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Environmental Impact Assessment
Registration Document
North West Sanitation Services Ltd.
Importation of Daily Cover Material
Grand Falls, New Brunswick

GEMTEC Project: 100458.001

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Submitted to:

Department of Environment and Local Government
Marysville Place, P.O. Box 6000
Fredericton, NB
E3A 5T8

Environmental Impact Assessment Registration Document
North West Sanitation Services Ltd.
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June 3, 2021
GEMTEC Project: 100458.001

GEMTEC Consulting Engineers and Scientists Limited
191 Doak Road
Fredericton, NB, Canada
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June 3, 2021 File: 100458.001

Department of Environment and Local Government
Marysville Place, P.O. Box 6000
Fredericton, NB
E3A 5T8

Attention: Shawn Hamilton, P.Eng. - Project Manager

Re: Environmental Impact Assessment
North West Sanitation Services Ltd. - Importation of daily cover material

GEMTEC Consulting Engineers and Scientists Limited (GEMTEC) is pleased to submit this electronic copy of the Environmental Impact Assessment (EIA) registration document for the proposed importation of daily cover material on behalf of North West Sanitation Services Ltd. (NWSS). The proposed Project involves the importation of a suitable alternate daily cover material for use at the existing C&D site, owned and operated by NWSS, located at the McCluskey Road in Grand Falls, New Brunswick on the property identified by SNB as PID 65225682.

Please do not hesitate to contact the undersigned if you have any questions or concerns about the registration document or the information presented herein.

Sincerely,

Paul Vanderlaan, P. Eng.
Environmental Regulatory Specialist

Emily Piggott, M.Eng., EIT
Engineer-in-Training

PV/ep

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1.0 INTRODUCTION

GEMTEC Consulting Engineers and Scientists (GEMTEC) has been retained by North West Sanitation Services Ltd. (NWSS) to prepare an Environmental Impact Assessment (EIA) registration document for the importation of a suitable daily cover material (herein referred to as "the Project") for use at their existing Construction and Demolition (C&D) facility located at the McCluskey Road in Grand Falls.

NWSS is a locally owned and operated company who has been in business since 1997 when they started with 6 employees and currently employ over 20. NWSS provides integrated waste collection and disposal services, including recycling in Victoria and Madawaska County. NWSS owns and operates a Transfer Station located at 29 Waddell Loop, Saint-André NB. This facility is open year round for the public to drop off C&D waste for disposal. NWSS has a C&D Site on its land located on McCluskey Road near Grand Falls, NB. The facility is designed to be used for the disposal of inert debris from the construction, renovation, or demolition of buildings and/or structures. NWSS also provides demolition services, provides firewood, and screened top soil. NWSS is widely recognized for being friendly and reliable, and are proud to offer a full range of equipment, including: roll-off containers, front-end load containers, recycling and a fleet of more than 25 specialized collection vehicles.

GEMTEC submitted a project description for the Project proposal to the New Brunswick Department of Environment and Local Government (NBDELG) on January 27, 2021 to confirm regulatory requirements for the proposed Project. The NBDELG issued a letter dated February 2, 2021, stating that the proposed Project requires an EIA registration and review as per item (m.1), "all disposal, destruction, recycling, reprocessing or storage of waste that originates outside New Brunswick and all facilities or systems for the disposal, destruction, recycling, reprocessing or storage of such waste" of *Schedule A* of the *EIA Regulation (87-83)*.

This document is the EIA registration for the proposed Project. The document details the necessary information as outlined in the NBDELG document "A Guide to Environmental Impact Assessment in New Brunswick" dated January, 2018.

The proposed Project involves the importation of a suitable daily cover material that originates from demolition activities at construction and renovation sites in the province of Quebec, it will have been recycled and re-processed to ensure it is suitable for its intended future use as a daily cover in the existing C&D waste management facility currently being operated by NWSS. The facility is currently operating under an approval to operate (S-2816) and is in compliance with all associated requirements of the approval. The proposed Project does not involve any construction activity and does not require any modification to the currently existing infra-structure at the site.

1.1 Project Proponent

Table 1.1 Proponent Information

Name of Proponent	North West Sanitation Services Ltd.
Address of Proponent	29 Chemin Waddell Loop, P.O. Box 7871 Grand Falls, NB E3Z 3E8
Principal Proponent Contact	Mr. Verne Savage Owner/Operator Telephone: (506) 475-5577 Email: vern.savage@nb.aibn.com
Principal Contact Person for EIA	Paul Vanderlaan, P.Eng. GEMTEC Consulting Engineers and Scientists Limited 191 Doak Road, Fredericton, New Brunswick, E3C 2E6 Telephone: (506) 453-1025 Email: paul.vanderlaan@gemtec.ca
Property Ownership	Property is owned by North West Sanitation Services Ltd.

2.0 PROJECT DESCRIPTION

2.1 Project Name

North West Sanitation Services Ltd - Importation of daily cover material for use at existing C&D facility.

2.2 Project Overview

NWSS proposes to import an alternate suitable supply of daily cover material (the material) for use at their existing C&D facility located at the McCluskey Road in Grand Falls, New Brunswick.

The material originates from demolition activities at construction and renovation sites within the province of Quebec. The material is recycled and reprocessed by Conteneurs KRT, a waste management facility located in Rivière-du-Loup, authorized by the Quebec Ministry of Sustainable Development, Environment, Wildlife, and Parks to operate a processing center for construction and demolition waste. The material will have been recycled and re-processed, at their licensed sorting facility where any undesirable materials are removed, to ensure it is suitability for its intended future use as a daily cover in a C&D waste management facility. Any and all by-products of the recycling process are managed in its source location.

When containers arrive at the sorting center operated by Conteneurs KRT, they are unloaded in a receiving area where a visual inspection is conducted by both the foreman as well as the equipment operator to ensure no inappropriate materials are contained within the load. Any undesirable and/or prohibited materials are removed at this stage. Although it is very rare, items such as paint cans, oil cans, batteries and propane tanks are sometimes encountered. These are then removed and send to appropriate facilities for disposal. Conteneurs KRT implements a rigorous process to ensure the outgoing recycled materials from their facility do not contain any contaminants or undesirable materials as their customers rely on their quality assurance.

The material has been approved for use as a daily cover by the Quebec Ministry of Sustainable Development, Environment, Wildlife, and Parks. A copy of this authorization and a copy of the material analysis results have been included in Appendix A.

Should a favorable EIA determination be granted, it is anticipated that that up to 5 tractor trailer loads will be brought in weekly, totaling approximately 7,500 Tonnes annually, all of which will be utilized as daily cover at the McCluskey Road C&D facility. The material will be imported from the province of Quebec by transport truck utilizing the existing highway infrastructure.

Applicable COVID 19 protocols will be followed to minimize or avoid the potential transmission of COVID -19 to New Brunswick residents. The protocols and procedures followed are further described in Section 4.5.

Once brought into the province, the material will not require any additional screening, washing, or any other processing prior to being used for its intended purpose. There will be no waste stream generated from the use of the material. It will simply be stockpiled and used in accordance with all operational requirements as outlined in the facility's approval to operate.

The use of the material will not require any construction activity or any modifications to the currently existing, and operating, facility, its infrastructure, management plans and/or operational protocols.

One noteworthy benefit of the proposal is that it provides an opportunity to transport oversized industrial tires to an approved recycling facility in Quebec by utilizing the truck's return trip for this purpose. The management/recycling of oversized industrial tires is currently not captured by the Recycle NB - Tire Recycling Program as Off-the-road (OTR) tires are excluded from the Designated Material Regulation. As such, tire retailers in New Brunswick would benefit from this proposal as they currently have limited options in managing OTR tires and this initiative would provide a potential solution to this challenge.

2.3 Purpose / Rationale / Need for the Undertaking

NWSS proposes to import an alternative suitable daily cover material for use at their existing C&D site located at the McCluskey Road in Grand Falls. The purpose and rationale for the proposal consist of the following:

- The imported material will offset the use of the locally sourced, naturally occurring, earthen material that is currently used for this purpose;
- A readily available source of daily cover material will not require new excavations/disturbances and would avoid associated runoff management activities (e.g., water puddling and surface water drainage challenges);
- The importation of the alternate daily cover material will create one or two permanent jobs in the trucking industry;
- The use of imported alternate daily cover material will result in a more environmentally friendly operation and will be fiscally more beneficial; and
- The proposal provides an opportunity to transport oversized industrial tires to an approved recycling facility in Quebec by utilizing the truck's return trip for this purpose. The management/recycling of oversized industrial tires is currently not captured by the Recycle NB - Tire Recycling Program as Off-the-road (OTR) tires are excluded from the Designated Material Regulation. As such, tire retailers in New Brunswick would benefit from this proposal as they currently have limited options in managing OTR tires and this proposal would provide a potential solution to this challenge.

2.4 Project Location and Ownership

The Project will be carried out on the existing C&D site currently being operated by NWSS on the property identified by Service New Brunswick (SNB) as PID 65225682. The location of the Site is shown on Figure 1.

The property is private land and owned by North West Sanitation Services Ltd.

2.5 Siting Considerations

NWSS currently owns and operates a C&D site at the McCluskey Road in Grand Falls on the property identified by PID number 65225682 (Figure 2). The Project will occur within the operational area of the existing C&D site and will not increase the developed footprint of the facility.

No alternative locations were considered given that the imported daily cover material will be utilized in the existing facility. The material will be temporarily stored in an area that is currently used for the same purpose (utilizing the current source of daily cover material).

