 0.0	NB
N	<i>Splachnum pennsylvanicum</i>	Southern Dung Moss				S1?	2 May Be At Risk	1	85.8 ± 1.0	NB
N	<i>Platylomella lescurii</i>	a Moss				S1?	5 Undetermined	1	70.9 ± 1.0	NB
N	<i>Cladopodiella francisci</i>	Holt's Notchwort				S1S2	6 Not Assessed	1	96.2 ± 1.0	NB
N	<i>Harpanthus flotovianus</i>	Great Mountain Flapwort				S1S2	6 Not Assessed	1	92.2 ± 1.0	NB
N	<i>Jungermannia obovata</i>	Egg Flapwort				S1S2	6 Not Assessed	1	19.4 ± 0.0	NB
N	<i>Pallavicinia lyellii</i>	Lyell's Ribbonwort				S1S2	6 Not Assessed	2	22.8 ± 1.0	NB
N	<i>Reboulia hemisphaerica</i>	Purple-margined Liverwort				S1S2	6 Not Assessed	1	76.4 ± 1.0	NB
N	<i>Brachythecium acuminatum</i>	Acuminate Ragged Moss				S1S2	5 Undetermined	6	64.7 ± 100.0	NB
N	<i>Bryum salinum</i>	a Moss				S1S2	2 May Be At Risk	2	31.3 ± 1.0	NB
N	<i>Campylium radicale</i>	Long-stalked Fine Wet Moss				S1S2	5 Undetermined	1	85.8 ± 1.0	NB
N	<i>Tortula obtusifolia</i>	a Moss				S1S2	2 May Be At Risk	1	52.5 ± 0.0	NB
N	<i>Distichium inclinatum</i>	Inclined Iris Moss				S1S2	2 May Be At Risk	5	96.0 ± 0.0	NB
N	<i>Ditrichum pallidum</i>	Pale Cow-hair Moss				S1S2	2 May Be At Risk	3	74.2 ± 3.0	NS
N	<i>Drummondia prorepens</i>	a Moss				S1S2	2 May Be At Risk	1	89.0 ± 0.0	NS
N	<i>Hygrohypnum bestii</i>	Best's Brook Moss				S1S2	3 Sensitive	4	81.8 ± 0.0	NB
N	<i>Sphagnum platyphyllum</i>	Flat-leaved Peat Moss				S1S2	5 Undetermined	2	92.8 ± 1.0	NB
N	<i>Timmia norvegica</i>	a moss				S1S2	2 May Be At Risk	3	60.3 ± 0.0	NB
N	<i>Timmia norvegica</i> var. <i>excurrens</i>	a moss				S1S2	2 May Be At Risk	1	96.0 ± 0.0	NB
N	<i>Tomentypnum falcifolium</i>	Sickle-leaved Golden Moss				S1S2	2 May Be At Risk	1	22.9 ± 1.0	NB

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N	<i>Tortella humilis</i>	Small Crisp Moss				S1S2	2 May Be At Risk	4	91.1 ± 0.0	NB
N	<i>Pseudotaxiphyllum distichaceum</i>	a Moss				S1S2	2 May Be At Risk	3	31.3 ± 1.0	NB
N	<i>Hamatocaulis vernicosus</i>	a Moss				S1S2	2 May Be At Risk	1	32.9 ± 100.0	NB
N	<i>Bryohaplocladium microphyllum</i>	Tiny-leaved Haplocladium Moss				S1S2	2 May Be At Risk	1	74.2 ± 3.0	NS
N	<i>Umbilicaria vellea</i>	Grizzled Rocktripe Lichen				S1S2	5 Undetermined	1	96.3 ± 1.0	NB
N	<i>Calypogeia neesiana</i>	Nees' Pouchwort				S1S3	6 Not Assessed	1	30.8 ± 1.0	NB
N	<i>Cephalozia elachista</i>	Spurred Threadwort				S1S3	6 Not Assessed	1	2.5 ± 5.0	NB
N	<i>Porella pinnata</i>	Pinnate Scalewort				S1S3	6 Not Assessed	2	36.9 ± 1.0	NB
N	<i>Amphidium mougeotii</i>	a Moss				S2	3 Sensitive	10	76.1 ± 8.0	NB
N	<i>Anomodon viticulosus</i>	a Moss				S2	2 May Be At Risk	5	7.9 ± 1.0	NB
N	<i>Cirriphyllum piliferum</i>	Hair-pointed Moss				S2	3 Sensitive	2	76.9 ± 0.0	NB
N	<i>Cynodontium strumiferum</i>	Strumose Dogtooth Moss				S2	3 Sensitive	1	76.1 ± 8.0	NB
N	<i>Dicranella palustris</i>	Drooping-Leaved Fork Moss				S2	3 Sensitive	9	53.4 ± 100.0	NB
N	<i>Didymodon ferrugineus</i>	a moss				S2	3 Sensitive	2	29.6 ± 1.0	NB
N	<i>Anomodon tristis</i>	a Moss				S2	2 May Be At Risk	2	77.0 ± 1.0	NB
N	<i>Hypnum pratense</i>	Meadow Plait Moss				S2	3 Sensitive	1	1.1 ± 0.0	NB
N	<i>Isopterygiopsis pulchella</i>	Neat Silk Moss				S2	3 Sensitive	3	95.4 ± 0.0	NB
N	<i>Meesia triquetra</i>	Three-ranked Cold Moss				S2	2 May Be At Risk	1	64.7 ± 100.0	NB
N	<i>Physcomitrium immersum</i>	a Moss				S2	3 Sensitive	6	36.9 ± 1.0	NB
N	<i>Platydictya jungermannioides</i>	False Willow Moss				S2	3 Sensitive	3	92.4 ± 0.0	NB
N	<i>Pohlia elongata</i>	Long-necked Nodding Moss				S2	3 Sensitive	7	91.1 ± 0.0	NB
N	<i>Sphagnum centrale</i>	Central Peat Moss				S2	3 Sensitive	7	77.7 ± 5.0	NS
N	<i>Sphagnum lindbergii</i>	Lindberg's Peat Moss				S2	3 Sensitive	8	9.8 ± 1.0	NB
N	<i>Sphagnum flexuosum</i>	Flexuous Peatmoss				S2	3 Sensitive	1	98.8 ± 0.0	NB
N	<i>Tayloria serrata</i>	Serrate Trumpet Moss				S2	3 Sensitive	5	40.5 ± 1.0	NB
N	<i>Tetradontium brownianum</i>	Little Georgia				S2	3 Sensitive	3	95.6 ± 1.0	NB
N	<i>Tetraplodon mnioides</i>	Entire-leaved Nitrogen Moss				S2	3 Sensitive	3	24.8 ± 0.0	NB
N	<i>Thamnobryum alleghaniense</i>	a Moss				S2	3 Sensitive	6	60.3 ± 0.0	NB
N	<i>Tortula mucronifolia</i>	Mucronate Screw Moss				S2	3 Sensitive	1	7.5 ± 0.0	NB
N	<i>Ulotia phyllantha</i>	a Moss				S2	3 Sensitive	5	31.3 ± 1.0	NB
N	<i>Anomobryum filiforme</i>	a moss				S2	5 Undetermined	5	59.1 ± 0.0	NB
N	<i>Cladonia macrophylla</i>	Fig-leaved Lichen				S2	5 Undetermined	2	99.4 ± 1.0	NB
N	<i>Fuscopannaria leucosticta</i>	Rimmed Shingles Lichen				S2	2 May Be At Risk	28	40.8 ± 0.0	NB
N	<i>Leptogium corticola</i>	Blistered Jellyskin Lichen				S2	2 May Be At Risk	1	80.4 ± 0.0	NB
N	<i>Nephroma laevigatum</i>	Mustard Kidney Lichen				S2	2 May Be At Risk	2	80.8 ± 10.0	NB
N	<i>Andreaea rothii</i>	a Moss				S2?	3 Sensitive	2	28.6 ± 0.0	NB
N	<i>Brachythecium digastrum</i>	a Moss				S2?	3 Sensitive	2	57.3 ± 0.0	NB
N	<i>Bryum pallescens</i>	Pale Bryum Moss				S2?	5 Undetermined	2	7.7 ± 1.0	NB
N	<i>Dichelyma capillaceum</i>	Hairlike Dichelyma Moss				S2?	3 Sensitive	1	98.7 ± 4.0	NB
N	<i>Dicranum spurium</i>	Spurred Broom Moss				S2?	3 Sensitive	2	17.9 ± 0.0	NB
N	<i>Hygrohypnum montanum</i>	a Moss				S2?	3 Sensitive	2	73.6 ± 1.0	NB
N	<i>Schistostega pennata</i>	Luminous Moss				S2?	3 Sensitive	3	53.4 ± 100.0	NB
N	<i>Seligeria campylopoda</i>	a Moss				S2?	3 Sensitive	1	32.9 ± 100.0	NB
N	<i>Seligeria diversifolia</i>	a Moss				S2?	3 Sensitive	2	59.1 ± 0.0	NB
N	<i>Sphagnum</i>	a Peatmoss				S2?	3 Sensitive	2	21.0 ± 10.0	NB

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N	<i>angermanicum</i>									
N	<i>Plagiomnium rostratum</i>	Long-beaked Leafy Moss				S2?	3 Sensitive	6	60.2 ± 0.0	NB
N	<i>Ramalina pollinaria</i>	Chalky Ramalina Lichen				S2?	5 Undetermined	1	99.4 ± 1.0	NB
N	<i>Nephroma arcticum</i>	Arctic Kidney Lichen				S2?	3 Sensitive	1	93.4 ± 1.0	NB
N	<i>Bryum uliginosum</i>	a Moss				S2S3	3 Sensitive	2	30.6 ± 4.0	NB
N	<i>Buxbaumia aphylla</i>	Brown Shield Moss				S2S3	3 Sensitive	2	74.6 ± 15.0	NB
N	<i>Calliergonella cuspidata</i>	Common Large Wetland Moss				S2S3	3 Sensitive	5	7.9 ± 1.0	NB
N	<i>Campylium polygamum</i>	a Moss				S2S3	3 Sensitive	1	93.8 ± 0.0	NB
N	<i>Palustriella falcata</i>	a Moss				S2S3	3 Sensitive	2	90.5 ± 0.0	NB
N	<i>Didymodon rigidulus</i>	Rigid Screw Moss				S2S3	3 Sensitive	9	88.4 ± 8.0	NB
N	<i>Ephemerum serratum</i>	a Moss				S2S3	3 Sensitive	2	74.7 ± 0.0	NB
N	<i>Fissidens bushii</i>	Bush's Pocket Moss				S2S3	3 Sensitive	1	88.7 ± 3.0	NS
N	<i>Orthotrichum speciosum</i>	Showy Bristle Moss				S2S3	5 Undetermined	4	60.9 ± 2.0	NB
N	<i>Pohlia prolifera</i>	Cottony Nodding Moss				S2S3	3 Sensitive	3	95.7 ± 1.0	NB
N	<i>Racomitrium fasciculare</i>	a Moss				S2S3	3 Sensitive	2	68.8 ± 0.0	NB
N	<i>Scorpidium scorpioides</i>	Hooked Scorpion Moss				S2S3	3 Sensitive	4	2.4 ± 0.0	NB
N	<i>Sphagnum subfulvum</i>	a Peatmoss				S2S3	2 May Be At Risk	3	22.9 ± 1.0	NB
N	<i>Taxiphyllum deplanatum</i>	Imbricate Yew-leaved Moss				S2S3	3 Sensitive	1	31.3 ± 1.0	NB
N	<i>Zygodon viridissimus</i>	a Moss				S2S3	2 May Be At Risk	3	70.7 ± 5.0	NB
N	<i>Schistidium agassizii</i>	Elf Bloom Moss				S2S3	3 Sensitive	4	60.9 ± 2.0	NB
N	<i>Loeskeobryum brevirostre</i>	a Moss				S2S3	3 Sensitive	8	80.3 ± 3.0	NS
N	<i>Cyrtomnium hymenophylloides</i>	Short-pointed Lantern Moss				S2S3	3 Sensitive	3	90.5 ± 0.0	NB
N	<i>Cladonia acuminata</i>	Scantly Clad Pixie Lichen				S2S3	5 Undetermined	2	93.2 ± 1.0	NB
N	<i>Cladonia ramulosa</i>	Bran Lichen				S2S3	5 Undetermined	4	97.5 ± 1.0	NB
N	<i>Parmeliopsis ambigua</i>	Green Starburst Lichen				S2S3	5 Undetermined	1	90.8 ± 1.0	NB
N	<i>Sphaerophorus globosus</i>	Northern Coral Lichen				S2S3	3 Sensitive	5	89.5 ± 1.0	NB
N	<i>Cynodontium tenellum</i>	Delicate Dogtooth Moss				S3	3 Sensitive	1	31.3 ± 1.0	NB
N	<i>Hypnum curvifolium</i>	Curved-leaved Plait Moss				S3	3 Sensitive	7	70.7 ± 5.0	NB
N	<i>Tortella fragilis</i>	Fragile Twisted Moss				S3	3 Sensitive	1	96.0 ± 0.0	NB
N	<i>Schistidium maritimum</i>	a Moss				S3	4 Secure	6	31.3 ± 1.0	NB
N	<i>Hymenostylium recurvirostre</i>	Hymenostylium Moss				S3	3 Sensitive	4	95.7 ± 1.0	NB
N	<i>Solorina saccata</i>	Woodland Owl Lichen				S3	5 Undetermined	6	90.8 ± 1.0	NB
N	<i>Normandina pulchella</i>	Rimmed Elf-ear Lichen				S3	5 Undetermined	3	92.0 ± 1.0	NB
N	<i>Cladonia farinacea</i>	Farinose Pixie Lichen				S3	5 Undetermined	2	99.4 ± 1.0	NB
N	<i>Cladonia strepsilis</i>	Olive Cladonia Lichen				S3	4 Secure	1	38.1 ± 0.0	NB
N	<i>Leptogium lichenoides</i>	Tattered Jellyskin Lichen				S3	5 Undetermined	6	96.3 ± 1.0	NB
N	<i>Nephroma bellum</i>	Naked Kidney Lichen				S3	4 Secure	2	92.5 ± 1.0	NB
N	<i>Peltigera degenii</i>	Lustrous Pelt Lichen				S3	5 Undetermined	3	93.0 ± 1.0	NB
N	<i>Leptogium laceroides</i>	Short-bearded Jellyskin Lichen				S3	3 Sensitive	1	98.5 ± 1.0	NB
N	<i>Peltigera membranacea</i>	Membranous Pelt Lichen				S3	5 Undetermined	6	90.8 ± 1.0	NB
N	<i>Cladonia carneola</i>	Crowned Pixie-cup Lichen				S3	5 Undetermined	1	99.4 ± 1.0	NB
N	<i>Cladonia deformis</i>	Lesser Sulphur-cup Lichen				S3	4 Secure	4	90.2 ± 1.0	NB
N	<i>Aulacomnium androgynum</i>	Little Groove Moss				S3?	4 Secure	7	70.7 ± 5.0	NB
N	<i>Dicranella rufescens</i>	Red Forklet Moss				S3?	5 Undetermined	3	85.0 ± 4.0	NB
N	<i>Rhytidiadelphus loreus</i>	Lanky Moss				S3?	2 May Be At Risk	2	88.8 ± 10.0	NB
N	<i>Sphagnum lescurii</i>	a Peatmoss				S3?	5 Undetermined	6	19.9 ± 0.0	NB
N	<i>Stereocaulon</i>	Coralloid Foam Lichen				S3?	5 Undetermined	1	99.4 ± 1.0	NB