2.6 Physical Components and Dimensions of the Project

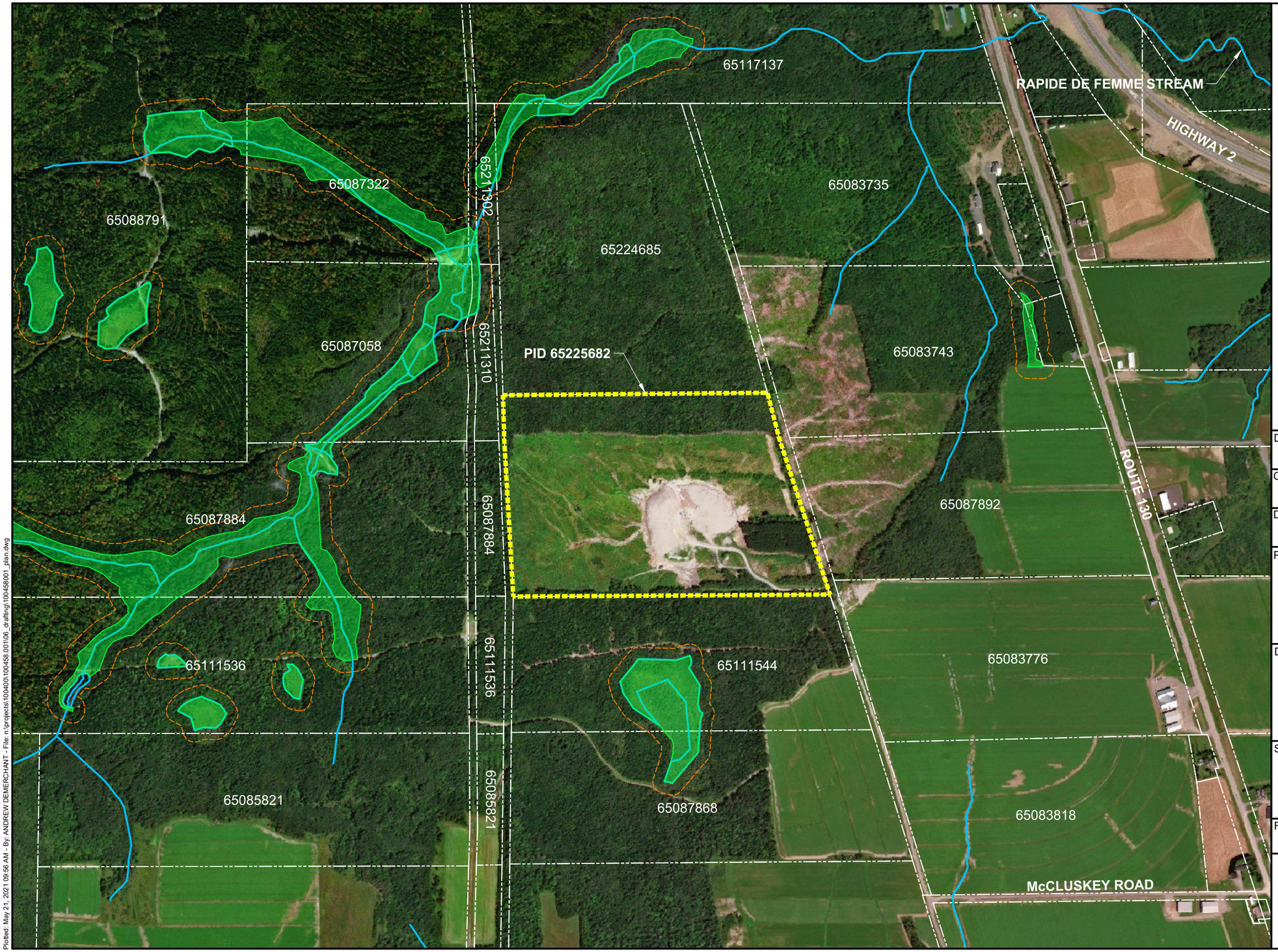
Figure 3 shows the existing site utilization plan of the facility within which the Project will be implemented. The Project will not change the development footprint or operation area of the facility and no construction is required to implement the Project.

The material will be transported to the facility by traditional class 8 transport trucks typically used for this purpose via the existing highway infrastructure network. No changes are required to any of the roads used to access the facility. One to three trucks will arrive at the site daily. Once on site, the material will be handled using the existing complement of equipment and no additional equipment will be needed. The material will be temporarily stored on an existing pad, presently used for storage of the current source of daily cover material, and the material will be used for its intended purpose on an as-needed basis.

2.7 Project Related Documents

A copy of the NBDELG issued Approval to Operate S-2816 is included in Appendix B.

A copy of the NWSS COVID-19 Operational Plan is include in Appendix C.



LEGEND

- PROPERTY BOUNDARY (GeoNB)
- WATER COURSE (GeoNB)
- REGULATED WETLAND (GeoNB)
- REGULATED WETLAND 30m BUFFER (GeoNB)

Drawn By	Checked By
AGSD	PV
Calculations By	Checked By

Date: MAY, 2021

Project: IMPORTATION OF COVER MATERIAL C&D SITE, McCLUSKEY ROAD GRAND FALLS, NB

Drawing: SITE LOCATION PLAN

Scale: 1:10000

0 200 400 600m

File No.	Drawing	Revision No.
100458001	FIGURE 1	0

GEMTEC
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Plotted: May 21, 2021 09:56 AM - By: ANDREW DEMERCHANT - File: n:\projects\100400\100458.001\06_drafting\100458001_plan.dwg

NOTES:
1) 2020 aerial photo from Google Earth.
2) Centre of site located at 46.9978° lat, -67.7664° long (NAD83 CSRS)

Drawn By	Checked By
AGSD	PV
Calculations By	Checked By

Date
MAY, 2021

Project
IMPORTATION OF COVER MATERIAL
C&D SITE, McCLUSKEY ROAD
GRAND FALLS, NB

Drawing
SITE PLAN

Scale
1:3000

0 100 200m

File No.	Drawing	Revision No.
100458001	FIGURE 2	0

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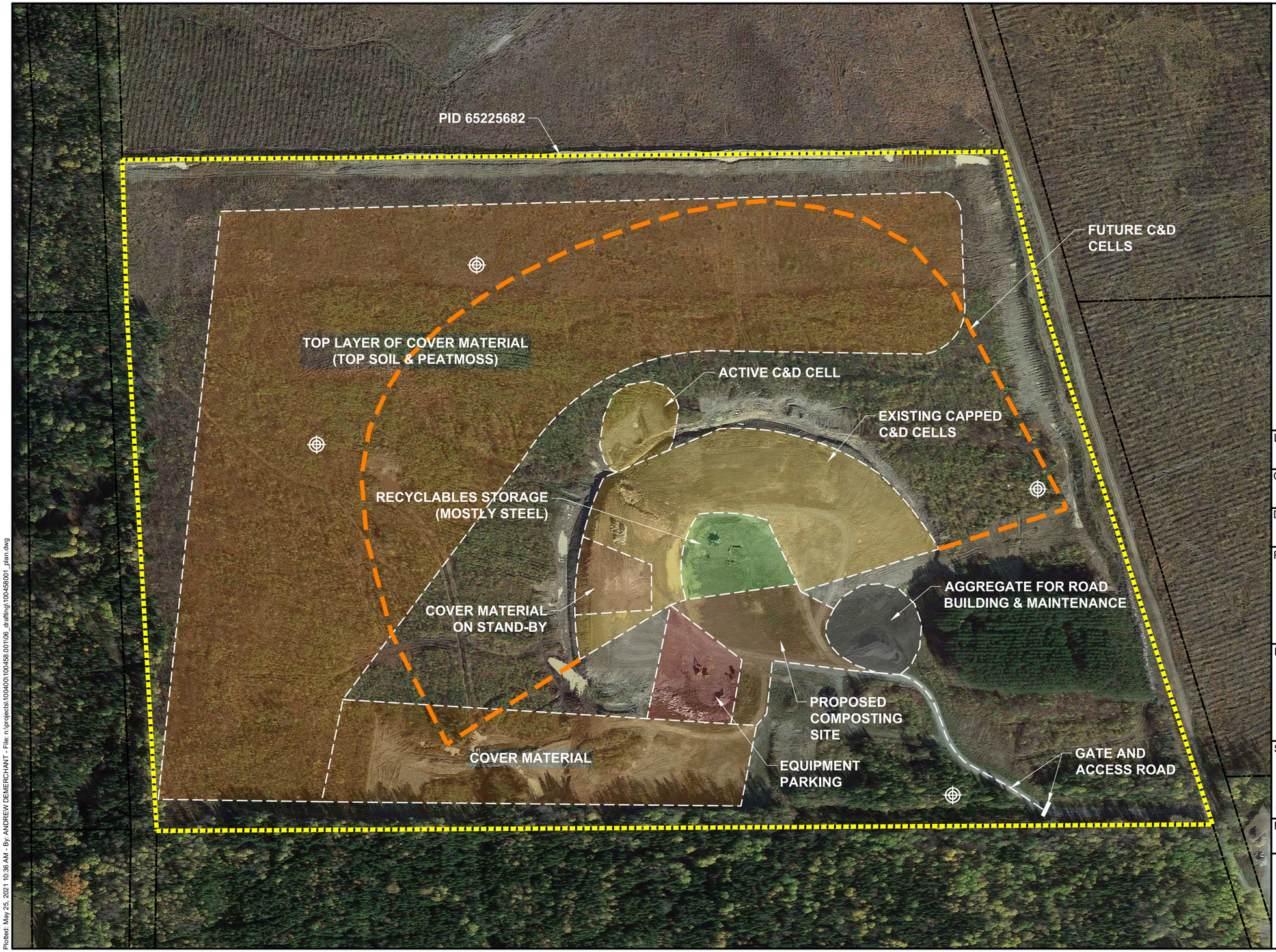

LEGEND

- EXISTING MONITORING WELL LOCATION
- PROPERTY BOUNDARY (GeoNB)

NOTES:

1) 2020 aerial photo from Google Earth.
2) Centre of site located at 46.9978° lat, -67.7664° long (NAD83 CSRS)

Drawn By	Checked By
AGSD	PV
Calculations By	Checked By

Date: MAY, 2021

Project: IMPORTATION OF COVER MATERIAL C&D SITE, McCLUSKEY ROAD GRAND FALLS, NB

Drawing: SITE UTILIZATION PLAN

Scale: 1:3000

0 100 200m

File No.	Drawing	Revision No.
100458001	FIGURE 3	0

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3.0 DESCRIPTION OF THE EXISTING ENVIRONMENT

3.1 Physical and Natural Features

3.1.1 Atmospheric Environment

In order to assess any potential impacts of the Project on the atmospheric environment, the following components were considered:

- *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;
- *Sound Quality* is the type, frequency, intensity, and duration of ambient noise. Sound quality also encompasses any vibration related stress on nearby structures; and
- *Odorous emissions* are evaluated as the offensive smells recognized in the surrounding ambient air.

3.1.1.1 Climate Conditions

The climate conditions of the Assessment Area are based upon Environment and Climate Change Canada (ECCC) climate normals recorded at St. Leonard A weather station, located approximately 18 km north of the site at an elevation of 242.2 m. As this is the closest monitoring station, the climate conditions measured are assumed to be representative to those at the site and surrounding areas.

The Canadian Climate Normals (1981 to 2010) recorded from the St. Leonard A climate station indicate an annual daily average temperature of 3.5 degree Celsius (°C), with a daily maximum temperature of 24.0°C (July) and daily minimum temperature of -12.6°C (January). An extreme maximum temperature was recorded in August 2001 (34.6°C) and an extreme minimum temperature was recorded in January 2009 (-38.8°C). According to the climate normals, January is typically the coldest month with a daily average temperature of -12.6°C and July is the warmest month with a daily average temperature of 18.0°C (ECCC, 2021).

Average annual precipitation in St. Leonard area is 1104.1 millimetres (mm); the average rainfall and snowfall is 792.2 mm and 335.0 cm, respectively. On average, July is the rainiest month and January is the snowiest (ECCC, 2021).

3.1.1.2 Air Quality

Air quality is monitored by both provincial and federal agencies across New Brunswick. There are no monitoring stations in close proximity to the site; the nearest is located in Edmundston, approximately 58 km to the North West of the site. This station monitors ozone, fine particulate matter, sulphur dioxide, nitrogen dioxide, relative humidity, ambient temperature, barometric pressure, wind speed, and wind direction.

The Province of New Brunswick has Air Quality Objectives (Table 3.1) for regulated air contaminants under the *Air Quality Regulation* of the *New Brunswick Clean Air Act*.

Table 3.1 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_2S)	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

Data available for the Edmundston Air Quality Monitoring Station did not identify any exceedances of the air quality objectives between 2017 and 2021 (NBDELG, Air Quality Data Portal, 2021).

3.1.1.3 Sound Quality

Within the Assessment Area, there are several noise and vibration sources:

- The C&D facility and associated operational activities including industrial and heavy equipment traffic, handling of C&D waste, and daily cover material.
- There are major roadways located to the east and northeast of the site (Figure 1). NB Route 130 and the Trans-Canada Highway 2 are located approximately 850 m east and 1.2 km northeast of the site, respectively.
- Farming equipment on nearby agricultural fields to the south, east, and southeast of the site.

The remaining area surrounding the site is generally undeveloped forested land with scattered rural residential dwellings along Route 130 and to the south (Figure 1). As per the NBDELG Approval to Operate (S-2816), the facility is required to maintain a treed or bermed buffer between the disposal cells and the property lines which reduce noise emissions originating from the site.

3.1.1.4 Odorous Emissions

Only inert C&D waste is accepted at the existing C&D facility located at the site. Putrescible wastes, one of the main contributors of nuisance odours at waste disposal facilities, are not accepted. Accepted material disposed of at the site is covered weekly, or more frequently as needed, with at least 150 mm of material to reduce any odorous emissions generated from the waste.

3.1.2 Groundwater Resources

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.,* C&D waste disposal 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 purpose:

- *Drainage and Topography* are the patterns that describe the physical geography of the landscape;
- *Geology and Hydrogeology* describe the subsurface soil and drainage conditions; and
- Known *Groundwater Quality and Quantity* data that provide baseline conditions for the Project area.

3.1.2.1 Drainage and Topography

Regionally, the area generally slopes to the northeast towards the confluence of two unnamed tributaries of Rapide de Femme Stream. The Site is generally flat; however, the capped C&D cells are raised approximately 7 to 9 metres (m) higher in elevation than the natural Site grades. Site elevations range from a maximum of 232 m near the southwest corner to 216 m near the northeast corner. Steep slopes were observed along the edge of the cells, from the southwest around the facility to the northeast.

In general, surface runoff from the site is directed to perimeter drainage ditching that borders the C&D disposal cells to the northeast, around the north and western edge towards the southwest; discharging runoff to the west of the cells toward an unnamed tributary of Rapide de Femme Stream (Figure 1). Any surface water not captured by the drainage ditching is expected to infiltrate pervious surfaces at the site or flow overland, following regional topography to the north and northeast.

3.1.2.2 Geology and Hydrogeology

Surficial geology mapping indicates that the area of study is covered with a blanket (generally 0.5 to 3.0 m thick) of Late Wisconsinan-aged morainal sediments consisting of loamy lodgement till, minor ablation till, silt, sand, gravel, and rubble (Rampton, V. N., 1984).

Bedrock geology mapping indicates that these overburden soils rest on Late Ordovician to Early Silurian aged argillaceous limestone and shale of the Matapedia Group (NBDNR, 2008).

Subsurface soils encountered during the installation of four (4) monitoring wells at the site in 2006 generally consisted of approximately 4 to 6 metres of brown sandy silt (till) underlain by shale bedrock. Based on the water levels measurements in these four (4) monitoring wells, shallow groundwater flow is likely to the west (GEMTEC, 2007).

3.1.2.3 Groundwater Quality and Quantity

The NBDELG Online Well Log System (OWLS) was accessed to identify groundwater extraction wells located within a 5 km radius of the Project Site. 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. Available water chemistry data from the NBDELG database were compared to the Canadian Drinking Water Quality Guidelines (CDWQG; Health Canada, June, 2019).

There were 10 groundwater wells, drilled between 2000 and 2018, identified in the NBDELG database that occur within a 1 km radius of the site. Well driller reports are presented in Appendix D and well construction details for these wells are summarized in Table 3.2.

Table 3.2 Construction Details for Wells Reported Within 1 km of Site

Well Construction Component	Minimum	Maximum	Average
Total Well Depth (m)	42.67	123.14	69.77
Casing Depth (m)	6.10	21.34	10.74
Casing Diameter (cm)	15.24	15.24	15.24
Estimated Safe Yield (L/min)	9.1	182	71.44
Water Bearing Fracture Zones (m)	19.51	78.94	40.84
Depth to Bedrock (m)	0	17.07	4.33
Bedrock Type	Shale and Sandstone		

Notes:
m = metres; cm = centimetres; L/min = litres per minute

There were no groundwater chemistry records available for the 10 wells located within a 1 km radius of the site.

The Project is situated within the active C&D facility at the site, which has an Approval to Operate (S-2816, valid to June 14, 2021; Appendix B) that requires compliance monitoring. In accordance with the Approval to Operate, a minimum of three (3) monitoring wells must be sampled at least twice each calendar year, at seasonal intervals. Groundwater samples are submitted for laboratory analysis of petroleum hydrocarbons (benzene, toluene, ethylbenzene, and toluene (BTEX) and modified total petroleum hydrocarbons (mTPH)), general chemistry, and trace metals. Conductivity, dissolved oxygen (DO), pH, temperature, and groundwater elevation measurements must also be obtained in the field during each sampling event.

Four (4) monitoring wells were installed at the site in 2006 to facilitate the compliance monitoring. GEMTEC completed this monitoring between 2006 and 2016, inclusive. Iron, manganese, and aluminum have exceeded the Guidelines for Canadian Drinking Water Quality (GCDWQ; Health Canada, 2020) on occasion in one or more monitoring wells at the site. However, these elevated concentrations are likely representative of background concentrations and not a result of operations at the C&D facility at the site. Turbidity has generally exceeded the GCDWQ at all monitoring wells. Higher turbidity values are expected in groundwater samples collected from shallow groundwater monitoring wells that are screened in fine-grained formations using sampling techniques that involve the rapid removal of groundwater from wells by purging and sampling.

Elevated concentrations of boron, sulphate, and nitrate+nitrite have been observed in the past in groundwater samples collected between 2010 and 2016; however, these elevated concentrations did not exceed the GCDWQ. Available data from the compliance monitoring completed by GEMTEC between 2006 and 2016 is summarized in Tables D1 to D3, Appendix D.

3.1.3 Terrestrial Environment

The site is currently utilized as an active C&D facility and is generally considered to be an anthropogenic habitat. On-going land disturbances required for the landfilling activities have broadly altered the natural habitat, including the topography, drainage patterns, vegetation communities, and surficial geology.

In order to assess any influence of the Project on the ecological environment, five components have been identified are described below:

- *Terrestrial Habitat* describes the general environmental conditions observed within the Project Site. Terrestrial habitat types were determined by reviewing aerial imagery (i.e. Google Earth) and available site photographs;
- *Ecologically Significant Areas* (ESAs) are areas designated as protected or managed by federal, provincial, or non-government agencies;
- *Wetlands and Watercourses* are features that offer biologically diverse ecosystems that support a wide variety of vegetation and wildlife species:
    - *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). In New Brunswick, wetlands are regulated under the *Clean Water Act - Watercourse and Wetland Alteration Regulation (90-80)* administered by NBDELG;
    - *Watercourses* are considered the "full width and length, including the bed, banks, sides and shoreline, or any part, of a river, creek, stream, spring, brook, lake, pond, reservoir, canal, ditch or other natural or artificial channel open to the atmosphere, the primary function of which is the conveyance or containment of water whether the flow be continuous or not" per the *Clean Water Act*;
- *Flora* is primarily focused on flora SAR and SOCC:
    - *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 Natural Resources and Energy Development (NBDNRED);
- *Wildlife and Birds*, which for the purpose of this assessment includes any wildlife (terrestrial and aquatic) SAR and SOCC, and migratory birds protected under the federal *Migratory Bird Convention Act* (*MBCA*). Wildlife SAR are considered species that have a protective status under Schedule 1 of the federal *SARA* or are protected under the provincial *NBSAR*. Wildlife SOCC include species that are:
    - Considered rare in New Brunswick with a ACCDC S-rank of S1 (imperiled) to S3 (vulnerable); and/or
    - Ranked At Risk, May Be At Risk or Sensitive by the NBDNRED.

Field studies for flora and wildlife (including birds) are considered outside the scope of this assessment as the Project footprint is situated within an active C&D site.

3.1.3.1 Terrestrial Habitat

The site is approximately 38.83 ha in size and is developed as an operational C&D facility that encompasses active disposal cells, a sorting area, a tire storage area, a stockpile area to store cover soil, and access roadways. Access from the Site via Kavanaugh Road is restricted by a gate. Photos of the existing site conditions are presented in Appendix E.

Undeveloped, wooded land borders the site to the west and south, a cleared vacant woodlot borders the site to the north, and a roadway (Kavanaugh Road) borders the site to the east.

3.1.3.2 Ecological Significant Areas (ESAs)

A data request was submitted to the ACCDC for a 5 km radius of the Project Site. 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. The ESAs are sites that may or may not have legal protection. The ACCDC report is presented in Appendix D.

The ACCDC report did not identify any MAs or ESAs within a 5 km radius of the Project Site (ACCDC, Appendix D). Furthermore there are no National Wildlife Areas, Migratory Bird Sanctuaries, Ramsar Sites, Important Bird Areas or New Brunswick Protected Natural Areas within a 5 km radius of the site (ECCC, 2020; ECCC, 2021; Ramsar, 2021, NBDNRED, 2021).

3.1.3.3 Wetlands and Watercourses

A formal wetland delineation was not completed; however, based on GeoNB Mapping (Appendix D), there are no regulated wetlands located within 30 m of the site. The nearest mapped regulated wetland is located approximately 160 m to the south of the site. A second, larger mapped regulated wetland is located to the west/North West of the site, which at its closest point is located approximately 160 m from the North Western corner of the site.

A formal watercourse assessment was not completed; however, based on GeoNB Mapping (Appendix D), there are no regulated watercourses located within 30 m of the site. The nearest watercourse, an unnamed tributary to Rapide de Femme Stream, is located approximately 215 m to the North West of the site. Two additional unnamed tributaries to Rapide de Femme Stream are located approximately 260 and 370 m to the northeast and east of the site. Based on regional topography, these watercourses flow to the northeast, away from the site.

3.1.3.4 Flora

A data request was submitted to the ACCDC for a 5 km radius of the site. The ACCDC report provides the location of known flora SAR and SOCC, any location sensitive species and information on protected or managed natural areas. A rare vascular flora survey was not completed as part of this assessment as no new ground disturbance or new landfill operational activities are included in the Project.