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N	<i>subcoralloides</i>									
N	<i>Anomodon rugelii</i>	Rugel's Anomodon Moss				S3S4	3 Sensitive	2	88.7 ± 3.0	NS
N	<i>Barbula convoluta</i>	Lesser Bird's-claw Beard Moss				S3S4	4 Secure	1	88.4 ± 8.0	NB
N	<i>Brachythecium velutinum</i>	Velvet Ragged Moss				S3S4	4 Secure	4	69.6 ± 0.0	NB
N	<i>Dicranella cerviculata</i>	a Moss				S3S4	3 Sensitive	5	31.3 ± 1.0	NB
N	<i>Dicranum majus</i>	Greater Broom Moss				S3S4	4 Secure	9	24.8 ± 0.0	NB
N	<i>Dicranum leioneuron</i>	a Dicranum Moss				S3S4	4 Secure	1	95.9 ± 0.0	NB
N	<i>Encalypta ciliata</i>	Fringed Extinguisher Moss				S3S4	3 Sensitive	1	96.4 ± 0.0	NB
N	<i>Fissidens bryoides</i>	Lesser Pocket Moss				S3S4	4 Secure	2	29.8 ± 5.0	NB
N	<i>Heterocladium dimorphum</i>	Dimorphous Tangle Moss				S3S4	4 Secure	1	60.9 ± 2.0	NB
N	<i>Isopterygiopsis muelleriana</i>	a Moss				S3S4	4 Secure	8	69.6 ± 0.0	NB
N	<i>Myurella julacea</i>	Small Mouse-tail Moss				S3S4	4 Secure	3	76.1 ± 8.0	NB
N	<i>Physcomitrium pyriforme</i>	Pear-shaped Urn Moss				S3S4	3 Sensitive	5	71.5 ± 0.0	NB
N	<i>Pogonatum dentatum</i>	Mountain Hair Moss				S3S4	4 Secure	2	31.3 ± 1.0	NB
N	<i>Sphagnum quinquefarium</i>	Five-ranked Peat Moss				S3S4	4 Secure	1	96.1 ± 0.0	NB
N	<i>Sphagnum torreyanum</i>	a Peatmoss				S3S4	4 Secure	6	9.3 ± 0.0	NB
N	<i>Sphagnum austinii</i>	Austin's Peat Moss				S3S4	4 Secure	1	8.6 ± 1.0	NB
N	<i>Sphagnum contortum</i>	Twisted Peat Moss				S3S4	4 Secure	1	16.8 ± 0.0	NB
N	<i>Splachnum rubrum</i>	Red Collar Moss				S3S4	4 Secure	1	35.1 ± 1.0	NB
N	<i>Tetraphis geniculata</i>	Geniculate Four-tooth Moss				S3S4	4 Secure	7	1.7 ± 0.0	NB
N	<i>Tetraplodon angustatus</i>	Toothed-leaved Nitrogen Moss				S3S4	4 Secure	2	28.9 ± 0.0	NB
N	<i>Weissia controversa</i>	Green-Cushioned Weissia				S3S4	4 Secure	2	83.9 ± 0.0	NS
N	<i>Abietinella abietina</i>	Wiry Fern Moss				S3S4	4 Secure	1	96.0 ± 0.0	NB
N	<i>Trichostomum tenuirostre</i>	Acid-Soil Moss				S3S4	4 Secure	4	69.6 ± 0.0	NB
N	<i>Pannaria rubiginosa</i>	Brown-eyed Shingle Lichen				S3S4	3 Sensitive	2	95.1 ± 1.0	NB
N	<i>Ramalina thrausta</i>	Angelhair Ramalina Lichen				S3S4	5 Undetermined	7	89.5 ± 1.0	NB
N	<i>Hypogymnia vittata</i>	Slender Monk's Hood Lichen				S3S4	4 Secure	18	89.5 ± 1.0	NB
N	<i>Cladonia floerkeana</i>	Gritty British Soldiers Lichen				S3S4	4 Secure	5	38.1 ± 0.0	NB
N	<i>Hypocenomyce friesii</i>	a Lichen				S3S4	5 Undetermined	1	96.3 ± 1.0	NB
N	<i>Melanelia panniformis</i>	Shingled Camouflage Lichen				S3S4	5 Undetermined	3	92.7 ± 1.0	NB
N	<i>Nephroma parile</i>	Powdery Kidney Lichen				S3S4	4 Secure	5	40.7 ± 0.0	NB
N	<i>Protopannaria pezizoides</i>	Brown-gray Moss-shingle Lichen				S3S4	4 Secure	14	72.9 ± 0.0	NB
N	<i>Pseudocyphellaria perpetua</i>	Gilded Specklebelly Lichen				S3S4	3 Sensitive	41	77.5 ± 0.0	NB
N	<i>Pannaria conoplea</i>	Mealy-rimmed Shingle Lichen				S3S4	3 Sensitive	6	80.4 ± 0.0	NB
N	<i>Anaptychia palmulata</i>	Shaggy Fringed Lichen				S3S4	3 Sensitive	1	98.2 ± 1.0	NB
N	<i>Peltigera neopolydactyla</i>	Undulating Pelt Lichen				S3S4	5 Undetermined	5	90.8 ± 1.0	NB
N	<i>Hypocenomyce scalaris</i>	Common Clam Lichen				S3S4	5 Undetermined	1	99.4 ± 1.0	NB
N	<i>Dermatocarpon luridum</i>	Brookside Stippleback Lichen				S3S4	4 Secure	12	40.9 ± 0.0	NB
N	<i>Grimmia anodon</i>	Toothless Grimmiid Moss				SH	5 Undetermined	2	9.1 ± 10.0	NB
N	<i>Leucodon brachypus</i>	a Moss				SH	2 May Be At Risk	6	62.9 ± 100.0	NB
N	<i>Thelia hirtella</i>	a Moss				SH	2 May Be At Risk	2	64.7 ± 100.0	NB
N	<i>Cyrto-hypnum minutulum</i>	Tiny Cedar Moss				SH	2 May Be At Risk	3	95.7 ± 10.0	NB
P	<i>Juglans cinerea</i>	Butternut	Endangered	Endangered	Endangered	S1	1 At Risk	54	22.3 ± 1.0	NB
P	<i>Polemonium</i>	Van Brunt's Jacob's-ladder	Threatened	Threatened	Threatened	S1	1 At Risk	72	27.0 ± 0.0	NB

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)	Prov
P	<i>vanbruntiae</i> <i>Symphyotrichum anticostense</i>	Anticosti Aster	Threatened	Threatened	Endangered	S2S3	1 At Risk	4	93.4 ± 0.0	NB
P	<i>Isoetes prototypus</i>	Prototype Quillwort	Special Concern	Special Concern	Endangered	S2	1 At Risk	27	23.9 ± 0.0	NB
P	<i>Pterospora andromedea</i>	Woodland Pinedrops			Endangered	S1	1 At Risk	11	91.2 ± 0.0	NB
P	<i>Cryptotaenia canadensis</i>	Canada Honewort				S1	2 May Be At Risk	1	72.9 ± 1.0	NB
P	<i>Sanicula trifoliata</i>	Large-Fruited Sanicle				S1	2 May Be At Risk	1	40.4 ± 5.0	NB
P	<i>Antennaria parlinii</i>	a Pussytoes				S1	2 May Be At Risk	7	56.6 ± 1.0	NB
P	<i>Antennaria howellii</i>	Pussy-Toes				S1	2 May Be At Risk	4	7.3 ± 1.0	NB
P	<i>ssp. petaloidea</i>					S1	2 May Be At Risk	4	7.3 ± 1.0	NB
P	<i>Bidens discoidea</i>	Swamp Beggarticks				S1	2 May Be At Risk	3	70.0 ± 0.0	NB
P	<i>Pseudognaphalium obtusifolium</i>	Eastern Cudweed				S1	2 May Be At Risk	2	88.7 ± 0.0	NB
P	<i>Helianthus decapetalus</i>	Ten-rayed Sunflower				S1	2 May Be At Risk	13	92.2 ± 0.0	NB
P	<i>Hieracium kalmii</i>	Kalm's Hawkweed				S1	2 May Be At Risk	5	19.7 ± 1.0	NB
P	<i>Hieracium kalmii</i> var. <i>kalmii</i>	Kalm's Hawkweed				S1	2 May Be At Risk	7	20.4 ± 1.0	NB
P	<i>Hieracium paniculatum</i>	Panicled Hawkweed				S1	2 May Be At Risk	17	49.7 ± 0.0	NB
P	<i>Hieracium robinsonii</i>	Robinson's Hawkweed				S1	3 Sensitive	4	90.6 ± 0.0	NB
P	<i>Senecio pseudoarnica</i>	Seabeach Ragwort				S1	2 May Be At Risk	14	80.7 ± 0.0	NB
P	<i>Cardamine parviflora</i> var. <i>arenicola</i>	Small-flowered Bittercress				S1	2 May Be At Risk	14	32.7 ± 0.0	NB
P	<i>Cardamine concatenata</i>	Cut-leaved Toothwort				S1	2 May Be At Risk	1	90.6 ± 1.0	NB
P	<i>Draba arabisans</i>	Rock Whitlow-Grass				S1	2 May Be At Risk	22	18.5 ± 0.0	NB
P	<i>Draba breweri</i> var. <i>cana</i>	Brewer's Whitlow-grass				S1	2 May Be At Risk	10	92.7 ± 0.0	NB
P	<i>Draba glabella</i>	Rock Whitlow-Grass				S1	2 May Be At Risk	10	6.5 ± 1.0	NB
P	<i>Minuartia groenlandica</i>	Greenland Stitchwort				S1	2 May Be At Risk	4	15.3 ± 0.0	NB
P	<i>Chenopodium capitatum</i>	Strawberry-blite				S1	2 May Be At Risk	4	10.3 ± 1.0	NB
P	<i>Chenopodium simplex</i>	Maple-leaved Goosefoot				S1	2 May Be At Risk	9	78.6 ± 1.0	NB
P	<i>Callitriche terrestris</i>	Terrestrial Water-Starwort				S1	5 Undetermined	1	99.5 ± 0.0	NB
P	<i>Triadenum virginicum</i>	Virginia St John's-wort				S1	2 May Be At Risk	2	15.1 ± 0.0	NB
P	<i>Viburnum acerifolium</i>	Maple-leaved Viburnum				S1	2 May Be At Risk	10	94.2 ± 0.0	NB
P	<i>Corema conradii</i>	Broom Crowberry				S1	2 May Be At Risk	1	8.5 ± 10.0	NB
P	<i>Vaccinium boreale</i>	Northern Blueberry				S1	2 May Be At Risk	1	29.5 ± 0.0	NB
P	<i>Vaccinium corymbosum</i>	Highbush Blueberry				S1	3 Sensitive	1	79.5 ± 5.0	NB
P	<i>Chamaesyce polygonifolia</i>	Seaside Spurge				S1	2 May Be At Risk	8	76.6 ± 0.0	NB
P	<i>Desmodium glutinosum</i>	Large Tick-Trefoil				S1	2 May Be At Risk	1	96.7 ± 1.0	NB
P	<i>Lespedeza capitata</i>	Round-headed Bush-clover				S1	2 May Be At Risk	8	70.9 ± 0.0	NB
P	<i>Gentiana rubricaulis</i>	Purple-stemmed Gentian				S1	2 May Be At Risk	13	45.5 ± 0.0	NB
P	<i>Lomatogonium rotatum</i>	Marsh Felwort				S1	2 May Be At Risk	2	57.0 ± 0.0	NB
P	<i>Proserpinaca pectinata</i>	Comb-leaved Mermaidweed				S1	2 May Be At Risk	3	31.8 ± 0.0	NB
P	<i>Pycnanthemum virginianum</i>	Virginia Mountain Mint				S1	2 May Be At Risk	4	39.6 ± 0.0	NB
P	<i>Lysimachia hybrida</i>	Lowland Yellow Loosestrife				S1	2 May Be At Risk	15	90.4 ± 0.0	NB
P	<i>Lysimachia quadrifolia</i>	Whorled Yellow Loosestrife				S1	2 May Be At Risk	16	9.3 ± 1.0	NB
P	<i>Primula laurentiana</i>	Laurentian Primrose				S1	2 May Be At Risk	28	70.3 ± 2.0	NS
P	<i>Ranunculus sceleratus</i>	Cursed Buttercup				S1	2 May Be At Risk	6	6.7 ± 0.0	NB
P	<i>Crataegus jonesiae</i>	Jones' Hawthorn				S1	2 May Be At Risk	5	71.0 ± 0.0	NB

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P	<i>Galium brevipes</i>	Limestone Swamp Bedstraw				S1	2 May Be At Risk	1	68.7 ± 5.0	NB
P	<i>Saxifraga paniculata</i> <i>ssp. neogaea</i>	White Mountain Saxifrage				S1	2 May Be At Risk	24	19.0 ± 10.0	NB
P	<i>Agalinis paupercula</i> <i>var. borealis</i>	Small-flowered Agalinis				S1	2 May Be At Risk	8	28.6 ± 1.0	NB
P	<i>Agalinis tenuifolia</i>	Slender Agalinis				S1	2 May Be At Risk	6	79.7 ± 0.0	NB
P	<i>Gratiola aurea</i>	Golden Hedge-Hyssop				S1	3 Sensitive	3	10.9 ± 5.0	NB
P	<i>Pedicularis canadensis</i>	Canada Lousewort				S1	2 May Be At Risk	20	54.2 ± 0.0	NB
P	<i>Viola sagittata</i> <i>var.</i> <i>ovata</i>	Arrow-Leaved Violet				S1	2 May Be At Risk	36	73.5 ± 0.0	NS
P	<i>Alisma subcordatum</i>	Southern Water Plantain				S1	5 Undetermined	4	35.6 ± 0.0	NB
P	<i>Carex atlantica</i> <i>ssp.</i> <i>atlantica</i>	Atlantic Sedge				S1	2 May Be At Risk	1	76.9 ± 0.0	NB
P	<i>Carex backii</i>	Rocky Mountain Sedge				S1	2 May Be At Risk	6	74.4 ± 0.0	NB
P	<i>Carex cephaloidea</i>	Thin-leaved Sedge				S1	2 May Be At Risk	2	97.7 ± 0.0	NB
P	<i>Carex merritt-feraldii</i>	Merritt Fernald's Sedge				S1	2 May Be At Risk	2	72.8 ± 0.0	NB
P	<i>Carex saxatilis</i>	Russet Sedge				S1	2 May Be At Risk	13	6.7 ± 10.0	NB
P	<i>Carex scirpoidea</i>	Scirpuslike Sedge				S1	2 May Be At Risk	6	71.9 ± 0.0	NB
P	<i>Carex sterilis</i>	Sterile Sedge				S1	2 May Be At Risk	1	94.9 ± 0.0	NB
P	<i>Carex grisea</i>	Inflated Narrow-leaved Sedge				S1	2 May Be At Risk	10	44.2 ± 0.0	NB
P	<i>Cyperus diandrus</i>	Low Flatsedge				S1	2 May Be At Risk	7	79.6 ± 1.0	NB
P	<i>Cyperus lupulinus</i>	Hop Flatsedge				S1	2 May Be At Risk	6	67.3 ± 0.0	NB
P	<i>Cyperus lupulinus</i> <i>ssp.</i> <i>macilentus</i>	Hop Flatsedge				S1	2 May Be At Risk	16	66.0 ± 0.0	NB
P	<i>Eleocharis olivacea</i>	Yellow Spikerush				S1	2 May Be At Risk	4	89.2 ± 1.0	NB
P	<i>Rhynchospora</i> <i>capillacea</i>	Slender Beakrush				S1	2 May Be At Risk	3	92.9 ± 0.0	NB
P	<i>Sisyrinchium</i> <i>angustifolium</i>	Narrow-leaved Blue-eyed-grass				S1	2 May Be At Risk	11	11.0 ± 1.0	NB
P	<i>Juncus greenei</i>	Greene's Rush				S1	2 May Be At Risk	1	41.6 ± 0.0	NB
P	<i>Juncus subtilis</i>	Creeping Rush				S1	2 May Be At Risk	1	47.1 ± 5.0	NB
P	<i>Allium canadense</i>	Canada Garlic				S1	2 May Be At Risk	11	39.9 ± 0.0	NB
P	<i>Goodyera pubescens</i>	Downy Rattlesnake-Plantain				S1	2 May Be At Risk	6	85.4 ± 0.0	NB
P	<i>Malaxis brachypoda</i>	White Adder's-Mouth				S1	2 May Be At Risk	4	79.9 ± 10.0	NB
P	<i>Platanthera flava</i> <i>var.</i> <i>herbiola</i>	Pale Green Orchid				S1	2 May Be At Risk	15	54.5 ± 0.0	NB
P	<i>Platanthera</i> <i>macrophylla</i>	Large Round-Leaved Orchid				S1	2 May Be At Risk	2	73.9 ± 1.0	NB
P	<i>Spiranthes casei</i>	Case's Ladies'-Tresses				S1	2 May Be At Risk	6	91.3 ± 0.0	NB
P	<i>Bromus pubescens</i>	Hairy Wood Brome Grass				S1	5 Undetermined	6	67.6 ± 0.0	NB
P	<i>Cinna arundinacea</i>	Sweet Wood Reed Grass				S1	2 May Be At Risk	22	48.9 ± 0.0	NB
P	<i>Danthonia compressa</i>	Flattened Oat Grass				S1	2 May Be At Risk	8	75.1 ± 1.0	NB
P	<i>Dichanthelium</i> <i>dichotomum</i>	Forked Panic Grass				S1	2 May Be At Risk	19	30.7 ± 1.0	NB
P	<i>Festuca subverticillata</i>	Nodding Fescue				S1	2 May Be At Risk	1	99.4 ± 1.0	NS
P	<i>Glyceria obtusa</i>	Atlantic Manna Grass				S1	2 May Be At Risk	6	36.3 ± 0.0	NB
P	<i>Sporobolus compositus</i>	Rough Dropseed				S1	2 May Be At Risk	17	92.5 ± 0.0	NB
P	<i>Potamogeton friesii</i>	Fries' Pondweed				S1	2 May Be At Risk	6	6.9 ± 5.0	NB
P	<i>Potamogeton nodosus</i>	Long-leaved Pondweed				S1	2 May Be At Risk	4	72.7 ± 0.0	NB
P	<i>Potamogeton</i> <i>strictifolius</i>	Straight-leaved Pondweed				S1	2 May Be At Risk	2	25.6 ± 0.0	NB
P	<i>Xyris difformis</i>	Bog Yellow-eyed-grass				S1	5 Undetermined	3	14.9 ± 0.0	NB
P	<i>Asplenium ruta-muraria</i> <i>var. cryptolepis</i>	Wallrue Spleenwort				S1	2 May Be At Risk	3	18.5 ± 0.0	NB
P	<i>Cystopteris laurentiana</i>	Laurentian Bladder Fern				S1	2 May Be At Risk	1	73.9 ± 1.0	NB
P	<i>Botrychium oneidense</i>	Blunt-lobed Moonwort				S1	2 May Be At Risk	4	53.4 ± 0.0	NB
P	<i>Botrychium rugulosum</i>	Rugulose Moonwort				S1	2 May Be At Risk	1	76.6 ± 1.0	NB

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P	<i>Schizaea pusilla</i>	Little Curlygrass Fern				S1	2 May Be At Risk	27	9.0 ± 0.0	NB
P	<i>Hieracium kalmii</i> var. <i>fasciculatum</i>	Kalm's Hawkweed				S1?	5 Undetermined	6	70.3 ± 0.0	NB
P	<i>Cuscuta campestris</i>	Field Dodder				S1?	2 May Be At Risk	3	72.0 ± 10.0	NB
P	<i>Drosera rotundifolia</i> var. <i>comosa</i>	Round-leaved Sundew				S1?	5 Undetermined	5	52.8 ± 1.0	NB
P	<i>Carex laxiflora</i>	Loose-Flowered Sedge				S1?	5 Undetermined	2	76.2 ± 5.0	NS
P	<i>Wolffia columbiana</i>	Columbian Watermeal				S1?	2 May Be At Risk	5	69.3 ± 0.0	NB
P	<i>Rumex aquaticus</i> var. <i>fenestratus</i>	Western Dock				S1S2	2 May Be At Risk	1	78.8 ± 1.0	NB
P	<i>Saxifraga virginensis</i>	Early Saxifrage				S1S2	2 May Be At Risk	14	91.2 ± 0.0	NB
P	<i>Potamogeton bicupulatus</i>	Snailseed Pondweed				S1S2	2 May Be At Risk	5	26.3 ± 0.0	NB
P	<i>Selaginella rupestris</i>	Rock Spikemoss				S1S2	2 May Be At Risk	27	74.0 ± 1.0	NB
P	<i>Thelypteris simulata</i>	Bog Fern				S1S2	2 May Be At Risk	7	71.9 ± 0.0	NB
P	<i>Cuscuta cephalanthi</i>	Buttonbush Dodder				S1S3	2 May Be At Risk	2	8.1 ± 1.0	NB
P	<i>Listera australis</i>	Southern Twayblade			Endangered	S2	1 At Risk	15	82.9 ± 0.0	NB
P	<i>Osmorhiza longistylis</i>	Smooth Sweet Cicely				S2	3 Sensitive	3	73.9 ± 0.0	NB
P	<i>Sanicula odorata</i>	Clustered Sanicle				S2	2 May Be At Risk	1	98.4 ± 0.0	NB
P	<i>Pseudognaphalium macounii</i>	Macoun's Cudweed				S2	3 Sensitive	8	8.3 ± 0.0	NB
P	<i>Solidago simplex</i> var. <i>racemosa</i>	Sticky Goldenrod				S2	2 May Be At Risk	12	92.0 ± 0.0	NB
P	<i>Ionactis linariifolius</i>	Stiff Aster				S2	3 Sensitive	1	89.9 ± 0.0	NB
P	<i>Symphotrichum racemosum</i>	Small White Aster				S2	3 Sensitive	8	40.9 ± 0.0	NB
P	<i>Impatiens pallida</i>	Pale Jewelweed				S2	2 May Be At Risk	3	72.4 ± 0.0	NB
P	<i>Alnus serrulata</i>	Smooth Alder				S2	3 Sensitive	28	48.9 ± 0.0	NB
P	<i>Arabis drummondii</i>	Drummond's Rockcress				S2	3 Sensitive	20	7.4 ± 1.0	NB
P	<i>Sagina nodosa</i>	Knotted Pearlwort				S2	3 Sensitive	15	31.4 ± 1.0	NB
P	<i>Sagina nodosa</i> ssp. <i>borealis</i>	Knotted Pearlwort				S2	3 Sensitive	2	14.8 ± 0.0	NB
P	<i>Stellaria longifolia</i>	Long-leaved Starwort				S2	3 Sensitive	6	7.5 ± 10.0	NB
P	<i>Atriplex franktonii</i>	Frankton's Saltbush				S2	4 Secure	3	50.6 ± 1.0	NB
P	<i>Chenopodium rubrum</i>	Red Pigweed				S2	3 Sensitive	4	4.7 ± 0.0	NB
P	<i>Hypericum dissimulatum</i>	Disguised St John's-wort				S2	3 Sensitive	6	47.4 ± 1.0	NB
P	<i>Triosteum aurantiacum</i>	Orange-fruited Tinker's Weed				S2	3 Sensitive	6	93.1 ± 0.0	NB
P	<i>Viburnum lentago</i>	Nannyberry				S2	4 Secure	82	79.4 ± 0.0	NB
P	<i>Viburnum recognitum</i>	Northern Arrow-Wood				S2	4 Secure	138	52.8 ± 0.0	NB
P	<i>Astragalus eucosmus</i>	Elegant Milk-vetch				S2	2 May Be At Risk	10	29.7 ± 0.0	NB
P	<i>Oxytropis campestris</i> var. <i>johannensis</i>	Field Locoweed				S2	3 Sensitive	7	18.1 ± 50.0	NB
P	<i>Quercus macrocarpa</i>	Bur Oak				S2	2 May Be At Risk	48	7.4 ± 1.0	NB
P	<i>Gentiana linearis</i>	Narrow-Leaved Gentian				S2	3 Sensitive	5	85.4 ± 5.0	NB
P	<i>Myriophyllum humile</i>	Low Water Milfoil				S2	3 Sensitive	5	63.0 ± 0.0	NB
P	<i>Proserpinaca palustris</i> var. <i>crebra</i>	Marsh Mermaidweed				S2	3 Sensitive	21	38.0 ± 0.0	NB
P	<i>Hedeoma pulegioides</i>	American False Pennyroyal				S2	4 Secure	60	4.2 ± 0.0	NB
P	<i>Nuphar lutea</i> ssp. <i>rubrodiscalis</i>	Red-disked Yellow Pond-lily				S2	3 Sensitive	10	12.5 ± 1.0	NB
P	<i>Orobancha uniflora</i>	One-Flowered Broomrape				S2	3 Sensitive	13	20.0 ± 2.0	NB
P	<i>Polygala paucifolia</i>	Fringed Milkwort				S2	3 Sensitive	16	53.4 ± 1.0	NB
P	<i>Polygala senega</i>	Seneca Snakeroot				S2	3 Sensitive	2	97.8 ± 1.0	NB
P	<i>Polygonum amphibium</i> var. <i>emersum</i>	Water Smartweed				S2	3 Sensitive	39	33.2 ± 0.0	NB
P	<i>Polygonum careyi</i>	Carey's Smartweed				S2	3 Sensitive	15	30.0 ± 5.0	NB

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P	<i>Podostemum ceratophyllum</i>	Horn-leaved Riverweed				S2	3 Sensitive	22	44.8 ± 0.0	NB
P	<i>Anemone multifida</i>	Cut-leaved Anemone				S2	3 Sensitive	1	93.3 ± 0.0	NB
P	<i>Hepatica nobilis</i> var. <i>obtusata</i>	Round-lobed Hepatica				S2	3 Sensitive	36	45.2 ± 1.0	NB
P	<i>Ranunculus flabellaris</i>	Yellow Water Buttercup				S2	4 Secure	17	45.7 ± 0.0	NB
P	<i>Ranunculus longirostris</i>	Eastern White Water-Crowfoot				S2	5 Undetermined	5	65.3 ± 1.0	NB
P	<i>Crataegus scabrada</i>	Rough Hawthorn				S2	3 Sensitive	7	18.4 ± 0.0	NB
P	<i>Crataegus succulenta</i>	Fleshy Hawthorn				S2	3 Sensitive	1	85.8 ± 5.0	NB
P	<i>Cephalanthus occidentalis</i>	Common Buttonbush				S2	3 Sensitive	39	61.7 ± 0.0	NB
P	<i>Salix candida</i>	Sage Willow				S2	3 Sensitive	3	93.8 ± 1.0	NB
P	<i>Agalinis neoscotica</i>	Nova Scotia Agalinis				S2	3 Sensitive	31	70.8 ± 0.0	NB
P	<i>Euphrasia randii</i>	Rand's Eyebright				S2	2 May Be At Risk	23	14.7 ± 0.0	NB
P	<i>Scrophularia lanceolata</i>	Lance-leaved Figwort				S2	3 Sensitive	5	28.1 ± 5.0	NB
P	<i>Dirca palustris</i>	Eastern Leatherwood				S2	2 May Be At Risk	5	91.3 ± 0.0	NB
P	<i>Phryma leptostachya</i>	American Lopseed				S2	3 Sensitive	2	95.9 ± 1.0	NB
P	<i>Verbena urticifolia</i>	White Vervain				S2	2 May Be At Risk	12	91.3 ± 1.0	NB
P	<i>Viola novae-angliae</i>	New England Violet				S2	3 Sensitive	5	32.8 ± 0.0	NB
P	<i>Symplocarpus foetidus</i>	Eastern Skunk Cabbage				S2	3 Sensitive	91	12.7 ± 1.0	NB
P	<i>Carex comosa</i>	Bearded Sedge				S2	2 May Be At Risk	5	75.2 ± 0.0	NS
P	<i>Carex granularis</i>	Limestone Meadow Sedge				S2	3 Sensitive	8	72.8 ± 5.0	NB
P	<i>Carex gynocrates</i>	Northern Bog Sedge				S2	3 Sensitive	5	75.1 ± 1.0	NB
P	<i>Carex hirtifolia</i>	Pubescent Sedge				S2	3 Sensitive	3	47.4 ± 0.0	NB
P	<i>Carex livida</i> var. <i>radicaulis</i>	Livid Sedge				S2	3 Sensitive	1	8.3 ± 2.0	NB
P	<i>Carex plantaginea</i>	Plantain-Leaved Sedge				S2	3 Sensitive	1	94.3 ± 0.0	NB
P	<i>Carex prairea</i>	Prairie Sedge				S2	3 Sensitive	1	81.2 ± 5.0	NS
P	<i>Carex rostrata</i>	Narrow-leaved Beaked Sedge				S2	3 Sensitive	2	76.2 ± 0.0	NB
P	<i>Carex salina</i>	Saltmarsh Sedge				S2	3 Sensitive	2	6.7 ± 1.0	NB
P	<i>Carex sprengei</i>	Longbeak Sedge				S2	3 Sensitive	3	68.5 ± 0.0	NB
P	<i>Carex tenuiflora</i>	Sparse-Flowered Sedge				S2	2 May Be At Risk	11	71.1 ± 0.0	NB
P	<i>Carex albicans</i> var. <i>emmonsii</i>	White-tinged Sedge				S2	3 Sensitive	4	17.2 ± 0.0	NB
P	<i>Cyperus squarrosus</i>	Awned Flatsedge				S2	3 Sensitive	31	37.3 ± 0.0	NB
P	<i>Eriophorum gracile</i>	Slender Cottongrass				S2	2 May Be At Risk	8	68.7 ± 0.0	NB
P	<i>Blysmus rufus</i>	Red Bulrush				S2	3 Sensitive	3	75.5 ± 0.0	NB
P	<i>Elodea nuttallii</i>	Nuttall's Waterweed				S2	3 Sensitive	8	32.1 ± 0.0	NB
P	<i>Allium tricoccum</i>	Wild Leek				S2	2 May Be At Risk	12	30.6 ± 0.0	NB
P	<i>Najas gracillima</i>	Thread-Like Naiad				S2	3 Sensitive	11	36.5 ± 0.0	NB
P	<i>Calypso bulbosa</i> var. <i>americana</i>	Calypso				S2	2 May Be At Risk	3	13.6 ± 0.0	NB
P	<i>Coeloglossum viride</i> var. <i>virescens</i>	Long-bracted Frog Orchid				S2	2 May Be At Risk	5	41.9 ± 5.0	NB
P	<i>Cypripedium parviflorum</i> var. <i>makasin</i>	Small Yellow Lady's-Slipper				S2	2 May Be At Risk	5	2.3 ± 1.0	NB
P	<i>Spiranthes lucida</i>	Shining Ladies'-Tresses				S2	3 Sensitive	13	29.4 ± 0.0	NB
P	<i>Spiranthes ochroleuca</i>	Yellow Ladies'-tresses				S2	2 May Be At Risk	10	77.3 ± 5.0	NB
P	<i>Dichanthelium linearifolium</i>	Narrow-leaved Panic Grass				S2	3 Sensitive	15	44.9 ± 0.0	NB
P	<i>Elymus canadensis</i>	Canada Wild Rye				S2	2 May Be At Risk	13	70.7 ± 1.0	NB
P	<i>Leersia virginica</i>	White Cut Grass				S2	2 May Be At Risk	42	45.5 ± 0.0	NB
P	<i>Piptatherum canadense</i>	Canada Rice Grass				S2	3 Sensitive	5	49.7 ± 0.0	NB