The ACCDC report identified 23 flora species (19 vascular and 4 nonvascular) within 5 km of the Project Site. Two of the 23 flora species are considered SAR under this assessment:

- Butternut (*Juglans cinerea)* is a vascular plant listed as Endangered under COSEWIC, SARA, and NBSAR. Butternut can occur in a wide range of habitats; most notable these habitats include floodplains, streambanks, terraces and ravine slopes (COSEWIC, 2017). Based on a map provided by ACCDC, butternut was observed along the Saint John River, which is located approximately 2.8 km to the east of the Site.
- Black Ash (*Fraxinus nigra)* is not on Schedule 1 of the SARA; however, is as Threatened under COSEWIC and under consideration for addition to Schedule 1. Based on the provincial rankings, Black Ash is considered apparently secure/secure (S4/S5) in New Brunswick specifically. Black Ash is found primarily in wetlands, swamps, floodplains, and fens, but can also be found in moist upland forests (COSEWIC, 2018). Similar to butternut, based on a map provided by ACCDC, black ash was observed along the Saint John River.

The remaining 21 flora species identified in the ACCDC report are considered to be SOCC; however, none of these identified species were reported to occur within 2 km of the Site.

3.1.3.5 Wildlife and Wildlife Habitat

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. A bird survey (*e.g.,* point counts) was not completed as part of this assessment as no new ground disturbance or new landfill operational activities are included in the Project.

The ACCDC lists 18 wildlife species as occurring within 5 km of the Project Site; five of which are considered SAR under this assessment. These species include: Barn Swallow (*Hirundo rustica*), Bank Swallow (*Riparioa riparia)*, Bobolink (*Dolichonyx oryzivorus)*, Olive-sided Flycatcher (*Contopus cooperi),* and the Common Nighthawk (*Chordeiles minor)*. Table 3.3 summarizes SAR wildlife species, their legal protection, and preferred habitat.

In addition to the SAR, the ACCDC lists the Bald Eagle (*Haliaeetus leucocphalus*) as a location sensitive species that has a known nesting location within 5 km of the Project Site. The Bald Eagle is considered regionally endangered under the *NBSAR*. These birds will often establish a nest in the top of a tall tree or near water. Concern over exploitation of the Bald Eagle prevents NBDNRED 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 (Cornell, 2021).

Table 3.3 Summary of Wildlife SAR Within 5 km of the Site

Common Name	Scientific Name	COSEWIC[1]	SARA[2]	Provincial Legal Protection	S-Rank[3]	NBDNRED General Status[4]	Nesting Habitat
Barn Swallow	*Hirundo rustica*	Threatened	Threatened	Threatened	S2B, S2M	Sensitive	Artificial structures, bridges, barns, and other outbuildings.
Bank Swallow	*Riparia riparia*	Threatened	Threatened	-	S2S3B,S2S3M	Sensitive	Riverbanks, road cuts, lake and ocean bluffs.
Bobolink	*Dolichonyx oryzivorus*	Threatened	Threatened	Threatened	S3B, S3M	Sensitive	Hayfields and pastures.
Olive-sided Flyctacher	*Contopus cooperi*	Special Concern	Threatened	Threatened	S3B,S3M	At Risk	Boreal forests or meadows, rivers and streams.
Common Nighthawk	*Chordeiles minor*	Special Concern	Threatened	Threatened	S3B, S4M	At Risk	Open area habitats, abandoned agriculture areas, disturbed areas, bogs, rock outcrops and gravel roofs.
Bald Eagle	*Haliaeetus leucocephalus*	Not at Risk	-	Endangered	S3B	At Risk	Nests in forests near water bodies and avoids heavily developed areas.

Notes:
1. Committee on the Status of Endangered Wildlife in Canada
2. Species at Risk Act
3. Sub-national (provincial) rank)
4. NBDNRED general status of Wildlife Species

The remaining 13 wildlife species recorded by ACCDC are considered SOCC.

Table 3.4 summarizes these species and their preferred habitat.

Table 3.4 Summary of Wildlife SOCC Within 5 km of the Site

Common Name	Scientific Name	S-Rank[1]	NBDNRED General Status[2]	Nesting Habitat
Cooper's Hawk	*Accipiter cooperii*	S1S2B, S1S2M	May be at risk	Forests, woodlands, parks, quiet residential areas, fields.
Lesser Scaup	*Aythya affinis*	S1B, S4M	Secure	Fresh and brackish wetlands, ponds, lakes, reservoirs, coastal estuaries, and coastal bays.
Cliff Swallow	*Petrochelidon pyrrhonota*	S2S3B, S2S3M	Secure	Bridges, farms, cliffs, and river bluffs.
Turkey Vulture	*Cathartes aura*	S3B, S3M	Secure	Open woodlands, farms, roadsides, and landfills.
Killdeer	*Charadrius vociferus*	S3B, S3M	Secure	Open habitat, pastures, plowed fields, large lawns, mudflats, lake shores, coastal estuaries.
Warbling Vireo	*Viero gilvus*	S3B, S3M	Secure	Deciduous woodlands.
Indigo Bunting	*Passerina cyanea*	S3B, S3M	Secure	Brushy areas along forest edges.
Brown-headed Cowbird	*Molothrus ater*	S3B, S3M	May be at risk	Grasslands with low and scattered trees, forest edges, shrub thickets, fields, pastures, orchards, and residential areas.
Baltimore Oriole	*Icterus galbula*	S3B, S3M	Secure	Leafy deciduous trees in open woodland or forest edges.
Eastern Kingbird	*Tyrannus tryrannus*	S3S4B, S3S4M	Sensitive	Fields with scattered shrubs and trees, in orchards, and along forest edges.
Spotted Sandpiper	*Actisis macularius*	S3S4B, S5M	Secure	Freshwater lakes, ponds and creeks.
Wilson's Snipe	*Gallinago delicate*	S3S4B, S5M	Secure	Wetland or marsh areas and long rivers and ponds.
Ring-billed Gull	*Larus delawarensis*	S3S4B, S5M	Secure	Urban, suburban, and agricultural areas, estuaries, beaches, mudflats, and coastal waters.

Notes:
1. Sub-national (provincial) rank)
2. NBDNRED general status of Wildlife Species

3.2 Cultural Features

There are no national or provincial parks located within the site or surrounding areas. Two (2) recreational campgrounds; Mulherins Campground and Rapid Brook Campground, are located approximately 1.4 km to the south and 2.5 km to the north of the site, respectively.

There are no federally, provincially, or locally recognized heritage areas located within the site or surrounding areas. The nearest First Nations community is the Tobique First Nations located approximately 20.7 km south/southeast of the site. The Madawaska Maliseet First Nations community is located approximately 56.5 km to the northeast of the site. Both the Tobique and Madawaska Maliseet communities reside on designated reserve lands and maintain the right to harvest natural resources to support their cultural, social, and economic wellbeing.

3.3 Socio-Economic Environment

3.3.1 Existing Land Use

Within the Assessment Area, the neighbouring residential properties are generally located to the east beyond Route 130 and to the south beyond McCluskey Road. The closest residential property is located approximately 902 m east of the site along Route 130. The site is situated in a rural area, approximately 2.7 km south/southwest outside of the limits of the Municipality of Grand Falls / Grand-Sault.

A list of all adjoining property uses is presented in Table 3.5 per SNB's Registry and Mapping Services (SNB Planet, 2021).

Table 3.5 Adjoining Property Land Use

Location Relative to the Site	PID	Land Use
North	65224685	Timberland
Northeast	65083743	Farmland
East	65087892	Farm & Timberland
Southeast	65083776	Farmland
South	65111544	Farmland & Timberland
Southwest	65111536	Timberland
West	65087884	Timberland
North West	65211310	Timberland
	65087058	Timberland

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 site. Neither the site nor any adjoining properties are identified to be federal contaminated sites. The Federal Contaminated Sites mapping, relative to the site, is included in Appendix D.

Property identifies for the site and surrounding properties were searched in SNB, reviewing the Land Gazette for each property. The Land Gazette is an information repository of land-related notices, restrictions, and other information about land parcels (i.e., PIDs). Based on a review of online Land Gazette information, there are no records of contamination or remediation for the site or surrounding properties.

3.3.2 Local Economy and Local Socio-economic Structure

North West Sanitation Services Ltd. services the local economy by providing necessary waste management services to the Municipality of Grand Falls / Grand-Sault and the greater North Western region of the province.

4.0 IDENTIFICATION OF ENVIRONMENTAL IMPACTS AND PROPOSED MITIGATION

The proposed Project involves the transportation and handling of a suitable alternate material to be used as a daily cover at an existing C&D site. The following environmental features have been considered for the identification of environmental impacts in relation to the proposed Project:

- Physical and Natural Features
    - Atmospheric Environment;
    - Terrestrial Environment;
    - Wildlife and Wildlife Habitat;
- Cultural Features
    - Heritage and Cultural Features; and
- Socio-Economic Environment

4.1 Physical and Natural Features

4.1.1 Atmospheric Environment

The Project involves the utilization of the existing highway infrastructure network to transport the material to its destination in Grand Falls. The number of trucks involved will vary between one to three trucks daily and will not significantly change the current use of the highway network. As such, the Project is not anticipated to have any impacts on the regional or local air quality.

Once on site, the material will be handled using the existing equipment currently used to support the operation of the facility. The Project offsets the material currently used as daily cover and consequently the Project will not result in any additional equipment use. As such, the Project is not anticipated to have any impacts on noise generated at the facility.

The required daily cover material is approximately 150 tonnes per week. To generate this amount locally, 45 hours of operating time are required by the on-site equipment consisting of a Komatsu PC 228 USLC excavator and a CAT D6T dozer. In addition, two class 7 dump trucks are used to move material on-site, as required. The fuel consumption of the on-site equipment, as estimated by the Caterpillar Handbook (Edition 41), for the operating conditions under which the daily cover material is generated, is shown in Table 4.1. Fuel consumption rates for the dump trucks were provided by the proponent (personal communication on June 2, 2021).

Table 4.1 On-site Equipment Fuel Consumption

Equipment	Hours	Fuel Consumption Rate (L/hr)	Fuel Consumed (L)
Komatsu PC 228 USLC excavator	10	26.5	265
CAT D6T dozer	15	22.7	340.5
Two class 7 dump trucks	20	12.1	242
Total Fuel Consumption (L)			847.5

The alternate daily cover material will be transported from Quebec by means of traditional class 7 and/or class 8 trucks. A distance of 1830 kilometers will be travelled on a weekly basis. The associated fuel consumption rates are shown in Table 4.2; based on an industry study of fuel efficiency benchmarking in Canada's trucking industry which indicates an average fuel consumption of 39.5 L/100km for class 7 and class 8 trucks (OEE, 2000).