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)	Prov
P	<i>Poa glauca</i>	Glaucous Blue Grass				S2	4 Secure	16	8.3 ± 2.0	NB
P	<i>Puccinellia phryganodes</i>	Creeping Alkali Grass				S2	3 Sensitive	15	27.1 ± 0.0	NB
P	<i>Schizachyrium scoparium</i>	Little Bluestem				S2	3 Sensitive	42	31.8 ± 0.0	NB
P	<i>Zizania aquatica</i> var. <i>aquatica</i>	Indian Wild Rice				S2	5 Undetermined	5	48.8 ± 0.0	NB
P	<i>Potamogeton vaseyi</i>	Vasey's Pondweed				S2	3 Sensitive	4	6.9 ± 1.0	NB
P	<i>Asplenium trichomanes</i>	Maidenhair Spleenwort				S2	3 Sensitive	17	4.7 ± 0.0	NB
P	<i>Woodwardia virginica</i>	Virginia Chain Fern				S2	3 Sensitive	14	75.3 ± 1.0	NB
P	<i>Woodsia alpina</i>	Alpine Cliff Fern				S2	3 Sensitive	8	19.0 ± 0.0	NB
P	<i>Selaginella selaginoides</i>	Low Spikemoss				S2	3 Sensitive	12	8.3 ± 6.0	NB
P	<i>Toxicodendron radicans</i>	Poison Ivy				S2?	3 Sensitive	15	31.0 ± 0.0	NB
P	<i>Symphotrichum novi-belgii</i> var. <i>crenifolium</i>	New York Aster				S2?	5 Undetermined	8	9.3 ± 0.0	NB
P	<i>Humulus lupulus</i> var. <i>lupuloides</i>	Common Hop				S2?	3 Sensitive	4	80.7 ± 0.0	NB
P	<i>Rubus recurvicaulis</i>	Arching Dewberry				S2?	4 Secure	5	17.9 ± 5.0	NB
P	<i>Galium obtusum</i>	Blunt-leaved Bedstraw				S2?	4 Secure	4	49.0 ± 1.0	NB
P	<i>Salix myricoides</i>	Bayberry Willow				S2?	3 Sensitive	8	72.8 ± 0.0	NB
P	<i>Carex vacillans</i>	Estuarine Sedge				S2?	3 Sensitive	4	63.8 ± 1.0	NB
P	<i>Platanthera huronensis</i>	Fragrant Green Orchid				S2?	5 Undetermined	2	88.5 ± 0.0	NB
P	<i>Solidago altissima</i>	Tall Goldenrod				S2S3	4 Secure	6	29.0 ± 1.0	NB
P	<i>Barbarea orthoceras</i>	American Yellow Rocket				S2S3	3 Sensitive	2	78.8 ± 10.0	NB
P	<i>Ceratophyllum echinatum</i>	Prickly Hornwort				S2S3	3 Sensitive	16	28.4 ± 0.0	NB
P	<i>Callitriche hermaphroditica</i>	Northern Water-starwort				S2S3	4 Secure	10	34.4 ± 1.0	NB
P	<i>Lonicera oblongifolia</i>	Swamp Fly Honeysuckle				S2S3	3 Sensitive	16	11.1 ± 6.0	NB
P	<i>Elatine americana</i>	American Waterwort				S2S3	3 Sensitive	8	10.0 ± 1.0	NB
P	<i>Bartonia paniculata</i>	Branched Bartonia				S2S3	3 Sensitive	5	15.3 ± 0.0	NB
P	<i>Bartonia paniculata</i> ssp. <i>iodandra</i>	Branched Bartonia				S2S3	3 Sensitive	36	8.8 ± 0.0	NB
P	<i>Geranium robertianum</i>	Herb Robert				S2S3	4 Secure	28	8.4 ± 1.0	NB
P	<i>Myriophyllum quitense</i>	Andean Water Milfoil				S2S3	4 Secure	71	6.3 ± 0.0	NB
P	<i>Epilobium coloratum</i>	Purple-veined Willowherb				S2S3	3 Sensitive	7	10.2 ± 1.0	NB
P	<i>Rumex pallidus</i>	Seabeach Dock				S2S3	3 Sensitive	6	13.0 ± 0.0	NB
P	<i>Rubus pensilvanicus</i>	Pennsylvania Blackberry				S2S3	4 Secure	15	14.7 ± 0.0	NB
P	<i>Galium labradoricum</i>	Labrador Bedstraw				S2S3	3 Sensitive	7	52.5 ± 1.0	NB
P	<i>Valeriana uliginosa</i>	Swamp Valerian				S2S3	3 Sensitive	1	86.8 ± 1.0	NB
P	<i>Carex adusta</i>	Lesser Brown Sedge				S2S3	4 Secure	7	5.9 ± 1.0	NB
P	<i>Corallorhiza maculata</i> var. <i>occidentalis</i>	Spotted Coralroot				S2S3	3 Sensitive	4	72.8 ± 0.0	NB
P	<i>Corallorhiza maculata</i> var. <i>maculata</i>	Spotted Coralroot				S2S3	3 Sensitive	3	83.0 ± 1.0	NB
P	<i>Listera auriculata</i>	Auricled Twayblade				S2S3	3 Sensitive	9	3.2 ± 1.0	NB
P	<i>Spiranthes cernua</i>	Nodding Ladies'-Tresses				S2S3	3 Sensitive	22	41.5 ± 0.0	NB
P	<i>Eragrostis pectinacea</i>	Tufted Love Grass				S2S3	4 Secure	14	47.5 ± 1.0	NB
P	<i>Stuckenia filiformis</i> ssp. <i>alpina</i>	Thread-leaved Pondweed				S2S3	3 Sensitive	7	8.3 ± 0.0	NB
P	<i>Potamogeton praelongus</i>	White-stemmed Pondweed				S2S3	4 Secure	12	8.3 ± 1.0	NB
P	<i>Isoetes acadensis</i>	Acadian Quillwort				S2S3	3 Sensitive	9	39.7 ± 0.0	NB
P	<i>Ophioglossum pusillum</i>	Northern Adder's-tongue				S2S3	3 Sensitive	9	4.9 ± 1.0	NB
P	<i>Botrychium</i>	Swamp Moonwort				S2S3	3 Sensitive	1	88.7 ± 0.0	NB

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P	<i>tenebrosus</i>									
P	<i>Panax trifolius</i>	Dwarf Ginseng				S3	3 Sensitive	15	17.2 ± 0.0	NB
P	<i>Artemisia campestris</i>	Field Wormwood				S3	4 Secure	25	67.6 ± 0.0	NB
P	<i>Artemisia campestris ssp. caudata</i>	Field Wormwood				S3	4 Secure	78	62.2 ± 0.0	NB
P	<i>Erigeron hyssopifolius</i>	Hyssop-leaved Fleabane				S3	4 Secure	53	13.3 ± 0.0	NB
P	<i>Prenanthes racemosa</i>	Glaucous Rattlesnakeroot				S3	4 Secure	67	4.3 ± 0.0	NB
P	<i>Tanacetum bipinnatum ssp. huronense</i>	Lake Huron Tansy				S3	4 Secure	20	15.3 ± 1.0	NB
P	<i>Symphotrichum boreale</i>	Boreal Aster				S3	3 Sensitive	11	29.3 ± 0.0	NB
P	<i>Betula pumila</i>	Bog Birch				S3	4 Secure	21	60.2 ± 1.0	NB
P	<i>Arabis glabra</i>	Tower Mustard				S3	5 Undetermined	1	81.5 ± 0.0	NB
P	<i>Arabis hirsuta var. pycnocarpa</i>	Western Hairy Rockcress				S3	4 Secure	18	7.4 ± 0.0	NB
P	<i>Cardamine maxima</i>	Large Toothwort				S3	4 Secure	29	10.4 ± 0.0	NB
P	<i>Subularia aquatica var. americana</i>	Water Awlwort				S3	4 Secure	14	27.2 ± 0.0	NB
P	<i>Lobelia cardinalis</i>	Cardinal Flower				S3	4 Secure	357	47.9 ± 0.0	NB
P	<i>Stellaria humifusa</i>	Saltmarsh Starwort				S3	4 Secure	7	6.2 ± 0.0	NB
P	<i>Hudsonia tomentosa</i>	Woolly Beach-heath				S3	4 Secure	3	17.7 ± 0.0	NB
P	<i>Cornus amomum ssp. obliqua</i>	Pale Dogwood				S3	3 Sensitive	194	31.1 ± 0.0	NB
P	<i>Crassula aquatica</i>	Water Pygmyweed				S3	4 Secure	10	46.8 ± 0.0	NB
P	<i>Rhodiola rosea</i>	Roseroot				S3	4 Secure	58	8.0 ± 5.0	NB
P	<i>Penthorum sedoides</i>	Ditch Stonecrop				S3	4 Secure	69	38.0 ± 0.0	NB
P	<i>Elatine minima</i>	Small Waterwort				S3	4 Secure	29	13.3 ± 5.0	NB
P	<i>Astragalus alpinus var. brunetianus</i>	Alpine Milk-Vetch				S3	4 Secure	3	92.0 ± 0.0	NB
P	<i>Hedysarum alpinum</i>	Alpine Sweet-vetch				S3	4 Secure	2	30.0 ± 0.0	NB
P	<i>Gentianella amarella ssp. acuta</i>	Northern Gentian				S3	4 Secure	6	7.0 ± 0.0	NB
P	<i>Geranium bicknellii</i>	Bicknell's Crane's-bill				S3	4 Secure	8	3.8 ± 5.0	NB
P	<i>Myriophyllum farwellii</i>	Farwell's Water Milfoil				S3	4 Secure	23	13.3 ± 0.0	NB
P	<i>Myriophyllum heterophyllum</i>	Variable-leaved Water Milfoil				S3	4 Secure	51	13.4 ± 0.0	NB
P	<i>Myriophyllum verticillatum</i>	Whorled Water Milfoil				S3	4 Secure	21	13.1 ± 1.0	NB
P	<i>Stachys tenuifolia</i>	Smooth Hedge-Nettle				S3	3 Sensitive	12	31.4 ± 0.0	NB
P	<i>Teucrium canadense</i>	Canada Germander				S3	3 Sensitive	5	75.8 ± 1.0	NS
P	<i>Utricularia radiata</i>	Little Floating Bladderwort				S3	4 Secure	38	2.4 ± 0.0	NB
P	<i>Nuphar lutea ssp. pumila</i>	Small Yellow Pond-lily				S3	4 Secure	15	8.3 ± 0.0	NB
P	<i>Epilobium hornemannii</i>	Hornemann's Willowherb				S3	4 Secure	6	24.8 ± 0.0	NB
P	<i>Epilobium hornemannii ssp. hornemannii</i>	Hornemann's Willowherb				S3	4 Secure	1	92.9 ± 0.0	NB
P	<i>Epilobium strictum</i>	Downy Willowherb				S3	4 Secure	24	9.2 ± 5.0	NB
P	<i>Polygala sanguinea</i>	Blood Milkwort				S3	3 Sensitive	15	56.3 ± 0.0	NB
P	<i>Polygonum arifolium</i>	Halberd-leaved Tearthumb				S3	4 Secure	20	45.8 ± 0.0	NB
P	<i>Polygonum punctatum</i>	Dotted Smartweed				S3	4 Secure	2	70.5 ± 0.0	NB
P	<i>Polygonum punctatum var. confertiflorum</i>	Dotted Smartweed				S3	4 Secure	15	69.2 ± 2.0	NB
P	<i>Polygonum scandens</i>	Climbing False Buckwheat				S3	4 Secure	34	31.1 ± 0.0	NB
P	<i>Littorella uniflora</i>	American Shoreweed				S3	4 Secure	20	23.4 ± 0.0	NB
P	<i>Primula mistassinica</i>	Mistassini Primrose				S3	4 Secure	12	0.4 ± 1.0	NB
P	<i>Pyrola minor</i>	Lesser Pyrola				S3	4 Secure	4	27.9 ± 0.0	NB
P	<i>Clematis occidentalis</i>	Purple Clematis				S3	4 Secure	24	10.0 ± 5.0	NB

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P	<i>Ranunculus gmelinii</i>	Gmelin's Water Buttercup				S3	4 Secure	8	48.8 ± 0.0	NB
P	<i>Thalictrum venulosum</i>	Northern Meadow-rue				S3	4 Secure	77	16.1 ± 5.0	NB
P	<i>Amelanchier canadensis</i>	Canada Serviceberry				S3	4 Secure	16	19.1 ± 1.0	NB
P	<i>Rosa palustris</i>	Swamp Rose				S3	4 Secure	35	3.6 ± 1.0	NB
P	<i>Rubus occidentalis</i>	Black Raspberry				S3	4 Secure	19	50.3 ± 0.0	NB
P	<i>Sanguisorba canadensis</i>	Canada Burnet				S3	4 Secure	2	99.1 ± 0.0	NB
P	<i>Galium boreale</i>	Northern Bedstraw				S3	4 Secure	9	22.3 ± 1.0	NB
P	<i>Salix interior</i>	Sandbar Willow				S3	4 Secure	27	62.0 ± 0.0	NB
P	<i>Salix nigra</i>	Black Willow				S3	3 Sensitive	124	6.8 ± 1.0	NB
P	<i>Salix pedicellaris</i>	Bog Willow				S3	4 Secure	47	15.1 ± 1.0	NB
P	<i>Comandra umbellata</i>	Bastard's Toadflax				S3	4 Secure	1	75.1 ± 10.0	NB
P	<i>Parnassia glauca</i>	Fen Grass-of-Parnassus				S3	4 Secure	1	90.0 ± 10.0	NB
P	<i>Limosella australis</i>	Southern Mudwort				S3	4 Secure	10	79.2 ± 0.0	NB
P	<i>Veronica serpyllifolia ssp. humifusa</i>	Thyme-Leaved Speedwell				S3	4 Secure	4	83.9 ± 100.0	NB
P	<i>Boehmeria cylindrica</i>	Small-spike False-nettle				S3	3 Sensitive	129	48.4 ± 0.0	NB
P	<i>Pilea pumila</i>	Dwarf Clearweed				S3	4 Secure	30	40.7 ± 0.0	NB
P	<i>Viola adunca</i>	Hooked Violet				S3	4 Secure	8	64.9 ± 1.0	NB
P	<i>Viola nephrophylla</i>	Northern Bog Violet				S3	4 Secure	8	4.1 ± 0.0	NB
P	<i>Carex arcta</i>	Northern Clustered Sedge				S3	4 Secure	50	48.5 ± 0.0	NB
P	<i>Carex atratiformis</i>	Scabrous Black Sedge				S3	4 Secure	1	8.3 ± 0.0	NB
P	<i>Carex capillaris</i>	Hairlike Sedge				S3	4 Secure	10	8.3 ± 2.0	NB
P	<i>Carex chordorrhiza</i>	Creeping Sedge				S3	4 Secure	20	36.4 ± 1.0	NB
P	<i>Carex conoidea</i>	Field Sedge				S3	4 Secure	30	6.9 ± 1.0	NB
P	<i>Carex eburnea</i>	Bristle-leaved Sedge				S3	4 Secure	10	90.7 ± 0.0	NB
P	<i>Carex exilis</i>	Coastal Sedge				S3	4 Secure	86	2.4 ± 0.0	NB
P	<i>Carex garberi</i>	Garber's Sedge				S3	3 Sensitive	2	29.2 ± 0.0	NB
P	<i>Carex haydenii</i>	Hayden's Sedge				S3	4 Secure	40	9.2 ± 1.0	NB
P	<i>Carex lupulina</i>	Hop Sedge				S3	4 Secure	110	30.8 ± 0.0	NB
P	<i>Carex michauxiana</i>	Michaux's Sedge				S3	4 Secure	62	2.5 ± 0.0	NB
P	<i>Carex ormostachya</i>	Necklace Spike Sedge				S3	4 Secure	7	60.5 ± 1.0	NB
P	<i>Carex rosea</i>	Rosy Sedge				S3	4 Secure	23	29.1 ± 0.0	NB
P	<i>Carex tenera</i>	Tender Sedge				S3	4 Secure	48	30.5 ± 0.0	NB
P	<i>Carex tuckermanii</i>	Tuckerman's Sedge				S3	4 Secure	70	30.8 ± 0.0	NB
P	<i>Carex vaginata</i>	Sheathed Sedge				S3	3 Sensitive	9	80.9 ± 0.0	NB
P	<i>Carex wiegandii</i>	Wiegand's Sedge				S3	4 Secure	38	2.0 ± 0.0	NB
P	<i>Carex recta</i>	Estuary Sedge				S3	4 Secure	9	11.6 ± 0.0	NB
P	<i>Cyperus dentatus</i>	Toothed Flatsedge				S3	4 Secure	146	14.3 ± 0.0	NB
P	<i>Cyperus esculentus</i>	Perennial Yellow Nutsedge				S3	4 Secure	42	40.5 ± 0.0	NB
P	<i>Eleocharis intermedia</i>	Matted Spikerush				S3	4 Secure	3	87.1 ± 0.0	NB
P	<i>Eleocharis quinqueflora</i>	Few-flowered Spikerush				S3	4 Secure	4	16.9 ± 0.0	NB
P	<i>Rhynchospora capitellata</i>	Small-headed Beakrush				S3	4 Secure	8	46.0 ± 0.0	NB
P	<i>Rhynchospora fusca</i>	Brown Beakrush				S3	4 Secure	36	2.4 ± 0.0	NB
P	<i>Trichophorum clintonii</i>	Clinton's Clubrush				S3	4 Secure	30	13.3 ± 0.0	NB
P	<i>Schoenoplectus fluviatilis</i>	River Bulrush				S3	3 Sensitive	58	11.8 ± 0.0	NB
P	<i>Schoenoplectus torreyi</i>	Torrey's Bulrush				S3	4 Secure	31	5.7 ± 0.0	NB
P	<i>Lemna trisulca</i>	Star Duckweed				S3	4 Secure	22	19.7 ± 1.0	NB
P	<i>Triantha glutinosa</i>	Sticky False-Asphodel				S3	4 Secure	8	29.2 ± 0.0	NB
P	<i>Cypripedium reginae</i>	Showy Lady's-Slipper				S3	3 Sensitive	20	1.4 ± 0.0	NB
P	<i>Liparis loeselii</i>	Loesel's Twayblade				S3	4 Secure	16	5.3 ± 0.0	NB
P	<i>Platanthera blephariglottis</i>	White Fringed Orchid				S3	4 Secure	52	79.0 ± 0.0	NB

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)	Prov
P	<i>Platanthera grandiflora</i>	Large Purple Fringed Orchid				S3	3 Sensitive	31	6.3 ± 1.0	NB
P	<i>Bromus latiglumis</i>	Broad-Glumed Brome				S3	3 Sensitive	2	47.5 ± 0.0	NB
P	<i>Calamagrostis pickeringii</i>	Pickering's Reed Grass				S3	4 Secure	105	3.7 ± 0.0	NB
P	<i>Dichanthelium depauperatum</i>	Starved Panic Grass				S3	4 Secure	27	46.9 ± 0.0	NB
P	<i>Muhlenbergia richardsonis</i>	Mat Muhly				S3	4 Secure	9	92.2 ± 0.0	NB
P	<i>Heteranthera dubia</i>	Water Stargrass				S3	4 Secure	59	7.6 ± 0.0	NB
P	<i>Potamogeton obtusifolius</i>	Blunt-leaved Pondweed				S3	4 Secure	16	15.6 ± 0.0	NB
P	<i>Potamogeton richardsonii</i>	Richardson's Pondweed				S3	3 Sensitive	16	8.3 ± 1.0	NB
P	<i>Xyris montana</i>	Northern Yellow-Eyed-Grass				S3	4 Secure	27	3.7 ± 0.0	NB
P	<i>Zannichellia palustris</i>	Horned Pondweed				S3	4 Secure	5	6.1 ± 0.0	NB
P	<i>Adiantum pedatum</i>	Northern Maidenhair Fern				S3	4 Secure	7	7.3 ± 1.0	NB
P	<i>Cryptogramma stelleri</i>	Steller's Rockbrake				S3	4 Secure	2	27.4 ± 1.0	NB
P	<i>Asplenium trichomanes-ramosum</i>	Green Spleenwort				S3	4 Secure	18	0.5 ± 1.0	NB
P	<i>Dryopteris fragrans</i> var. <i>remotiuscula</i>	Fragrant Wood Fern				S3	4 Secure	25	4.7 ± 0.0	NB
P	<i>Dryopteris goldiana</i>	Goldie's Woodfern				S3	3 Sensitive	5	95.5 ± 5.0	NB
P	<i>Woodsia glabella</i>	Smooth Cliff Fern				S3	4 Secure	40	37.6 ± 1.0	NB
P	<i>Equisetum palustre</i>	Marsh Horsetail				S3	4 Secure	6	74.5 ± 10.0	NB
P	<i>Isoetes tuckermanii</i>	Tuckerman's Quillwort				S3	4 Secure	28	22.3 ± 0.0	NB
P	<i>Lycopodium sabinifolium</i>	Ground-Fir				S3	4 Secure	11	6.4 ± 1.0	NB
P	<i>Huperzia appalachiana</i>	Appalachian Fir-Clubmoss				S3	3 Sensitive	16	9.2 ± 1.0	NB
P	<i>Botrychium dissectum</i>	Cut-leaved Moonwort				S3	4 Secure	26	7.1 ± 0.0	NB
P	<i>Botrychium lanceolatum</i> var. <i>angustisegmentum</i>	Lance-Leaf Grape-Fern				S3	3 Sensitive	7	4.5 ± 0.0	NB
P	<i>Botrychium simplex</i>	Least Moonwort				S3	4 Secure	9	71.8 ± 0.0	NB
P	<i>Polypodium appalachianum</i>	Appalachian Polypody				S3	4 Secure	15	7.5 ± 1.0	NB
P	<i>Utricularia resupinata</i>	Inverted Bladderwort				S3?	4 Secure	19	2.6 ± 0.0	NB
P	<i>Crataegus submollis</i>	Quebec Hawthorn				S3?	3 Sensitive	18	7.3 ± 1.0	NB
P	<i>Mertensia maritima</i>	Sea Lungwort				S3S4	4 Secure	29	9.9 ± 2.0	NB
P	<i>Lobelia kalmii</i>	Brook Lobelia				S3S4	4 Secure	18	10.3 ± 1.0	NB
P	<i>Suaeda calceoliformis</i>	Horned Sea-blite				S3S4	4 Secure	6	7.9 ± 1.0	NB
P	<i>Myriophyllum sibiricum</i>	Siberian Water Milfoil				S3S4	4 Secure	29	6.1 ± 0.0	NB
P	<i>Stachys pilosa</i>	Hairy Hedge-Nettle				S3S4	5 Undetermined	5	52.7 ± 1.0	NB
P	<i>Utricularia gibba</i>	Humped Bladderwort				S3S4	4 Secure	32	2.4 ± 0.0	NB
P	<i>Rumex maritimus</i>	Sea-Side Dock				S3S4	4 Secure	1	70.6 ± 1.0	NB
P	<i>Potentilla arguta</i>	Tall Cinquefoil				S3S4	4 Secure	32	29.2 ± 0.0	NB
P	<i>Rubus chamaemorus</i>	Cloudberry				S3S4	4 Secure	56	4.0 ± 0.0	NB
P	<i>Geocaulon lividum</i>	Northern Comandra				S3S4	4 Secure	9	8.7 ± 0.0	NB
P	<i>Juniperus horizontalis</i>	Creeping Juniper				S3S4	4 Secure	23	6.9 ± 1.0	NB
P	<i>Cladium mariscoides</i>	Smooth Twigrush				S3S4	4 Secure	40	3.7 ± 0.0	NB
P	<i>Eriophorum russeolum</i>	Russet Cottongrass				S3S4	4 Secure	5	6.4 ± 1.0	NB
P	<i>Triglochin gaspensis</i>	Gasp [r Arrowgrass				S3S4	4 Secure	18	6.8 ± 1.0	NB
P	<i>Spirodela polyrrhiza</i>	Great Duckweed				S3S4	4 Secure	36	38.7 ± 0.0	NB
P	<i>Corallorhiza maculata</i>	Spotted Coralroot				S3S4	3 Sensitive	15	9.2 ± 1.0	NB
P	<i>Calamagrostis stricta</i>	Slim-stemmed Reed Grass				S3S4	4 Secure	4	7.3 ± 2.0	NB
P	<i>Distichlis spicata</i>	Salt Grass				S3S4	4 Secure	3	78.4 ± 0.0	NB
P	<i>Potamogeton oakesianus</i>	Oakes' Pondweed				S3S4	4 Secure	49	5.1 ± 0.0	NB

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)	Prov
P	<i>Montia fontana</i>	Water Blinks				SH	2 May Be At Risk	1	54.0 ± 1.0	NB
P	<i>Solidago caesia</i>	Blue-stemmed Goldenrod				SX	0.1 Extirpated	2	10.3 ± 1.0	NB
P	<i>Celastrus scandens</i>	Climbing Bittersweet				SX	0.1 Extirpated	2	89.7 ± 100.0	NB
P	<i>Carex swanii</i>	Swan's Sedge				SX	0.1 Extirpated	59	74.6 ± 0.0	NS

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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.

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TABLE G-4-1: SPECIES HABITAT COMPARISON

Flora			
Common Name	Scientific Name	Preferred Habitat	Habitat Present
American False Pennyroyal	<i>Hedeoma pulegioides</i>	Anthropogenic habitats, cliffs, balds, ledges, meadows and fields and ridges (1).	Yes
Auricled Twayblade	<i>Listera auriculata</i>	Most commonly grows beneath alders in sand or moss along the edges of rocky streams or rivers (2).	No
Bicknell's Crane's-bill	<i>Geranium bicknellii</i>	Anthropogenic habitats, forests, ridges or ledges, talus and rocky slopes (1).	Yes
Brown Beakrush	<i>Rhynchospora fusca</i>	Bogs, shores of rivers or lakes (1). Springy or boggy ground (2).	No
Cloudberry	<i>Rubus chamaemorus</i>	Bogs, shrublands or thickets (1). In acid bogs (2).	No
Coastal Sedge	<i>Carex exilis</i>	Bogs, fens, meadows and fields, ridges or ledges, shores of rivers or lakes, swamps (1). In sphagnum bogs often in calcareous areas (2).	No
Fragrant Wood Fern	<i>Dryopteris fragrans var. remotiuscula</i>	Cliffs, balds, ledges or ridges (1).	No
Geniculate Four-tooth Moss	<i>Tetraphis geniculata</i>	Well decayed wood, stumps, logs, rarely on rock (3).	Yes
Glaucous Rattlesnakeroot	<i>Prenanthes racemosa</i>	Sandy alluvial soils of stream banks, wet meadows, tall-grass prairies, fens, marshy flats, bogs (3).	Yes
Green Spleenwort	<i>Asplenium trichomanes-ramosum</i>	Forests; crevices in rocks (4). Calcareous ledges (2).	Yes
Hooked Scorpion Moss	<i>Scorpidium scorpioides</i>	Fens, pools, lakeshores, submerged in lakes; low to high elevations (3).	No
Humped Bladderwort	<i>Utricularia gibba</i>	Lakes or ponds and edges of wetlands (1). Shallow water and bogs (2).	No
Inverted Bladderwort	<i>Utricularia resupinata</i>	Lakes or ponds, shores of rivers or lakes, edges of wetlands (1). Damp shores and in shallow water (2).	No
Lance-Leaf Grape-Fern	<i>Botrychium lanceolatum var. angustisegmentum</i>	Rich hardwoods and clearings (2).	No
Little Floating Bladderwort	<i>Utricularia radiata</i>	Lakes or ponds and rivers or streams (1). In rocky beach pools (2).	No
Maidenhair Spleenwort	<i>Asplenium trichomanes</i>	Cliffs, balds, ledges, ridges and talus and rocky slopes (1). On shaded calcareous ledges (2).	Yes
Meadow Plait Moss	<i>Hypnum pratense</i>	Exposed places such as rich fens, Carex meadows and seeps (5).	Yes
Michaux's Sedge	<i>Carex michauxiana</i>	Bogs, fens, shores of rivers or lakes (1). Ledge crevices, dry meadows, sandy thickets and gravelly banks (2).	Yes
Mistassini Primrose	<i>Primula mistassinica</i>	Ridges, ledges and shores of rivers or lakes (1).	No
Northern Adder's-tongue	<i>Ophioglossum pusillum</i>	Anthropogenic or disturbed habitats, marshes, meadows, fields and edges of wetlands (1). On open slopes, edges of old logging roads (2).	Yes
Northern Bog Violet	<i>Viola nephrophylla</i>	Fens, meadows, fields and shores of rivers and lakes (1). Scattered on gravelly shores and wet fens (2).	No
Northern Yellow-Eyed-Grass	<i>Xyris montana</i>	Anthropogenic or disturbed habitats, bogs, fens, shores of rivers and lakes, edges of wetlands (1).	Yes
Pickering's Reed Grass	<i>Calamagrostis pickeringii</i>	Bogs, meadows, fields and shores of rivers and lakes (1). In boggy heaths and wet, sandy, open woods (2).	No
Red Pigweed	<i>Chenopodium rubrum</i>	Anthropogenic or disturbed habitats, brackish or salt marshes and flats. Intertidal, subtidal and open ocean (1). Scattered along the coast in salt marshes and on saline soils (2).	No
Showy Lady's-Slipper	<i>Cypripedium reginae</i>	Fens, swamps and edges of wetlands (1). In calcareous bogs, fens and boggy meadows, and edges of swamps (2).	Yes
Small Yellow Lady's-Slipper	<i>Cypripedium parviflorum var. makasin</i>	Fields and open areas, wet areas, moist woods, bogs (6).	Yes
Smooth Twigrush	<i>Cladium mariscoides</i>	Bogs, fens, floodplain (river or stream floodplains), in lakes and ponds. Shores of rivers or lakes (1).	Yes
Spurred Threadwort	<i>Cephaloziella elachista</i>	Almost exclusively in very acidic bogs (8).	No
Swamp Rose	<i>Rosa palustris</i>	Marshes, meadows, fields, shores of rivers and lakes, swamps, edges of wetlands (1).	Yes
Three-ranked Moss	<i>Calliergon trifarium</i>	Very wet, highly calcareous fen habitats, often emergent from the shallow water of pool (7).	Yes
Wiegand's Sedge	<i>Carex wiegandii</i>	Bogs, forests, meadows and fields (1). Sphagnum bogs, boggy thickets and along shores (2).	Yes

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APPENDIX H

VEC: Archaeological and Heritage Resources

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1.0 RATIONALE FOR THE VALUED ENVIRONMENTAL COMPONENT (VEC)

Archaeological resources are considered to be material remains of past human activity which are of a historical, cultural or scientific interest, whereas heritage resources are considered natural or cultural features that have been recognized for heritage values (Parks Can, 2017). Any project that involves the disturbance of surface or sub-surface ground should be investigated for archaeological and heritage resources. In New Brunswick, streams and rivers have historically been used for food gathering, water resources and transportation. As such, the lands on both sides of Mill Creek, and other tributaries of the Saint John River have an elevated potential for archeological and/or heritage resources.

2.0 BOUNDARIES FOR THE ENVIRONMENTAL EFFECTS ASSESSMENT

2.1 Spatial Boundaries

The assessment of archaeological and heritage resources has been completed for two spatial boundaries:

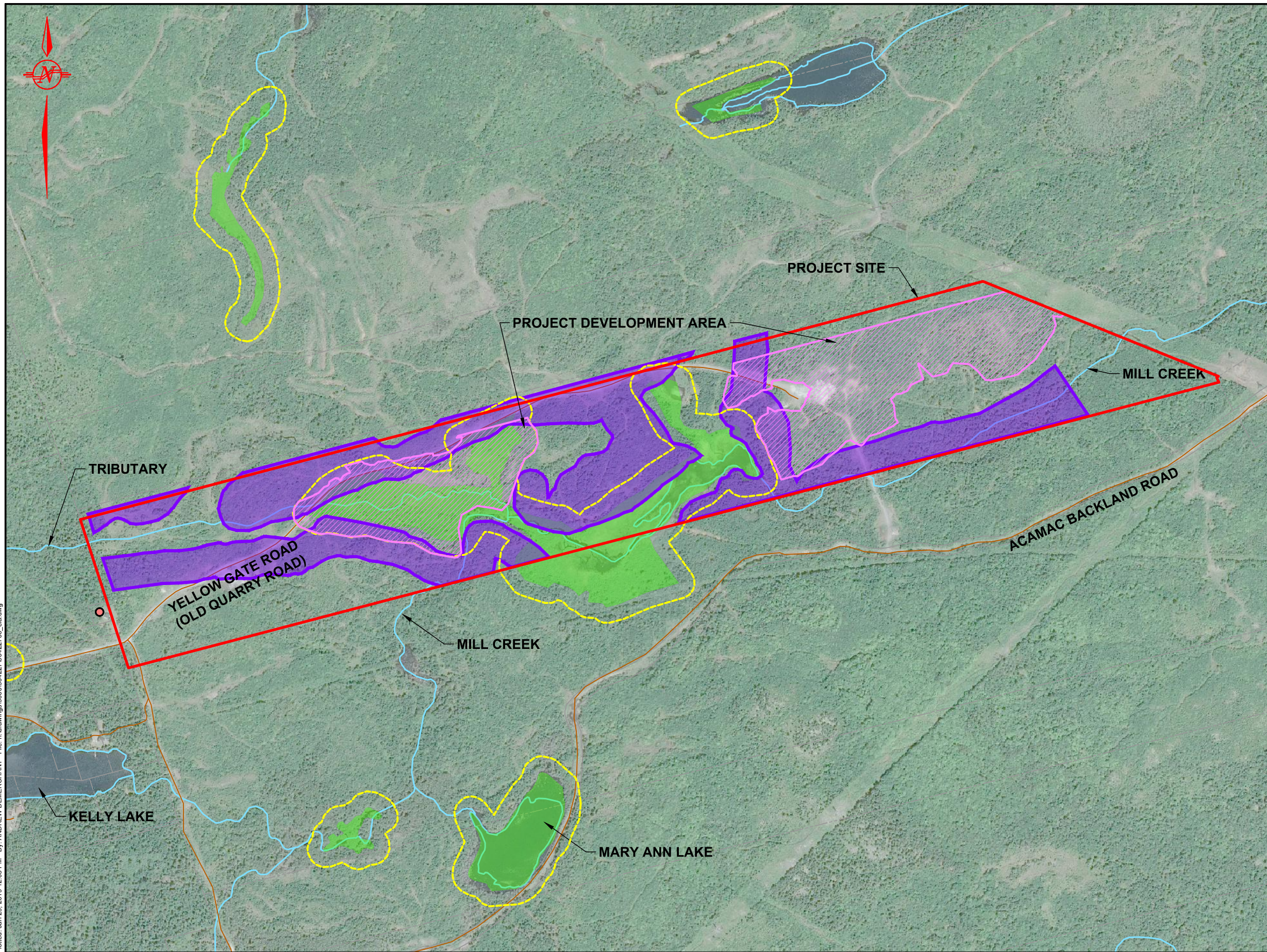
- The Project Development Area (PDA) is defined as the footprint of ground disturbance required for the Project activities (Figure H-1); and
- The Project Site as the southwestern portion of PID 00289595 as investigated during the baseline environmental studies (Figure H-1).