Table 4.2 Transport Truck Fuel Consumption

Equipment	Distance Driven (km)	Fuel Consumption Rate (L/100km)	Fuel Consumed (L)
Class 7 or 8 transport trucks	1,830	39.5	723
Total Fuel Consumption (L)			723

The US EPA references a common conversion factor of 10,180 grams of CO_2 emissions per gallon (3.78541 liters) of diesel fuel consumed (Federal Register 2010). This value assumes that all the carbon in the diesel fuel is converted to CO_2. Based on the above fuel consumption volumes, the CO_2 emissions resulting from the use of on-site equipment and use of transport trucks is 2.28 and 1.97 tonnes of CO_2 respectively as shown in Table 4.3. The implementation of the Project is therefore anticipated to result in a reduction of 13.6 percent in CO_2 emissions.

Table 4.3 CO_2 Emission Reduction

Source	Fuel Consumed (L)	CO_2 Emissions emitted (tonnes)
On-site Equipment	847.5	2.28
Transport Trucks	723	1.97
Net reduction (%)		13.6

In relation to greenhouse gas emissions, the Project is anticipated to result in a net reduction of emissions when comparing the amount of fuel consumed to transport the alternate material from Quebec to the fuel consumed to operate the on-site equipment specifically for the generation of the currently used, locally sourced daily cover material. The overall net reduction resulting from the Project is estimated to be approximately 13 percent.

Although impacts are not anticipated, NWSS will continue to minimize any potential impacts to the atmospheric environment by continuing to:

- Use properly licensed/equipped trucks and properly maintained equipment;
- Utilise mufflers and sound deadening devices on equipment as appropriate;
- Collect any unintentionally displaced debris that has accumulated in the buffer area on a regular basis; and
- Operate the facility in accordance with the Approval to Operate and maintain the treed buffer between the operational area and the property lines.

4.1.2 Terrestrial Environment

The Project does not involve any new construction activity and the currently existing components of the facility will be utilized in the Project's implementing. Given that there are no physical modifications required to implement the Project, it is anticipated that there are no impacts to any of the watercourses and wetlands, the closest of which are located more than 300 metres from the operational area.

The facilities' operational area or development footprint will not be altered as a result of the Project, nor will the Project generate or cause any changes to emissions, discharges or odours being generated by the facility. As such, there are no anticipated impacts on wildlife or wildlife habitat.

Even though impacts on the terrestrial environment are not anticipated, the facility will continue to operate in accordance with its approval to operate, and maintain the required treed or bermed buffer zone between the facilities' operational area and the property lines to continue to minimize environmental impacts.

4.2 Cultural Features

The Project does not involve any new construction and/or expansion of the facilities' currently utilized operational area or development footprint. As such there are no anticipated impacts on cultural and/or heritage features.

4.3 Socio Economic Environment

The Project involves the utilization of existing highway infrastructure for the transportation of the material and the use of the material will be confined to the existing operational area of the facility. There are no anticipated changes to emissions, discharges or odours being generated by the facility. As such, there are no anticipated impacts to the surrounding properties.

Although there are no anticipated impacts on the surrounding properties or socio economic environment of the surrounding area, NWSS will continue to operate the facility in accordance with the requirements of the Approval to Operate. Specifically, NWSS will maintain the required treed or bermed buffer zone between the facilities' operational area and the property lines. In doing so the various separation distances to potential receptors will continue to be maintained and NWSS will continue to minimize potential environmental impacts on surrounding properties.

4.4 Accidents, Malfunctions and Unplanned Events

The Project proposes to utilize the existing highway infrastructure to transport the material from its origin to the existing C&D site in Grand Falls, New Brunswick. Any accidents, malfunctions and unplanned events would be managed through the currently existing emergency response systems associated with the operation of the highway infrastructure. As such, there are no impacts on the use of the highway infrastructure system.

Once on-site, NWSS assumes responsibility for the response to any accidents, malfunctions and/or unplanned events. These events should be rare based on the facilities' existing record/history in this regard as there have not been any accidents or spills since the establishment of the facility. As such, the Project is not anticipated to have any impacts on the facility's ability to respond to any unplanned events or accidents.

Although the use of the material as daily cover in the Province of Quebec has never lead to any issues with fire, during the implementation of the Project, NWSS will place a 5 cm layer of conventional daily cover material once a week in the active C&D cell to further mitigate this risk. The layer of conventional daily cover material will provide a fire-break in the unlikely/improbable event a fire were to occur.

Even though impacts are not anticipated, NWSS will continue to operate in accordance with the Approval to Operate and manage and report any accidents or unplanned events accordingly. In doing so, NWSS will continue to minimize potential environmental impacts from accidents and unplanned events.

4.5 COVID-19 Related

The global pandemic and manifestation of the coronavirus (COVID-19) has become an issue that effects all New Brunswickers, its business and all facets of the economy. As a result, this issue warrants consideration during the environmental review and approval processes for proposals that may be influenced by the pandemic, or alternatively, may have an impact on the pandemic.

The Project does involve the daily importation of the material from the Province of Quebec into the Province of New Brunswick utilizing the inter-provincial highway infrastructure network. This interprovincial travel has the potential to contribute to the transmission of COVID-19 to New Brunswick residents as a result of any interaction of the truck drivers with individuals along the transportation route and/or at its destination.

The McCluskey Road C&D facility is located approx. 83 km from the Quebec/New Brunswick border and involves an approximate driving time of 1 hr one way. The return trip would be completed in approximately 2 hrs plus the time needed to unload the material and load cargo (oversized tires) for the return trip.

Proposed mitigation to minimize or avoid the potential transmission of COVID-19 include the following measures:

- NWSS will apply and qualify for all applicable NB travel approval(s) through WorkSafeNB as required at time of Project implementation/initiation;
- Drivers will ensure sufficient fuel is taken on within the Province of Quebec to enable the completion of the return trip without having to stop for fuel in New Brunswick;
- Drivers will bring sufficient supplies, food and other required goods to avoid having to purchase these in New Brunswick;
- All reasonable steps will be taken to minimize or avoid stopping in New Brunswick other than at the McCluskey Road C&D facility in Grand Falls;
- If stops are required, sanitation devices are utilized to properly disinfect all items touched;
- Wearing facemasks, washing hands protocols are followed; and
- At the destination, interaction with facility staff is minimized and any necessary interaction will be done incompliance with social distancing protocols and NB Department of Health requirements.

The above mitigation measures will complement the COVID-19 operational plan currently being implemented by NWSS, a copy of which is attached in Appendix C.

5.0 PUBLIC AND FIRST NATIONS INVOLVEMENT

5.1 First Nations Involvement

The Province of New Brunswick has a constitutional Duty to Consult, and accommodate where required, Aboriginal Peoples whenever a decision or activity is being contemplated that could adversely impact Aboriginal or Treaty rights. As per the Interim Proponent Guide published by the Province of New Brunswick, project proponents play a valuable role in the consultation process by engaging Aboriginal Peoples in the development of any project or proposal.

In keeping with the above guidance, a notification containing a high level description of the proposal was sent on April 14, 2021 to Neqotkuk (Tobique) and Matawaskiye (Madawaska Maliseet) First Nations, their Consultation Coordinator as well as the Wolastoqey Nation of New Brunswick EIA Coordinator.

Any comments and/or questions will be addressed and responded to and summarized in the First Nation Involvement/Public Consultation Summary report to be submitted to NBDELG.

5.2 Public and Stakeholder Involvement

An information letter will be send to adjoining landowners and local MLAs as well as the Mayor of Grand Falls. The information letter will provide a description of the Project. Any comments and/or questions will be addressed and responded to and summarized in the First Nation Involvement/Public Consultation Summary report to be submitted to NBDELG.

A copy of this registration document will be available for viewing at the NWSS Transfer Station located at 29 Waddell Loop, Saint-André, New Brunswick.

6.0 APPROVAL OF THE PROJECT

Subsequent to the receipt of a Certificate of Determination, an amendment to the approval to operate will be obtained if required.

7.0 FUNDING

The Project will be funded solely by NWSS.

8.0 SIGNATURE

Paul Vanderlaan, P. Eng.
Environmental Regulatory Specialist

Emily Piggott, M. Eng., EIT
Engineer-in-Training

9.0 REFERENCES

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APPENDIX A

Quebec Authorization & Material Analysis Results

Ministère du
Développement durable,
de l'Environnement
et des Parcs
Québec

Rimouski, le 3 mai 2011

CERTIFICAT D'AUTORISATION
Loi sur la qualité de l'environnement
(L.R.Q., c. Q-2, article 22)

Régie intermunicipale des déchets de Témiscouata
369, avenue Principale
Dégelis (Québec) G5T 2G3

N/Réf. : 7522-01-01-0001905
N/Doc. : 400812462

Objet : Utilisation d'un matériau alternatif de recouvrement journalier

Mesdames,
Messieurs,

À la suite de votre demande de certificat d'autorisation du 19 avril 2011, reçue le 27 avril 2011 et complétée le 29 avril 2011, j'autorise, conformément à l'article 22 de la *Loi sur la qualité de l'environnement* (LRQ, chapitre Q-2), la titulaire ci-dessus mentionnée, à réaliser le projet décrit ci-dessous :

Utilisation d'un résidu de broyage provenant des activités de récupération de matériaux secs de l'entreprise Conteneurs KRT inc., comme matériau alternatif de recouvrement journalier des matières résiduelles au lieu d'enfouissement technique (LET) de Dégelis.

Le projet sera réalisé à l'intérieur des cellules d'enfouissement autorisées du lieu d'enfouissement technique (LET) de Dégelis, localisé sur une partie des lots 23-B, 24-B et 25-B, rang A Est de la rivière Madaswaska, cadastre de la seigneurie de Madaswaska, municipalité de Dégelis, MRC de Témiscouata.

Les documents suivants font partie intégrante du présent certificat d'autorisation :

- Demande de certificat d'autorisation pour un projet d'utilisation d'un matériau alternatif de recouvrement journalier au lieu d'enfouissement technique (LET) de Dégelis, signée par Maxime Groleau, directeur général de la RIDT, le 19 avril 2011, 1 page et 4 annexes.

- Lettre de renseignements complémentaires à la demande de certificat d'autorisation, signée par Maxime Groleau, le 29 avril 2011, 1 page.

En cas de divergence entre ces documents, l'information contenue au document le plus récent prévaudra.

Le projet devra être réalisé et exploité conformément à ces documents.

Le présent certificat d'autorisation permet la réalisation du projet décrit ci-dessus à condition que celui-ci soit conforme aux données et renseignements énoncés plus haut.

En outre, ce certificat d'autorisation ne vous dispense pas d'obtenir toute autorisation requise par toute loi ou tout règlement le cas échéant.

Pour le ministre,

JMD/NR/sj

Jean-Marie Dionne
Directeur régional de l'analyse et de
l'expertise du Bas-Saint-Laurent
et de la Gaspésie–Îles-de-la-Madeleine

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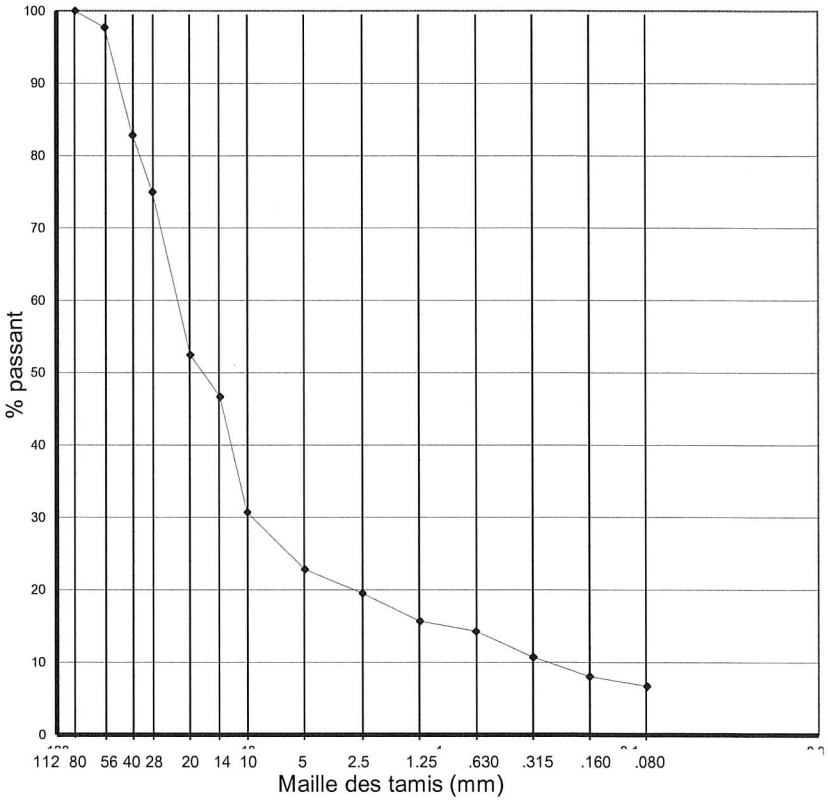
Tél.: (418) 860-2740
Téléc.: (418) 860-2741
Couriel: laboratoire@lerinc.ca

RL-6176 (14/10/22)

ANALYSE DES SOLS ET GRANULATS

Soumis à :	Conteneurs KRT	**No. de projet:**	9112-00
Lieu du projet:	N/D	**No échantillon:**	21790
Provenance :	RDL	**Prélevé par:**	Client
Nature de l'éch. :	Indéterminé	**Date:**	2019-05-02
Localisation :	N/D		
Usage prévu:	recouvrement	**Reçu le:**	2019-05-02

Tamis	Séparé	Combiné	Exigences
112		100	
80		100	
56		98	
40		83	
31,5		75	
20		52	
14		47	
10		31	
5		23	
2,5		20	
1,25		16	
0,630		14	
0,315		11	
0,160		8	
0,080		6,7	



ESSAIS

Coéfficient de perméabilité (K): 5,3 x 10^{-4} cm/s

REMARQUES: * Hors norme au tamis équivalent

PRÉPARÉ PAR: SN APPROUVÉ PAR:

DATE: 2019-05-15 DATE: 2019-05-15

Note: Les résultats des essais ne se rapportent qu'à l'échantillon analysé

LABORATOIRE
D'EXPERTISES
DE RIVIÈRE-DU-LOUP INC.
Géotechnique, environnement
et ingénierie des sols et matériaux

145, rue Beaubien
Rivière-du-Loup
Québec G5R 1H9
Tél.: (418) 860-2740
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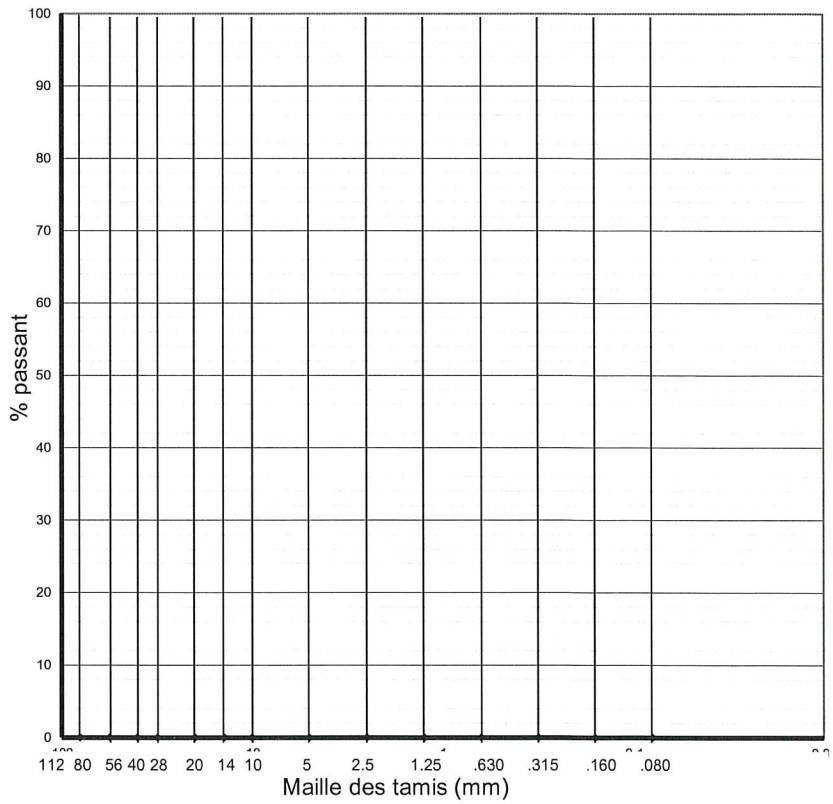
0,080			



ESSAIS

répartirion des matériaux en poids :

Bois : 80,66 %
Plastique : 1,56 %
Verre : 3,73 %
Céramique : 12,57 %
mousse,papier : 0,29 %
Bardeau d'asphalte : 1,19 %

REMARQUES: * Hors norme au tamis équivalent

PRÉPARÉ PAR: SN
DATE: 2019-05-15

APPROUVÉ PAR:
DATE: 2019-05-15

Note: Les résultats des essais ne se rapportent qu'à l'échantillon analysé

APPENDIX B

NBDELG Approval to Operate

APPROVAL TO OPERATE

S-2816

Pursuant to paragraph 8(1) of the *Water Quality Regulation - Clean Environment Act,* this Approval to Operate is hereby issued to:

NORTH WEST SANITATION SERVICES LTD. - SERVICES SANITAIRES DU NORD-OUEST LTEE

for the operation of the

Grand Falls Construction & Demolition Site

Description of Source:	**A site to be used for the disposal of inert debris from the construction, renovation, or demolition of a building/structure**
Source Classification:	**Fees for Industrial Approvals Regulation - Clean Water Act** **Class 17**
Parcel Identifier:	**65087819**
Mailing Address:	**29 Waddell Loop** **Box 7871** **Grand Falls, NB E3Z 3E8**
Conditions of Approval:	**See attached Schedule "A" of this Approval**
Supersedes Approval:	**S-1928**
Valid From:	**June 15, 2016**
Valid To:	**June 14, 2021**

Recommended by: _____

Issued by: _____ June 9, 2016

for the Minister of Environment and Local Government — Date

SCHEDULE "A"

A. GENERAL INFORMATION

APPLICABILITY:

This standard applies to all construction and demolition (C&D) debris disposal sites operating in New Brunswick and may be cited as the "Sector Standard for Construction and Demolition Debris Disposal Sites".

DEFINITIONS

"Approval Holder" means the person or entity to whom the Approval is issued, as named on the first page (certificate) of the Approval.

"Department" means the New Brunswick Department of the Environment and Local Government.

"Facility" means the property, buildings and equipment located on the property identified by the Parcel Identifier(s) on the certificate page (first page) of this Approval, and all contiguous property in the title and/or control of the Approval Holder at that location.

"Petroleum Product" means a mixture of hydrocarbons, or their by-products, of any kind and in any form, including airplane fuel, asphalt, bunker "C" oil, crude oil, diesel fuel, engine oil, fuel oil, gasoline, kerosene, lubricants, mineral spirits, naphtha, petroleum based solvents regardless of specific gravity, transformer oil and waste petroleum products and excluding propane and paint.

"after hours" means the hours when the Department's offices are closed. These include statutory holidays, weekends, and the hours before 8:15 a.m. and after 4:30 p.m. from Monday to Friday.

"normal business hours" means the hours when the Department's offices are open. These include the period between 8:15 a.m. and 4:30 p.m. from Monday to Friday excluding statutory holidays.

"environmental emergency" means a situation where there has been or will be a release, discharge, or deposit of a contaminant or contaminants to the atmosphere, soil, surface water, and/or groundwater environments of such a magnitude or duration that it could cause significant harm to the environment or put the health of the public at risk.

"statutory holiday" means New Year's Day, Good Friday, Easter Monday, the day fixed by proclamation of the Governor-in-council for the celebration of the birthday of the Sovereign (Victoria Day), Canada Day, New Brunswick Day, Labour Day, the day fixed by proclamation of the Governor-in-council as a general day of Thanksgiving, Remembrance Day and Christmas Day and Boxing Day. If the Statutory Holiday falls on a Sunday, the following day shall be considered as the Holiday.

"Accredited" means accreditation to ISO/IEC 17025 by the Standards Council of Canada (SCC), the Canadian Association for Laboratory Accreditation Inc. (CALA), or accreditation to ISO/IEC 17025:2005 from another body that is recognized to grant such accreditation per ISO/IEC 17011 criteria.

"disposal cell" means the area at the Facility approved in writing by the Department for the disposal of C&D debris.

"designated sorting area" means a location at the Facility, approved in writing by the Department, which may be used to scrutinize loads of material intended for disposal.

"Site Operations Plan" means a detailed document containing, but is not limited to, a visual depiction of the facility, a delineation of the disposal cell(s), surface water management features, the location of the ground water monitoring wells and the location of a designated sorting area as approved by the Department.

"friable asbestos" means waste material containing asbestos fibre or asbestos dust in a concentration greater than 1% by weight that is not tightly bound within a solid matrix such that it is easily crumbled by the hands.

"C&D debris" means:

a) concrete, brick and untreated wood,
b) siding, ceiling tile, gypsum board and insulation,
c) asbestos that is not friable asbestos,
d) solid roofing materials such as asphalt shingles - no cans, drums, or other packages (empty or otherwise) of roofing adhesives, tar, or waterproofing compounds,
e) glass from doors and windows,
f) metal, wood, fibreglass and durable plastic structural materials,
g) wiring and incandescent light fixtures that do not contain fluorescent tubing/lighting,
h) toilets, bathtubs, wash basins and plumbing fixtures,
i) floor coverings attached to a building during demolition,
j) broken and aged asphalt or chip seal pavement only, no cans, drums, or other packages (empty or otherwise) of sealers, adhesives, tar or waterproofing compounds or new asphalt product
k) any mixture of (a) through (i), and
l) other inert material approved by the Department that has been obtained during the construction, renovation or demolition of a building or structure.