2.2 Temporal Boundaries




The assessment of the archaeological and heritage resources has been completed for the following temporal boundaries:

- The construction phase of the Project;
- The operational phase of the Project; and
- The reclamation phase of the Project.

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LEGEND


	REGULATED WETLAND (GeoNB)
	30m WETLAND BUFFER
	AREA OF HIGH ARCHAEOLOGICAL POTENTIAL

Drawn By	AGSD	Checked By	JH
Calculations By		Checked By	

Date
JAN, 2019

Project
ENVIRONMENTAL IMPACT ASSESSMENT
CRANE MOUNTAIN LANDFILL CLAY AND
AGGREGATE QUARRY

Drawing
ARCHAEOLOGY VEC SPATIAL
BOUNDARIES

Scale
1:7500


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3.0 METHODOLOGY

A two-phased approach was used to determine the existing archaeological and heritage resources conditions and any potential interactions with the Project, including:

- A desktop review of all existing information for archaeological and heritage resources within the Project Site; and
- A pedestrian survey, to determine the potential and/or extent of any heritage or archaeological features within the Project Site.

Specific to the Environmental Impact Assessment (EIA) document, potential interactions or effects of the Project on the archaeological and heritage resources have been identified and are discussed. When residual effects are anticipated, the proposed methods for mitigating the potential effects have been presented.

Jason Jeandron of Archaeological Prospectors was retained by GEMTEC to complete the desktop review and field components of this valued environmental component (VEC). The pedestrian survey was completed on October 17, 2018.

4.0 DESCRIPTION OF EXISTING ENVIRONMENT

There are no archaeological sites recorded by the Archeological Services of New Brunswick in the vicinity of the proposed Project Site and a review of historic aerial imagery (1945) showed no extant cultural features within the Project Site. In the historical aerial photos (1945), a lake with two wooden dams spanning the outlet are visible in the southern portion of the Project Site. The lake is currently considered a wetland (Wetland 1 as described in Appendix G) and only remnants of the wooden dams were observed on-site in September and October, 2018. Evidence of historic forestry activities (*i.e.*, skidder tracks, logging roads, tree stumps, and historic garbage, *etc.*) were observed throughout the Project Site.

Watercourses and their riparian zones were important historically and were known to provide food, medicine and habitation. Given the proximity (1.5 kilometres) of the Project Site and PDA to the Saint John River and the current and historic watercourses within the Project Site, it is likely that the Project Site has an elevated potential for historical use by Indigenous peoples and for archaeological significance. In addition, the local topography with high ground surrounding wetlands and watercourses likely provided views for hunting and habitation.

Based on the findings of the desktop review and the pedestrian survey, an approximate 80 metre buffer zone was established around the historic lake basin (*i.e.*, Wetland 1) and around watercourses areas within the Project Site. The 80 metre zone was determined using provincial recommendations.

5.0 SUMMARY OF POTENTIAL EFFECTS

Potential effects to archaeological and heritage resources as a result of the Project are possible as portions of the PDA are considered to have high potential for archaeological findings and significance. Project activities that may interfere with surface and sub-surface heritage and archeological resources include the following:

- Vegetation clearing and grubbing (construction and operational phase);
- Watercourse re-alignment (construction phase);
- Ground disturbance and/or excavation for clay extraction (operational phase); and
- Blasting, drilling and excavation for the aggregate quarry (operational phase).

During the construction phase of the Project, the existing roadways may be enhanced to provide a suitable transportation network within the Project Site. The roadway enhancement will include building-up and widening the existing Yellow Gate Road (herein referred to, and known locally as “Old Quarry Road”) and the construction of new access roadways via the placement of fill. The roadway enhancement activities are not expected to interact with the sub-surface areas of the Project Site; therefore, are not expected to negatively affect archaeological and heritage resources and are not discussed further in this VEC assessment.

Blasting activities for the aggregate quarry during the operational phase of the Project are not expected to negatively affect archaeological and heritage resources as cultural remains and artifacts are not expected to be found within bedrock. Blasting events will be infrequent and conducted by a certified contractor in accordance to an Approval to Operate from NBDELG; therefore, the effects of blasting are not discussed further in this VEC assessment.

During the reclamation phase of the Project, the PDA will be graded and stabilized. Stockpiled material from the construction and operational phases of the Project may be utilized during the reclamation process. No new excavation or ground disturbance is expected during the reclamation phase. The enhanced roadways and re-aligned watercourse will likely remain as per the construction phase of the Project to minimize ground disturbance during reclamation. Following a partial in-fill of any remaining stockpiles, the clay extraction pit will be left to naturally impound surface water, with the exception of grading and stabilizing previously disturbed ground, additional ground disturbance in the PDA is not required. Given the unlikely potential for adverse effects, the archaeological and heritage resources during the reclamation phase are not discussed further in this VEC assessment.

5.1 Accidents, Malfunctions and Unplanned Events

There is a potential for accidents to occur during all phases of the Project. Accidents that may impact heritage and archeological resources within the Project Area, include:

- Fire; and
- Accidental release of chemicals or petroleum products (*i.e.*, excavation of contaminated soil).

6.0 PROPOSED MITIGATION MEASURES

The potential adverse effects and proposed mitigation measures to minimize the effects to archaeological and heritage resources during all phases of the Project are summarized in Table H-1. An Environmental Management Plan (EMP) will be developed prior to the commencement of the Project and the EMP will outline specific mitigation measures to follow during construction and operation phases to minimize adverse impacts to any archaeological and/or heritage resources. The EMP will also describe a protocol to be followed should archaeological and/or historic resources be discovered.

A test pitting program will be developed for all areas within the PDA that fall within the 80 metre buffer zone of the historic lake basin (*i.e.*, Wetland 1) and watercourses areas (Figure H-1). The specific locations and density of the proposed test pitting program will be determined in consultation with the Archaeological Services Branch of the New Brunswick Department of Tourism, Heritage and Culture (NBDTHC).

Table H-1 Summary of Mitigation Measures for Archaeological and Heritage Resources

Project Component	Summary of Potential Effects	Mitigation Measures
Archaeological and Heritage Resources	All Project Phases (Construction, Operational, Reclamation)	
	<ul style="list-style-type: none"> Ground disturbance could alter or destroy archeological artifacts. 	<ul style="list-style-type: none"> A test-pitting program will be implemented prior to any ground disturbance within the areas identified as being high potential for archeological significance; Existing vegetation will be retained whenever possible and tree/vegetation clearing will be kept to a minimum; and Areas to be excavated will be clearly marked to minimize the footprint within the PDA.
	Accidents, Malfunctions and Unplanned Events	
	<ul style="list-style-type: none"> Increased potential for contaminants to be released into water and/or soil through spills of fuels and lubricants from Project equipment. 	<ul style="list-style-type: none"> Equipment will be kept in good working order; and Emergency and spill response procedures will be in place prior to construction activities as per the EMP.
<ul style="list-style-type: none"> Fire. 	<ul style="list-style-type: none"> Emergency and spill response and procedures will be in place prior to construction activities. 	

7.0 SUMMARY OF POTENTIAL SIGNIFICANT RESIDUAL EFFECTS

A residual effect to the heritage and archeological resources VEC is considered to be the permanent alteration or destruction of any archaeological artifact or heritage structure(s), location, and/or landscape within the Project Site. In the event that the identified feature is unique to the community, or is known to be rare, the residual effect would be considered significant.

Portions of the Project Site have been identified as areas of high potential for archaeological findings of significance and as a result, the construction and operational phases of the Project may result in the disturbance of heritage and archeological resources. This interaction is considered to be non-significant as proposed mitigation measures are anticipated to minimize any adverse effects. The test pitting program will be conducted at appropriate intervals to determine the presence and/or extent of any archaeological artifact or heritage structure(s) within the high potential zone of the PDA. Depending on the findings of the test pitting survey, additional mitigation measures relative to construction, operation and reclamation activities may be required. The findings and potential additional mitigation measures will be discussed with the Archaeological Services Branch of the NBDTHC.

8.0 REFERENCES

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APPENDIX I

VEC: Land Use and Economy

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- I-1 Surrounding Land Use
- I-2 Federal Contaminated Sites Mapping

1.0 RATIONALE FOR THE VALUED ENVIRONMENTAL COMPONENT (VEC)

In order to assess any influence of the Project on land use and economy, six components have been identified for the valued environmental component (VEC):

- *Existing Land Use* describes the current residential, recreational, industrial, and commercial arrangements within proximity to the Project;
- *Transportation Patterns and Volume* describes any change in the local roadway structures, alignment and use as a result of the Project;
- *Navigable Waters* identifies any interactions with vessel traffic within the waterways contained within proximity to the Project, and any consideration to the federal *Navigation Protection Act*;
- The *Commercial, Recreational and Aboriginal (CRA)* fisheries - as defined under the federal *Fisheries Act* - and how the functions of these fisheries may be impacted by Project activities;
- *Local Economy and Local Socio-economic Structure* identifies any interactions with local industry (e.g., retail sales, service businesses, etc.) as a result of Project related activities; and
- *The Current Use of Land and Resources for Traditional Purpose by Aboriginal Persons* determines if any of the land and/or resources that may be impacted by the Project are currently used by Aboriginal persons. Traditional uses of lands may include activities such as: hunting, trapping, fishing and/or gathering by First Nations. Aboriginal engagement is not included in the VEC, but is addressed in Section 4.0 of the EIA registration document.

2.0 BOUNDARIES FOR THE ENVIRONMENTAL EFFECTS ASSESSMENT

2.1 Spatial Boundaries

The assessment of land use and economy has been completed for the following three spatial boundaries:

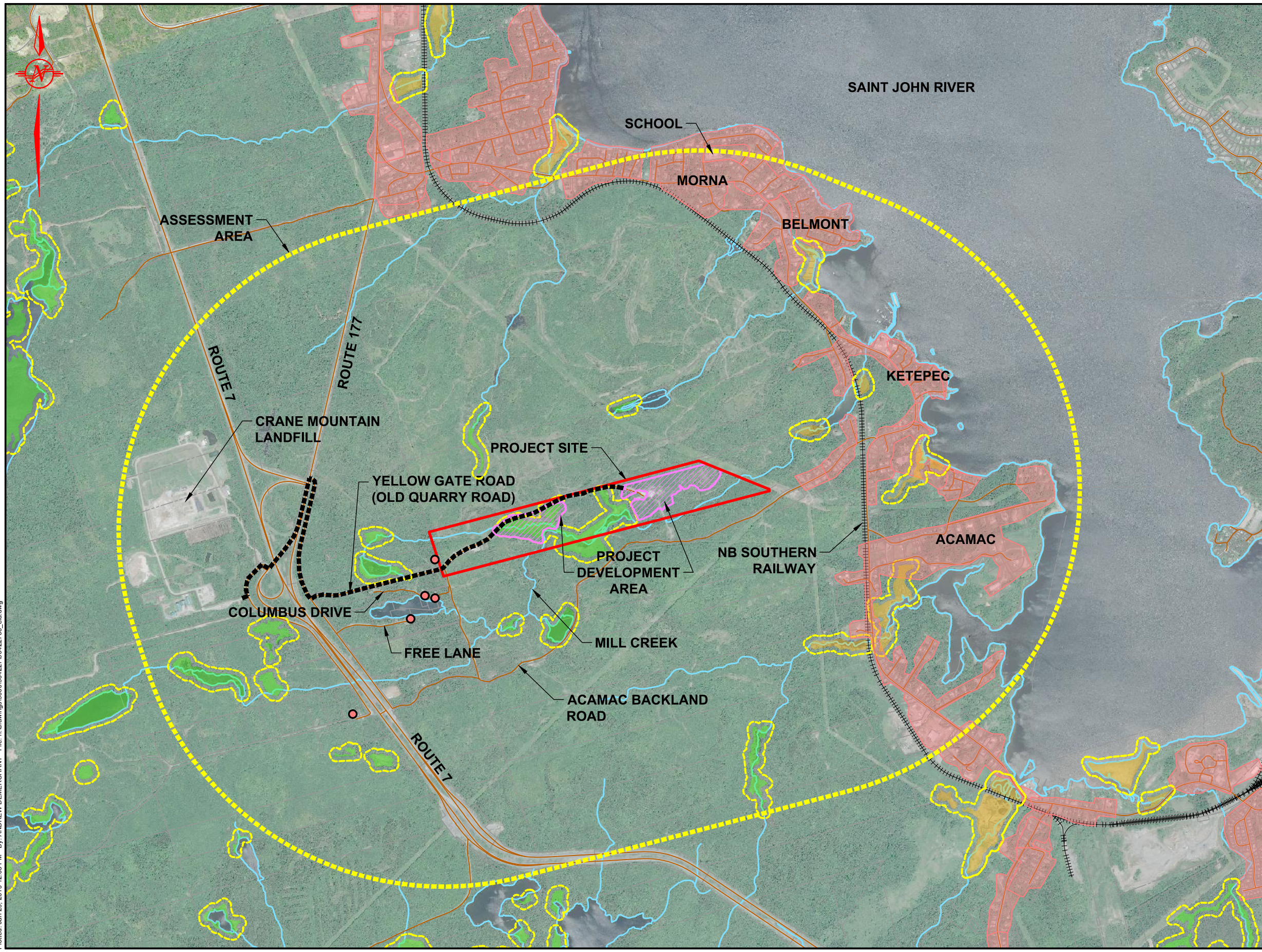
- The Project Development Area (PDA) is defined as the footprint of ground disturbance required for the Project activities (portion of PID 00289595; Figure I-1);
- The Project Site is defined as the southwestern portion of PID 00289595 as investigated during the environmental baseline studies (Figure I-1); and
- The Assessment Area considers the nearby residential communities (*i.e.*, Morna, Belmont, Ketepec, and Acamac). Generally, the Assessment Area encompasses a 2 kilometre (km) radius of the Project Site as presented in Figure I-1.

2.2 Temporal Boundaries

The assessment of land use and economy has been completed for the following temporal boundaries:

- The construction phase of the Project;
- The operational phase of the Project; and
- The reclamation phase of the Project.

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LEGEND

- DWELLING
- RESIDENTIAL AREA
- PROVINCIALY SIGNIFICANT WETLAND (GeoNB)
- REGULATED WETLAND (GeoNB)
- 30m WETLAND BUFFER
- PROPOSED HAULING ROUTE

NOTES:
 1) Residential areas have been adapted from NRCAN Canvec Residential Area mapping.