"unacceptable materials" means, but is not limited to:

a) burnt C&D debris,
b) wastes or other materials obtained from commercial, industrial and manufacturing sources,
c) debris from a building that has or may have manufactured, contained, transferred or distributed contaminated or hazardous products (such as a pesticide storage warehouse),
d) debris that contains PCB's (polychlorinated biphenyls),
e) debris that contains lead paint of a known concentration greater than 1000 ppm (parts per million), or that has been deemed lead leachable toxic (exceeds 5 mg/L) or contains lead paint that is flaking/chipping/peeling,
f) wastes or debris that originates from outside of the Province of New Brunswick unless specifically approved by the Department following an evaluation under *Environmental Impact Assessment Regulation - Clean Environment Act*, and
g) any debris not listed under C&D debris.

TERMS AND CONDITIONS

The Approval Holder shall operate the facility in accordance with the following:

EMERGENCY REPORTING

1a. Immediately following the discovery of an environmental emergency, a designate representing the Approval Holder shall notify the Department in the following manner:

During normal business hours, telephone the Department's applicable Regional Office **until personal contact is made** (i.e. no voice mail messages will be accepted) and provide all information known about the environmental emergency. The telephone number for the applicable Regional Office is provided below.

After hours, telephone the Canadian Coast Guard **until personal contact is made** and provide all information known about the environmental emergency. The telephone number for the **Canadian Coast Guard** is **1-800-565-1633.**

Within 24 hours of the time of initial notification, a **Preliminary Emergency Report** shall be filed by the Approval Holder to the applicable Regional Office within the Department and the Department's Central Office using the fax numbers provided below. The Preliminary Emergency Report shall clearly communicate as much information that is available at the time about the environmental emergency.

1b. Within five (5) days of the time of initial notification, a **Detailed Emergency Report** shall be filed, by the Approval Holder to the applicable Regional Office within the Department and the Department's Central Office using the fax numbers provided below. The Detailed Emergency Report shall include, as a minimum, the following: i) a description of the problem that occurred; ii) a description of the impact that occurred; iii) a description of what was done to minimize the impact; and iv) a description of what was done to prevent recurrence of the problem.

Office Location	Phone	Fax
Bathurst Regional Office	(506) 547-2092	(506) 547-7655
Miramichi Regional Office	(506) 778-6032	(506) 778-6796
Moncton Regional Office	(506) 856-2374	(506) 856-2370
Saint John Regional Office	(506) 658-2558	(506) 658-3046
Fredericton Regional Office	(506) 444-5149	(506) 453-2893
Grand Falls Regional Office	(506) 473-7744	(506 475-2510
Central Office	---	(506) 457-7333

LIMITS

2. The Approval Holder shall ensure that odour, dust, noise, and/or site run-off being released or discharged from the Facility does not cause adverse impacts to any off-site receptor. In the event impacts are suspected by the Department to be adversely impacting any off-site receptor, the Approval Holder may be required to investigate the degree of impact and/or develop, submit, and implement a Prevention and Control Plan in accordance with a timetable established by the Department. The plan shall be submitted in writing to the Department for review and approval prior to implementation.

FACILITY MANAGEMENT

3. The Approval Holder shall ensure that the Facility is operated in compliance with the most recently approved Site Operations Plan and the Department's Construction and Demolition Debris Disposal Site Siting Standard and Application Requirements.

4. The Approval Holder shall restrict access to the Facility by means of a fence and/or locked gate (or other barrier approved by the Department) during non-working hours or when no on-site supervision is being provided.

5. The Approval Holder shall maintain an all-weather access road to the Facility.

6. The Approval Holder shall ensure that C&D debris is disposed of in the disposal cell, and at least 1.5 m above bedrock and the seasonal high groundwater table.

7. The Approval Holder shall establish and maintain a treed or bermed buffer zone between the disposal cell and the property lines.

8. The Approval Holder shall maintain a minimum of three monitoring wells to facilitate ongoing groundwater monitoring at the Facility. The location, construction and monitoring of these wells shall be supervised and/or conducted by a qualified professional. Well logs and groundwater test results shall be submitted to the Department for review prior to acceptance of debris at the Facility.

9. In the event of Facility closure, the Approval Holder shall ensure that a Site Closure Plan is prepared for complete site rehabilitation, ongoing monitoring, and leachate treatment if appropriate. The plan shall be submitted to the Department for review and comment **at least six (6) months** prior to the anticipated closure date. Once approved by the Department, the Approval Holder shall ensure that the Site Closure Plan is implemented as described. The Site Closure Plan shall include, but is not limited to, an updated Site Operations Plan, recommendations for continued groundwater monitoring, and an engineering proposal for the site rehabilitation and closure. The Site Closure Plan must be approved by a member in good standing of the Association of Professional Engineers and Geoscientists of the Province of New Brunswick. Once closure activities are completed, the Approval Holder shall submit as-built drawings to the Department.

OPERATING CONDITIONS

10. The Approval Holder shall provide on-site supervision when C&D debris is being transported to the Facility.

11. The Approval Holder shall ensure that all loads of C&D have been properly scrutinized before disposal.

12. The Approval Holder shall ensure that all unacceptable materials, including those in a designated sorting area, are either immediately placed in a dumpster (or other temporary storage container approved by the Department) or immediately removed from the Facility and taken to the nearest regional sanitary landfill (or other acceptable location approved by the Department) for disposal.

13. The Approval Holder shall ensure that all C&D debris not destined for reuse or recycling is placed in the disposal cell.

14. The Approval Holder shall not burn C&D debris or any other material at the Facility.

15. The Approval Holder shall ensure that no C&D debris is disposed of in standing water at the Facility.

16. The Approval Holder shall ensure that no C&D debris is placed within 10 metres of any groundwater monitoring well at the Facility.

17. The Approval Holder shall ensure that the C&D debris disposed of at the Facility is compacted to minimize voids. Compaction with a dozer or equivalent is recommended.

18. The Approval Holder shall ensure that the disposal cell is shaped to minimize the generation of leachate from precipitation.

19. The Approval Holder shall ensure that the side slopes of the disposal cell are 4 horizontal to 1 vertical or flatter, properly stabilized (using riprap or a vegetative layer for example) and maintained to limit erosion.

20. The Approval Holder shall ensure that all exposed C&D debris in the disposal cell is covered weekly with at least 150 mm of clean granular material.

21. The Approval Holder shall ensure that portions of the disposal cell having reached final grade and/or which are no longer in use are covered with at least 300 mm of low permeability soil and 150 mm of growing medium, and vegetated.

22. The Approval Holder shall ensure that the Facility is maintained such that surface water is prevented from entering the disposal cell.

23. The Approval Holder shall ensure that perimeter ditches are sloped and maintained to prevent ponding.

24. The Approval Holder shall ensure that written permission from the Department is obtained if calcium chloride or other chemical compounds are to be used for dust control at the Facility. The use of a petroleum product (oil) for dust control is prohibited.

TESTING AND MONITORING

25. The Approval Holder shall ensure that the groundwater monitoring wells at the Facility are sampled at least twice each calendar year by a qualified technician. The groundwater monitoring wells must be sampled at seasonal intervals that will provide an accurate representation of groundwater quality at the Facility. If the disposal cell discharges surface water to the environment, surface water shall be sampled for the same parameters and at the same frequency as groundwater.

26. The Approval Holder shall ensure that the following field parameters are obtained during each sampling event at the Facility:

    Conductivity
    Dissolved Oxygen
    pH
    Temperature
    Ground water elevations (referenced to geodetic datum)

27. The Approval Holder shall ensure that all required samples are analyzed for the following parameters by an accredited laboratory, whose accreditation includes the analytical method used to make the determination:

BTEX/TPH, GENERAL CHEMISTRY, TRACE METALS

For the purpose of this Approval BTEX/TPH shall include the following analyses:

Benzene	Toluene	Ethylbenzene
Xylene	Total Petroleum Hydrocarbons	

"GENERAL CHEMISTRY" shall include the following analysis:

Ammonia (as N)	Alkalinity (as CaCO3)	Calcium
Chemical Oxygen Demand	Chloride	Colour
Copper	Hardness (as CaCO3)	Iron
Nitrate-Nitrite (as N)	Magnesium	Manganese
o-Phosphate (as P)	Potassium	
r-Silica (as SiO2)		
Sodium	Sulphate	
Suspended Solids		
Total Organic Carbon	Turbidity	Zinc

with the associated calculated parameters: Cation Sum, Anion Sum and % difference.

and "TRACE METALS" shall include the following analyses:

Aluminum	Arsenic	Barium	Boron	
Cadmium	Calcium	Chromium		Copper
Iron	Lead	Lithium		Magnesium
Manganese	Mercury (CVAAS)	Nickel		Potassium
Sodium	Zinc			

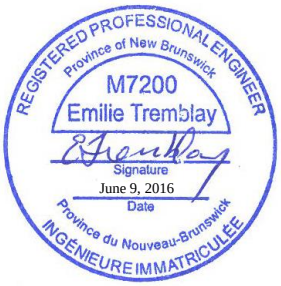
REPORTING

28. In the event of a small spill or leak of liquid materials, the Approval Holder shall act first to contain, and then to clean up the spilled or leaked material and mitigate any resulting impacts as soon as the spill or leak is detected. If the spill or leak results in an "environmental emergency" as defined in this Approval, the Approval Holder shall report the event in accordance with the Emergency Reporting section of this Approval. If the spill or leak is not an "environmental emergency", the Approval Holder shall report this event to the Department's applicable Regional Office by fax, within one business day, identifying the material spilled, the approximate amount of liquid spilled, the location of the spill and the method(s) used to clean up the liquid.

29. The Approval Holder shall ensure that no later than 60 days after each sampling event conducted for the Facility, a sampling report is submitted to the Department. The report must be approved by a person who is a member in good standing of the Association of Professional Engineers and Geoscientists of the Province of New Brunswick or is licensed to practice as a professional engineer pursuant to the Engineering Profession Act. The report shall include, as a minimum, a copy of the analysis, an evaluation and discussion of the results that includes comparisons with previous samples from the Facility, and commentary indicating whether the ground or surface waters have been impacted as a result of the operation of the Facility. Further, if an impact has occurred or is suspected the report must include a proposal for site remediation.

30. The Approval Holder shall ensure that prior to installing or decommissioning any wells at the Facility, a monitoring well plan and schedule is approved in writing by the Department.

Prepared by: _____
Emilie Tremblay, P.Eng.
Approval Engineer, Impact Management



APPENDIX C

NWSS COVID-19 Operational Plan

COVID-19 OPERATIONAL PLAN

Once completed, print and keep a copy of the plan in your place of business. Inform the appropriate employee(s) of the location of the printed plan. If procedures and steps are modified, print a new copy of the plan and replace the existing copy on location. The plan should be communicated to employees.

COVID-19 Operational Plan – NORTHWEST SANITATION SERVICES LTD.