Drawn By AGSD	Checked By JH
Calculations By	Checked By

Date
JAN, 2019

Project
 ENVIRONMENTAL IMPACT ASSESSMENT
 CRANE MOUNTAIN LANDFILL CLAY AND
 AGGREGATE QUARRY

Drawing
 LAND USE VEC SPATIAL
 BOUNDARIES

Scale
 1:25000

File No. 90422706	Drawing I-1	Revision No. 0
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GEMTEC
 CONSULTING ENGINEERS
 AND SCIENTISTS

3.0 METHODOLOGY

A desktop review of available information relative to land use and economy was undertaken to determine the prevailing VEC conditions and any potential interaction with the Project.

Specific to the Environmental Impact Assessment (EIA) document, potential interactions or effects of the Project on land use and economy have been identified and are discussed in this document. Where residual effects are anticipated, the proposed methods for mitigating the potential effects have been presented.

3.1 Existing Land Use

3.1.1 Residential Land Use

The Service New Brunswick (SNB) Registry and Mapping of Real Property Information and Natural Resources Canada Canvec Residential Area mapping (NRCAN, 2018) was accessed to determine the presence of residential properties within the Assessment Area.

3.1.2 Recreational Land Use

The New Brunswick Federation of Snowmobile Clubs (NBFSC) mapping and New Brunswick All-Terrain Vehicle Federation (NBATVF) mapping was reviewed to determine the presence of any managed trails within the Project Site.

Other recreational activities (*i.e.*, boating, fishing, *etc.*) are discussed in Section 3.3 and Section 3.4 of this report.

3.1.3 Commercial and Industrial Land Use

The Treasury Board of Canada Secretariat maintains an inventory of federal contaminated sites. This inventory was reviewed, in conjunction with the SNB Planet, to determine the current and historical extent of commercial and/or industrial sites within and adjoining the Project Site.

SNB imagery and publicly available aerial photography (Google Earth) was also reviewed to determine commercial and industrial used within the Assessment Area.

Commercial fisheries are discussed in Section 3.4 of this report.

3.2 Transportation Patterns and Volume

A number of publicly accessible information sources including maps from the New Brunswick Department of Transportation and Infrastructure (NB DTI) were reviewed to obtain baseline information on the existing roadway network in proximity to the Project Site. Specifically;

- Maximum Gross Vehicle Weights Highway Map;
- Municipal Maps;

- Designated Highways Maps; and
- Google Earth Imagery.

3.3 Navigable Waters

The *Navigation Protection Act (NPA)* was reviewed to determine if Mill Creek or its tributaries require review under Transport Canada's Navigation Protection Program (NPP). The NPP administers and enforces the federal *NPA* and is a program that reviews and authorizes any work within navigable waters. In the *NPA*, work is defined as "any structure, device or thing - temporary or permanent - made by humans that is in, on, over, under, through or across any navigable water." Work under the *NPA* also includes the dumping of fill or the excavation of material from the bed of any navigable waterbody.

3.4 Commercial, Recreational and Aboriginal (CRA) Fisheries

CRA fisheries are regulated under the federal *Fisheries Act*, which is administered by Fisheries and Oceans Canada (DFO). CRA fisheries are defined by the *Fisheries Act* as follows:

- Commercial fisheries refer to fish harvested under the authority of a license for the purpose of sale, trade, or barter;
- Recreational fisheries refers to fish harvested under the authority of a license for personal use of the fish or for sport; and
- Aboriginal fisheries refers to fish harvested by an Aboriginal organization or any of its members for the purpose of using the fish as food, for social or ceremonial purposes or for purposes set out in an agreement entered into between DFO and the Aboriginal organization.

The *Fisheries Act* restricts work, undertakings or activities that result in "serious harm" to fish that are part of a CRA fishery, or to fish that support such a fishery. Serious harm is defined under section 2(2) of the *Fisheries Act* as "the death of fish or the permanent alteration to, or destruction of, fish habitat".

3.5 Local Economy

Publicly accessible information from the City of Saint John and Canada Census records was reviewed for the purposes of identifying indicators of the local economy.

3.6 Current Use of Land and Resources for Traditional Purpose by Aboriginal Persons

Any incidental sighting or evidence relative to the current use of land and resources for traditional purposes by Aboriginal persons was obtained during field investigation.

4.0 DESCRIPTION OF EXISTING ENVIRONMENT

The Project Site is located within the City of Saint John municipal limits, and is located west of Route 7, a provincial highway providing a main corridor between Saint John and Fredericton. The Project Site and PDA are currently accessed via the Acamac Backland Road and Yellow Gate Road (herein referred to, as locally known as “Old Quarry Road”) in a rural setting comprised of mixed forest stands, gravel roadways (Figure I-1). There is also a managed transmission line that adjoins the Project Site to the east.

4.1 Existing Land Use

4.1.1 Residential Land Use

Generally, the neighbouring residential properties are located to the east of the Project Site in the communities of Morna, Belmont, Ketepec, and Acamac (Figure I-1). Several dwellings (though some are seasonal use dwellings, such as cabins/camps) are located west of the Project Site and include:

- PID 00289488 - property adjoins the Project Site to the west, on Old Quarry Road;
- PID 00420901 and PID 00289496 - properties are located approximately 0.17 km and 0.12 km southwest of the Project Site, respectively, on Columbus Drive; and
- PID 00419143 - property is located approximately 0.32 km southwest of the Project Site, on Free Lane.

A list of all adjoining property uses is presented in Attachment I-1 and the surrounding residential areas and seasonal dwellings are presented in Figure I-1.

4.1.2 Recreational Land Use

Although the Project Site is a privately owned property, there is evidence of use by recreational vehicles throughout the Project Site (*i.e.*, incidental sightings of dirt bikes, incidental sightings and sounds of all-terrain vehicles (ATV), ATV tracks, miscellaneous garbage, trails, *etc.*). However, there are no managed NBFSC snowmobile trails or NBATVF trails located within the Project Site.

A non-managed NBATVF trail is located along Route 7, west of the Project Site, within the Assessment Area. The Project is not expected to interact with the trail or users; therefore, recreational land use is not discussed further in this VEC assessment.

4.1.3 Commercial and Industrial Land Use

No registered Federal Contaminated Sites are located in close proximity to the Assessment Area (FCSI, 2018). Based on SNB Land Registry records, neither the Project Site nor any adjoining properties are known to be contaminated, nor does the Land Registry have records of contamination remediation (SNB, 2018). The Federal Contaminated Sites mapping, relative to the Project Site, is included in Attachment I-2.

The Fundy Regional Service Commission's (FRSC) Crane Mountain Landfill (herein referred to as the "Landfill") is located within the Assessment Area, approximately 1.2 km west of the Project Site. The Landfill facilitates municipal solid waste, recycling, compost, household hazardous waste, and construction and demolition debris for the Greater Saint John Region (*i.e.*, City of Saint John, Grand Bay-Westfield, Rothesay, Quispamsis, Hampton, St. Martins, Musquash, Petersville, *etc.*). Since opening in 1997, the Landfill has operated as an engineered sanitary landfill with environmental compliance programs in accordance with a NBDELG Approval to Operate. The Project is not anticipated to interact negatively with the Landfill, nor vice versa. The Project is required to support future landfill operations and capital construction with the extracted clay and aggregate being used on-site to construct future landfill cells and to provide cell coverage.

4.2 Transportation Patterns and Volume

The Project Site is located approximately 1 km east of the Route 7 and Route 177 interchange. Route 7 is a provincial arterial highway maintained by NBDTI and provides the main a corridor between the City of Saint John and the City of Fredericton (NBDTI, 2018). Route 177 is a provincial collector highway that connects Route 7 to the communities of Martinon and Grand Bay-Westfield (NBDTI, 2018). The Project Site is accessible via Acamac Backland Road and Old Quarry Road, which are gravel municipal roads. Old Quarry Road is currently serviced and maintained privately.

Currently, traffic into and out of the Landfill, including heavy equipment required for the delivery of construction materials such as clay and aggregate, use the following routes:

- Northbound: Vehicles traveling north on Route 7, will exit onto Route 177 for approximately 0.65 km, then onto Crane Mountain Road at the Landfill entrance. When exiting the Landfill, vehicles travelling north will back-track on Crane Mountain Road and Route 177, then merge onto Route 7 northbound; and
- Southbound: Vehicles will exit Route 7 directly at the Crane Mountain Road (Landfill entrance) junction. When exiting the Landfill, vehicles travelling south will back-track on Crane Mountain Road then merge directly onto Route 7 southbound.

The provincial maximum gross vehicle weight allowed on Route 7 and Route 177 is 62,500 kilograms (kg).

4.3 Navigable Waters

With the exception of the Saint John River, there are no navigable waters present within the Assessment Area. The Project is not expected to interact with the Saint John River; therefore, the Project will not require the approval from the NPP to comply with the *Navigation Protection Act* (Transport Canada, 2017) and is not discussed further in this VEC assessment.

4.4 Commercial, Recreational and Aboriginal (CRA) Fisheries

DFO was unable to provide commentary at the time of this EIA registration. Any information received from DFO post EIA registration will be submitted as an addendum to this document.

4.4.1 Commercial Fisheries

There are no known licensed commercial fisheries within the Assessment Area.

4.4.2 Recreational Fisheries

The Project Site is contained within the New Brunswick Department of Energy and Resource Development (NBDERD) Recreational Fishery Area (RFA) 6 (Lower Saint John). The watercourses within the Project Site (Mill Creek and the Tributary) are tributaries to the Saint John River. The NBDERD issues an annual report (Fish, 2018) that details the recreational fishing seasons for each region of New Brunswick.

4.4.3 Aboriginal Fisheries

There are no First Nations communities, nor any known Aboriginal fisheries within the Assessment Area. Appropriate First Nations will be consulted as part of the public consultation process of this EIA.

4.5 Local Economy and Local Socio-economic Structure

According to 2016 Canada Census data, the City of Saint John has a population of 67,575 people, approximately 9% of the provincial population. The median household income in 2015 was \$52,132 and the average annual household income in 2015 was \$65,851 (STATCan, 2018). The City of Saint John has a tax rate of 1.7850 percent (%; NBDELG, 2018b).

The FRSC and the Landfill provide service to the Greater Saint John Region (*i.e.*, City of Saint John, Grand Bay-Westfield, Rothesay, Quispamsis, Hampton, St. Martins, Musquash, Petersville, *etc.*) with a total combined population of these areas of 115,623 (FRSC, 2017). Although the funding model for the FRSC is based on each communities' tax base and population, the Landfill is funded solely through the tipping fees. This Project is funded by the Landfill's general operation budget.

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

The nearest Aboriginal community is the Oromocto First Nation (Maliseet), located approximately 65 km north of the Project Site. The Brother's Indian Reserve Number 1 is located approximately 6.5 km east of the Project Site and encompasses three islands at the convergence of the Saint John River and the Kennebecasis River, near Ragged Point, Saint John. The Brother's Indian Reserve has affiliation with the Kingsclear First Nation, Madawaska Maliseet First Nation, Tobique First Nations, and Woodstock First Nation.

The Project is located on privately owned land and no traditional use of land or resources currently occurs or is expected to occur within the Project Site.

5.0 SUMMARY OF POTENTIAL EFFECTS

5.1 Land Use

5.1.1 Residential Land Use

Potential effects to residential land use are generally limited to the operational phase of the Project and include increased noise and vibration levels, increased hauling traffic, and dust generated as a result of the blasting and excavation activities in the PDA, as indicated in Appendix C and these potential effects are not discussed further in this VEC assessment. Blasting activities required for the aggregate quarry do have the potential to impact the quality and quantity of private groundwater resources in the vicinity of the Project Site, and this is discussed in Appendix D.

The aforementioned potential effects, *i.e.*, increased seasonal traffic volume, and changes to ambient noise and vibration levels in the PDA, may adversely impact residential properties within the Assessment Area.

5.1.2 Commercial and Industrial Land Use

Any effects to local commercial business within the Assessment Area are expected to be similar to the effects presented in Section 5.1.1.

The Project is expected to have a positive impact on the Landfill by providing a secure and viable source of clay and aggregate materials to supply general operations until the end of the Landfill's expected lifetime (*i.e.*, 2048).

5.2 Transportation Patterns and Volumes

Traffic volumes are not expected to increase significantly during the construction phase of the Project as equipment will only be mobilized to the Project Site as required. Similar traffic volumes will be observed during the reclamation phase of the Project.

An increase in traffic volume will be observed on the western portion of Acamac Backland Road and Old Quarry Road during the operational phase of the Project. It is expected that during periods of Landfill cell construction, hauling trucks will travel between the Project Site and the Landfill. However, the hauling activities are expected to be intermittent and there may be periods of several years where no work is completed at the Project Site. The preferred hauling route between the Project Site and the Landfill is presented on Figure I-1.

Route 7 and Route 177 are currently used for vehicle and haul truck traffic into the Landfill and a measurable increase in traffic volume is not anticipated on these roadways as a result of any Project activities.

5.3 Commercial, Recreational and Aboriginal (CRA) Fisheries

There are no known or long-term effects to CRA fisheries as a result of the Project. There is a potential for limited access on a temporary basis to recreational fishing areas within the Project Site due to the presence of Project components and active work zones. Although no recreational fisheries are known to occur within the Project Site, it is expected that approximately 1 km of Mill Creek and 500 metres of the Tributary will be inaccessible (within the Project Site) during the Projects' lifetime. This removal of access will be temporary and localized to on-going operational zones. Potential effects to CRA fisheries are therefore expected to be negligible and is not discussed further in this VEC assessment.

5.4 Local Economy and Socio-economic Structure

By acquiring the Project Site, the Landfill will secure a consistent and viable source of clay material that will fulfill the construction requirements of the Landfill until the end of its expected lifetime (*i.e.*, 2048). The close proximity of the Landfill to the Project Site minimizes hauling distance, which in turn reduces the overall operating costs and by reducing hauling distance will reduce the overall carbon footprint of construction at the Landfill.

The Project will also have a positive effect for local contractors. At this time the Landfill is planning on continuing to use a public tendering process to construct their capital projects, such as new disposal cells. The blasting, crushing, excavating, hauling, and placement of materials from the proposed quarry and clay source will be conducted by private construction contractors, and will enable smaller contractors who do not currently have a source of aggregate or clay near the Landfill to bid on potential upcoming capital projects.

It is also anticipated that the Project may generate seasonal employment opportunities for heavy equipment operators in the area, either through contractors or potentially the Landfill itself.

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

There are no known potential effects to Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons as a result of the Project; therefore, this not discussed further in this VEC assessment.

5.6 Accidents, Malfunctions and Unplanned Events

There is the potential for accidents to occur during all phases of the Project. Accidents that may impact land use and economy within the Project Site include:

- Fire;
- Failure of sedimentation and erosion controls structures (*i.e.*, to result in damage to adjacent properties);
- Traffic mishaps; and
- Accidental release of chemicals or petroleum products (*i.e.*, to result in contamination of adjacent properties).

6.0 PROPOSED MITIGATION MEASURES

The potential effects and proposed mitigation measures to minimize the potential effects to land use and economy during all phases of the Project are summarized in Table I-1. In addition, an Environmental Management Plan (EMP) will be developed prior to the commencement of the Project.

Table I-1 Summary of Mitigation Measures for Land Use and Economy

Project Component	Summary of Potential Interaction	Mitigation Measures
Land Use	All Project Phases (Construction, Operational, Reclamation) and Accident, Malfunctions and Unplanned Events	
	Increased potential for contaminants to be released into surface water/soil through the accidental release of fuels and lubricants from construction equipment.	<ul style="list-style-type: none"> • No chemical or petroleum storage will occur within 30-metres of a regulated area (<i>i.e.</i>, wetland, watercourses, <i>etc.</i>); • Equipment will be kept in good working order; and • Emergency and spill response procedures will be in place prior to construction activities.
	Increased potential for the degradation of surface water and adjoining properties via the failure of erosion and sediment control structures.	<ul style="list-style-type: none"> • Erosion and sediment control (ESC) structures will be properly installed around the work area prior to commencement of any on-site activities. All structures will be inspected regularly to ensure that they are functioning as intended; • At the first evidence that runoff of sediment is starting to occur, Project work will temporarily cease. All siltation prevention devices shall be inspected and monitored; any necessary repairs will be made such that they accomplish their intended function prior to work commencing; • Once the Project work is complete, all exposed, erodible soil will be permanently stabilized against erosion (<i>i.e.</i>, riprap, mulch, hydroseed, <i>etc.</i>); and • Existing vegetation will be retained whenever possible and tree/vegetation clearing will be kept to a minimum.

Table I-1 Summary of Mitigation Measures for Land Use and Economy

Project Component	Summary of Potential Interaction	Mitigation Measures
<p>Land Use</p>	<p>Increased potential for fire that could damage/destroy surrounding properties and structures.</p>	<ul style="list-style-type: none"> • Fire Prevention and Contingency Plan and Emergency Response Plan will be developed as part of the EMP.
	<p>Operational Phase Only</p>	
	<p>Increased potential for impact to residential properties within the Assessment Area.</p>	<ul style="list-style-type: none"> • The FRSC will consult with local landowners prior to construction phase of the Project; • Local landowners and businesses will be notified of the construction/operational activities, as required; and • Additional mitigation to surrounding landowners is presented in Appendix C and Appendix D of the EIA registration document.
<p>Traffic Patterns and Volumes</p>	<p>Increased traffic volumes within the Project Site, on Acamac Backland Road and on Old Quarry Road.</p>	<ul style="list-style-type: none"> • A designated transportation route will be established and adhered to by all Project vehicles; • Drivers will adhere to posted speed limits and warning signs; • Vehicle traffic and heavy equipment operation will be minimized outside of daylight hours; • Property access will be maintained and efforts will be made to reduce the amount of mud/gravel transported onto paved public roads by vehicles; • If required, permits will be obtained from NBDTI to transport any oversized loads/vehicles on public roads; and • Dust suppression efforts may be undertaken during periods of dry and/or windy conditions.

7.0 SUMMARY OF POTENTIAL SIGNIFICANT RESIDUAL EFFECTS

A significant residual effect to the land use and economy VEC is defined as a permanent change in land use in the Assessment Area (outside the Project Site) as a direct result of the Project.

Potential effects of the Project include:

- Increased traffic to and from the Project Site;
- Increased noise and vibration levels at nearby receptor sites (residential and commercial properties) as a result of Project activities; and
- Increased dust at nearby receptor sites (residential and commercial properties) as a result of Project activities.

The Project Site has historically been used for clay source extraction and aggregate quarry activities as described in Sections 2.3 and 2.4 of the EIA registration document. Therefore, the proposed Project will occur in an area that is considered compatible with other land uses in the area. The implementation of the proposed mitigation measures will minimize adverse impacts on land use and the economy, and therefore, the interaction of the Project on this VEC is considered to be non-significant.

8.0 REFERENCES

2018. Statistics Canada (STATCan). 2018. Census Profile, 2016 Census, Saint John, City. Accessed October 22, 2018. Website: <http://www12.statcan.ca/census-recensement/2016/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CSD&Code1=1301006&Geo2=PR&Code2=13&Data=Count&SearchText=Saint%20John&SearchType=Begins&SearchPR=01&B1=All&TABID=1>

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Service New Brunswick (SNB). 2017. Registry and Mapping Services. Accessed October 15, 2018. Website: <https://www.planet.snb.ca/PLANET/index.html>



ATTACHMENTS

I-1 - Surrounding Land Use

PID Number	Land Use	Location in Relation to Site
00469932	Vacant Residential Land	North
00290361	Residential Improved	North
00000003	Roadway	Northeast
00000002	Watercourse	Northeast
55204358	Residential Improved	East
00289330	Residential Improved	East
00289363	Residential Improved	Southeast
00289389	Residential Improved	Southeast
00289405	Residential Improved	Southeast
00289413	Residential Improved	Southeast
00289421	Residential Improved	Southeast
55169049	Residential Improved	Southeast
55169056	Residential Improved	Southeast
55169064	Residential Improved	Southeast
00289439	New Brunswick Power Corporation - Sub Stations	Southeast
00455493	Vacant Residential Land	South
00289512	Recreational Land - Unimproved	West
00289454	Unserviced Residential Lots	West
00295527	Vacant Residential Land	West
00289488	Recreational - Private Improved Properties	West
55043285	Recreational Land - Unimproved	West
00296095	Vacant Residential Land	West
55087035	Fundy Regional Service Commission - Dumps	Northwest
00000001	Vacant Land	Center (Divides the Site)



I-2 - Federal Contaminated Sites Mapping

Treasury Board of Canada Secretariat

Home > [OCG](#) > [Real Property Management](#) > [FCSI](#) > DFRP/FCSI - Map Navigator

DFRP/FCSI - Map Navigator

Area: Saint John, Kings Content:



Layers

- ● ● Contaminated Sites from active query
- ★ Federal Properties
- ★ Federal Buildings
- ● ● Federal Contaminated Sites
- Economic Region
- Census Divisions
- Census Subdivisions
- Metropolitan Areas
- Federal Electoral Districts
- Treaty Areas

¹ This layer is visible only when the map scale is smaller than 1:3,000,000.

² ● Suspected ● Active ● Closed

Google base maps are only available when the map scale is smaller than 1:60,000.

IMPORTANT NOTE: The tables below are currently not synchronized with the map content.

Please click on the following hyperlink if you want to update the tables content: [UPDATE TABLES](#)

Federal Properties

Federal Properties

Page(s):

Select the number of rows per page

Federal Buildings

Federal Contaminated Sites



APPENDIX J

VEC: Effects of the Environment on the Project

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1.0 RATIONALE FOR THE VALUED ENVIRONMENTAL COMPONENT (VEC)

The analysis of effects of the environment on the Project considers naturally-occurring hazards or influences that could impact the Project. These impacts may be attributed to the physical site conditions or characteristics, natural land forms and/or climatic influences. The effects of the environment can be negative to Project components, result in unforeseen costs, and/or delay the Project schedule. Proper identification and management of any adverse potential effects of the environment on the Project are typically addressed during the planning and design phase of the Project. In order to assess the effects of the environment on the Project, five components have been identified for this valued environmental component (VEC):

- *Climate Conditions* are the long-term weather conditions of an area that are typically influenced by latitude, altitude and proximity to oceans. The climate conditions are measured by assessing the patterns of temperature, wind, precipitation, and other meteorological aspects;
- *Climate Change* is defined as the long-term shift in weather conditions measured by changes in temperature, precipitation, wind, snow cover, and changes in extreme weather conditions. Climate change is caused by natural processes (e.g., output of the sun, volcanic dust in the atmosphere, etc.) and by human activities (e.g., burning fossil fuels and increased greenhouse gas emissions), (NRCAN, 2018);
- *Seismic Activity* refers to earthquakes, during which rocks break and slip along faults in the Earth. Seismic energy is released during these events, which can result in severe consequences, including the collapse of structures and large waves;
- *Natural Forest Fires* are hazards in any forested area; and
- *Contaminated Sites* in Canada are sites that are considered contaminated when certain substances (e.g., petroleum product, metals, etc.) occur at concentrations above background levels, exceed levels specified in policies and regulations, and if the concentration of the contamination poses a risk to human health or the environment (FCSI, 2018).

2.0 BOUNDARIES FOR THE ENVIRONMENTAL EFFECTS ASSESSMENT

2.1 Spatial Boundaries

The assessment of effects of the environment has been completed for three spatial boundaries:

- The Project Development Area (PDA) is defined as the footprint of ground disturbance required for the Project activities (portion of PID 00289595);
- The Project Site is defined as the southwestern portion of PID 00289595 as investigated during the baseline environmental studies; and
- The Assessment Area considers the nearby residential communities (*i.e.*, Morna, Belmont, Ketepec, and Acamac). Generally, the Assessment Area will focus on areas within a 2 kilometre (km) radius of the Project Site.

2.2 Temporal Boundaries

The assessment of the effects of the environment has been completed for the following temporal boundaries:

- The construction phase of the Project;
- The operational phase of the Project; and
- The reclamation phase of the Project.

3.0 METHODOLOGY

A desktop review of available information relative to an analysis of the effects of the environment on the Project was undertaken to determine the prevailing VEC conditions and any potential interactions with the Project.

Specific to the Environmental Impact Assessment (EIA) document, potential interactions or effects of the VEC on the Project have been identified and are discussed. Where residual effects are anticipated, the proposed methods for mitigating the potential effects have been presented.

4.0 DESCRIPTION OF EXISTING ENVIRONMENT

4.1 Climate Conditions

The climate conditions described for the Project Site are based upon Environment Canada's climate normals recorded at the weather station at the Saint John Airport (45.3181°, -65.8856°), located approximately 24 km east of the Project Site. Due to the proximity to the Project Site, the climate conditions measured at the monitoring station are assumed to be comparable to those within the Project Site boundaries.

The climate conditions of the Project Site are discussed in Appendix C and are summarized below:

- Average annual air temperature is 5.2 degrees Celsius (°C);
- An extreme maximum temperature was recorded in August, 1976 (34.4°C) and an extreme minimum temperature was recorded in February, 1948 (-36.7°C);
- January is typically the coldest month and July is typically the warmest;
- Average annual precipitation is 1295.5 (millimetres (mm));
- An extreme daily precipitation event was recorded in November, 1975 (154.4 mm) and an extreme snowfall event was recorded in December, 1967 (58.2 centimetres (cm));
- November is typically the rainiest month and January is the snowiest; and
- The prevailing winds are generally from the south between May and August and from the northwest between November and February. The average annual wind speed is 15.2 km per hour (km/hr); March is typically the windiest month (average wind speed of 17.2 km/hr and August is typically the least windy month (average wind speed of 11.3 km/hr; ECCC, 2018).

4.2 Climate Change

The effects of climate change in Canada are expected to result in:

- More frequent, longer-lasting, or more intense extreme weather events (e.g., heavy precipitation events, droughts, heat waves); and
- Associated natural disasters and wildfires (NRCAN, 2018).

When considering long-term effects of climate change, it is generally accepted that climate trends for New Brunswick will be wetter and warmer (Lines et al., 2005). These conditions may be slightly off-set by warmer temperatures (e.g., evaporation); however, warmer winter temperatures may cause earlier freeze/thaw conditions, and more wet snow and freezing precipitation. Additionally, the warmer weather may delay winter freeze-up and may promote an earlier spring melt.

4.3 Seismic Activity

Based on the Geological Survey of Canada's, National Earthquake Database (NEDB), New Brunswick is situated in the North Appalachian Seismic Zone. This zone is considered generally stable. Since 2009 there have been 15 earthquakes recorded in southern New Brunswick, ranging in magnitude (MN) from 2.0 MN to 3.7 MN (NRCAN, 2018a).

4.4 Natural Forest Fires

In Canada, forest fires typically occur in the western and central provinces between May and September and are less likely to occur in New Brunswick (NRCAN, 2018b). The Fire Weather Index (FWI) is a numeric rating of fire intensity and is a suitable index for fire danger throughout the forested areas of Canada. The available information (1981 to 2010) shows that the Project Site had a FWI of 0 to 5. The highest FWI is greater than thirty (> 30), therefore the FWI within the Project Site is considered to be low.

4.5 Contaminated Sites

The Treasury Board of Canada Secretariat maintains the Federal Contaminated Sites Inventory (FCSI). This is a database with information of all known federal contaminated sites under the custodial care of Crown corporations, as well as those that may have contamination arising from past use that could pose a risk to human health or the environment. No registered federal contaminated sites are in proximity to the Project Site.

Based on Service New Brunswick (SNB) Land Registry records, the Project Site and any adjoining properties are not known to be contaminated nor do they have records of contamination remediation (SNB, 2018).

The Federal Contaminated Sites mapping, relative to the Project Site, is included in Attachment J-1.

5.0 SUMMARY OF POTENTIAL PROJECT INTERACTIONS

5.1 Climate Conditions

Effects on the construction and reclamation phases of the Project as a result of climate conditions are not expected. An extreme weather event (e.g., significant snowfall, heavy precipitation, and/or strong winds) may cause delays; however, weather delays are normal and a contingency plan for unplanned delays will be incorporated into the Project timeline.

Extreme weather may temporarily affect the operations of the Project. Significant snowfall and/or precipitation may interfere with the transport of material from the Project Site and with overall safety during storm events. During extreme events the transport of material, excavating and blasting may be stopped until weather conditions improve.

5.2 Climate Change

Effects on the construction phase of the Project as a result of climate change are not expected. Climate change is considered to be the result of long-term changes in weather conditions. The construction, operational and reclamation phases of the Project are expected to be completed in 2020, 2048 and 2049, respectively. Given that the end of life for the Project is not considered long term, the effects of climate change on the Project are not discussed further in this VEC assessment.

5.3 Seismic Activity

Based on the historic NEDB data, seismic activity is not expected to affect the Project and is not discussed further in this VEC assessment.

5.4 Natural Forest Fires

A forest fire could destroy construction equipment, construction materials and/or temporary outbuildings within the PDA. Additionally, Project activities (e.g., operation of equipment, storage of petroleum products *etc.*) may increase the risk of a fire igniting within the PDA or Project Site.

5.5 Contaminated Sites

Considering the distance of the Project to known contaminated sites, the risk of adverse effects during the Project timeline is very low. Therefore, the potential effects of contaminated sites are not discussed further in this VEC assessment.

6.0 PROPOSED MITIGATION MEASURES

The potential effects and proposed mitigation measures to minimize the potential adverse effects to the VEC, effects of the environment on the Project, during all phases of the Project are summarized in Table J-1.

In addition, an Environmental Management Plan (EMP) will be developed prior to the commencement of any Project activities.

Table J-1 Summary of Mitigation Measures for Effects of the Environment on the Project

Project Component	Summary of Potential Interaction	Proposed Mitigation Measures
All Project Phases (Construction, Operational, Reclamation) and Accidents, Malfunctions and Unplanned Events		
Climate Conditions	Significant weather events may interfere with on-site activities and hauling to and from the Project Site.	<ul style="list-style-type: none"> • During extreme weather events hauling, excavating and blasting may be stopped until weather conditions improve; • The Project infrastructure (<i>i.e.</i>, roadway, culverts, sedimentation ponds, <i>etc.</i>) will be designed in accordance to current engineering standards and practices to account for extreme weather events; • Roadways will be maintained in good working order; and • Drainage ditches along roadways will be kept clear of debris.
Natural Forest Fire	Potential for propagation of a fire within the PDA or Project Site.	<ul style="list-style-type: none"> • A fire safety plan will be implemented; • Petroleum products, combustible materials and other hazardous materials will be stored properly and spills will be cleaned up immediately; and • Trucks and heavy equipment will be equipped with a fire extinguisher.

7.0 SUMMARY OF POTENTIAL SIGNIFICANT RESIDUAL EFFECTS

Any effects of the environment on the Project will be mitigated through industry standard practices and will be incorporated into the construction, operational and reclamation phases of the Project. Generally, the Project plans will predict and plan for any foreseeable impacts from the environment to allow for a substantial margin of protection through the Project phases. Based on the above considerations, significant residual effects as a result of the environment are not expected.

8.0 REFERENCES

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ATTACHMENT

J-1 - Federal Contaminated Sites Inventory Mapping

Treasury Board of Canada Secretariat

Home > [OCG](#) > [Real Property Management](#) > [FCSI](#) > DFRP/FCSI - Map Navigator

DFRP/FCSI - Map Navigator

Area: Saint John, Kings Content:



Layers

- ● ● Contaminated Sites from active query
- ★ Federal Properties
- ★ Federal Buildings
- ● ● Federal Contaminated Sites
- Economic Region
- Census Divisions
- Census Subdivisions
- Metropolitan Areas
- Federal Electoral Districts
- Treaty Areas

¹ This layer is visible only when the map scale is smaller than 1:3,000,000.

² ● Suspected ● Active ● Closed

Google base maps are only available when the map scale is smaller than 1:60,000.

IMPORTANT NOTE: The tables below are currently not synchronized with the map content.

Please click on the following hyperlink if you want to update the tables content: [UPDATE TABLES](#)

Federal Properties

Federal Properties

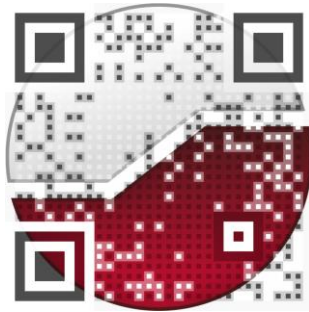
Page(s):

Select the number of rows per page

Federal Buildings

Federal Contaminated Sites

experience • knowledge • integrity



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geotechnical
environmental
field services
materials testing

civil
géotechnique
environnementale
surveillance de chantier
service de laboratoire des matériaux

expérience • connaissance • intégrité