Date: May 1st 2020

Location: 29 Waddell loop, Grand Falls, NB

COVID-19 SIGNAGE IN PUBLIC AREAS

You must affix signage on proper hand hygiene, respiratory hygiene, and physical distancing throughout the facility and outdoor settings as applicable. At a minimum, signage must be placed at any common entrance and location where people tend to congregate.

The required signage has been affixed in this location in the appropriate locations:	Yes	No	N/A
Public Health Authority Sign Colour / Black and White (throughout the facility and outdoor as applicable)	X	☐	☐
Physical Distancing Sign (Throughout the facility and outdoor as applicable)	X	☐	☐
Entry Screening Sign (Points of entry)	X	☐	☐
Hand Washing Sign (Washrooms and handwashing stations if applicable)	X	☐	☐
Hand sanitizer Sign (Washrooms and handwashing stations if applicable)	X	☐	☐
A list of important emergency contact information (This would include a list of local public health screening centers, mental health resources, self screening links and the contact information for public health authorities)	X	☐	☐

PHYSICAL DISTANCING MEASURES

You must ensure physical distancing of 2 meters (6 feet) at all times for both your clients and employees in your business.

- Clients and employees must not be permitted to congregate in groups;
- Where possible, a designated staff should monitor adherence to physical distancing requirements on premises;
- Customers may partake in their activity while maintaining physical distancing requirements;
- The workplace may need to be altered to ensure physical distancing requirements (i.e. arrange furniture position to allow 2-meter rule, provide visual cues on floor for distancing and for directional movement of clients);
- Situations where interfacing between staff and customers is common might deserve special considerations for mutual protection (i.e. installing a plexiglass screen at the cash, have the customer service representative wear a reminder for customers to keep their distance);
- In elevators, the number of people getting into each car to no more than 2 at a time. People should consider only riding the elevator with their own family, taking the stairs, or waiting for the next elevator.

The following physical distancing measures are in place at this location:

Plexiglass install at the front desk .
Table install to make sure we have the proper distancing.
Door is locked at all time and customer must knock to be able to enter the premises.
Every customer / employee must wear face mask.
Only 1 customer or employee at the time in our office.
No group meeting between employees is permitted in wash bay and garage.

Employees receive every update about the Covid-19 and must follow guidelines.

Every truck driver have the following items in the truck:
Hand sanitizer
Gloves
Mask
Desinfectant
Employee on the road have to respect physical distancing and wear mask.

The following employee(s) is(are) responsible for monitoring adherence to physical distancing requirements at this location:

Regis Tremblay	Paul Savage
Sylvie Perreault	Verne Savage

CLEANING AND DISINFECTION PROCEDURES

You must ensure that all common areas of your business are cleaned and disinfected twice daily, or more often as required (i.e., if soiled).

- Items such as countertops, chairs (including below the front of the seat), rental/shared equipment, cashier equipment, light switches, public washrooms, doorknobs, and furniture need to be disinfected more frequently throughout the day.
- Regular household cleaners, disinfectant wipes or a diluted bleach solution can be used according to the label directions. Information on cleaning and disinfection can be found on the Public Health Agency of Canada website. Disposable gloves should be used when cleaning surfaces. Employees and clients should be removed from the area during cleaning.
- You must ensure that all the necessary supplies such as hot/cold potable runningwater, liquid soap, paper towel, and garbage bins, for handwashing; or minimum 60% alcohol based hand sanitizer; toilet paper, cleaning and disinfecting supplies and personal protection equipment (non-medical masks and disposable gloves) are available as appropriate.

The following cleaning and disinfection procedures are in place at this location:

Everything is disinfected after each customer / employee.
Door knob , desk surface, Debit Machine

The following cleaning and disinfection supplies are available at this location:

Alcool Base disinfectant
Hand Sanitizer
Skip the Germs Hand Lotion
Desinfectant wipes

The following employee(s) is(are) responsible for the monitoring of supplies to ensure stock is maintained during operating hours:

Regis Tremblay	Paul Savage
Sylvie Perreault	

The following employee(s) is(are) responsible for maintaining the house cleaning and disinfecting log:

Regis Tremblay	

SCREENING OF EMPLOYEES BEFORE EVERY SHIFT

Consider using both passive (i.e. signage) and active (i.e. asking questions) screening measures:

- Passive screening would be to have a clear and visible sign to warn clients and/or customers not to enter the facility if experiencing symptoms and to give them an expectation as to the etiquette or protocol they should expect to follow within the business.
- Active screening – would be implemented and supported by a Business COVID-19 Health & Safety policy. Such a policy would cover reasonable grounds for testing or protocol should an employee be suspected on having symptoms. These protocols could include:
    - Instruct employees to self- monitor for symptoms;
    - Instruct employees to use a self-assessment tool if they need help determining whether they should seek further care;
    - Consider having a screener at the facility entrance(s) to conduct active screening of employees and visitors or reminders of protocol within the workplace. Please remember that any screening should have reasonable cause. Suggestions for consideration might be:
        - Pre-screening employees before the beginning of each shift by using the Screening Questionnaire for COVID-19
        - Advising those who are either symptomatic and/or have been advised by Public Health to self-isolate, to remain home and not enter the premises
        - Provide PPE
        - Ensure to protect all personal information in such a manner as to protect the personal privacy of employees
        - Temperature checks (only with reasonable cause)
        - Contact the local public health authority and business owner/HR contact should there be a confirmed or suspected case

The following employee(s) is(are) responsible for pre-screening employees at the beginning of their shifts:

Every employee must take their temperature and monitor their symptoms.

If any fever or symptoms, they must call to advise supervisor.

APPENDIX D

Existing Site Condition Records Reviewed

Toporama

April 13, 2021

1:39,094

0 0.325 0.65 1.3 mi

0 0.5 1 2 km

Natural Resources Canada | Ressources naturelles Canada

Canada

New Nouveau Brunswick

Environment

Report Number **461**

Well Driller's Report

Date printed 4/13/2021

Drilled by

Well Use	Work Type	Drill Method	Work Completed
Drinking Water, Domestic	New Well	Rotary	05/01/2002

Casing Information

Casing above ground

Drive Shoe Used?

Well Log	Casing Type	Diameter	From	End	Slotted?
461	**Steel**	**15.24cm**	**0m**	**18.29m**	

Aquifer Test/Yield

Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
Air	3.05m *(BTC - Below top of casing)*	27.3 lpm	1hr	0m	22.75 lpm	No	0 lpm

Well Grouting

There is no Grout information.

Drilling Fluids Used
Water

Disinfectant
Bleach (Javex)
Qty 0L

Pump Installed
N/A
Intake Setting (BTC)
44.20m

Driller's Log

Overall Well Depth
50.29m

Bedrock Level
5.79m

Well Log	From	End	Colour	Rock Type
461	**0m**	**0.30m**	**Brown**	**Topsoil**
461	**0.30m**	**5.79m**	**Brown**	**Gravel**
461	**5.79m**	**9.75m**	**Brown**	**Sand**
461	**9.75m**	**15.54m**	**Blue**	**Clay**
461	**15.54m**	**17.37m**	**Brown**	**Fine Sand**
461	**17.37m**	**17.98m**	**Brown**	**Coarse Gravel**
461	**17.98m**	**50.29m**	**Blue**	**Rock**

Water Bearing Fracture Zone

Well Log	Depth	Rate
461	**18.29m**	**27.3 lpm**

Setbacks

Well Log	Distance	Setback From
461	**18.29m**	**Septic Tank**
461	**30.48m**	**Leach Field**
461	**106.68m**	**Right of any Public Way Road**

Drilled by

Well Use	Work Type	Drill Method	Work Completed
Drinking Water, Domestic	New Well	Rotary	05/01/2002

Casing Information

Casing above ground

Drive Shoe Used?

Well Log	Casing Type	Diameter	From	End	Slotted?
461	Steel	15.24cm	0m	18.29m	

Aquifer Test/Yield

Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
Air	3.05m	27.3 lpm	1hr	0m	22.75 lpm	No	0 lpm
	(BTC - Below top of casing)						

Well Grouting

There is no Grout information.

Drilling Fluids Used
Water

Disinfectant
Bleach (Javex)

Qty 0L

Pump Installed
N/A

Intake Setting (BTC)
44.20m

Driller's Log

Well Log	From	End	Colour	Rock Type
461	0m	0.30m	Brown	Topsoil
461	0.30m	5.79m	Brown	Gravel
461	5.79m	9.75m	Brown	Sand
461	9.75m	15.54m	Blue	Clay
461	15.54m	17.37m	Brown	Fine Sand
461	17.37m	17.98m	Brown	Coarse Gravel
461	17.98m	50.29m	Blue	Rock

Overall Well Depth
50.29m

Bedrock Level
5.79m

Water Bearing Fracture Zone

Well Log	Depth	Rate
461	18.29m	27.3 lpm

Setbacks

Well Log	Distance	Setback From
461	18.29m	Septic Tank
461	30.48m	Leach Field
461	106.68m	Right of any Public Way Road

New Nouveau Brunswick

Environment

Report Number **464**

Well Driller's Report

Date printed 4/13/2021

Drilled by

Well Use	Work Type	Drill Method	Work Completed
Drinking Water, Domestic	New Well	Rotary	05/01/2002

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	3.05m *(BTC - Below top of casing)*	27.3 lpm	1hr	0m	22.75 lpm	No	0 lpm

Well Grouting

There is no Grout information.

Drilling Fluids Used
None

Disinfectant
Bleach (Javex)

Qty 0L

Pump Installed
N/A

Intake Setting (BTC)
44.20m

Driller's Log

There is no rock layer information.

Overall Well Depth
50.29m

Bedrock Level
5.79m

Water Bearing Fracture Zone

There is no water bearing fracture zone information.

Setbacks

There is no Setback information.

Drilled by

Well Use	Work Type	Drill Method	Work Completed
Drinking Water, Domestic	New Well	Rotary	05/01/2002

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	3.05m	27.3 lpm	1hr	0m	22.75 lpm	No	0 lpm
	(BTC - Below top of casing)						

Well Grouting

There is no Grout information.

Drilling Fluids Used
None

Disinfectant
Bleach (Javex)

Qty 0L

Pump Installed
N/A

Intake Setting (BTC)
44.20m

Driller's Log

There is no rock layer information.

Overall Well Depth
50.29m

Bedrock Level
5.79m

Water Bearing Fracture Zone

There is no water bearing fracture zone information.

Setbacks

There is no Setback information.

New Nouveau Brunswick

Environment

Report Number **1588**

Well Driller's Report

Date printed 4/13/2021

Drilled by

Well Use	Work Type	Drill Method	Work Completed
Drinking Water, Domestic	New Well	Cable Tool	05/13/2003

Casing Information

Casing above ground

Drive Shoe Used?

Well Log	Casing Type	Diameter	From	End	Slotted?
1588	**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 30min	0m	27.3 lpm	No	0 lpm
	(BTC - Below top of casing)						

Well Grouting

There is no Grout information.

Drilling Fluids Used
None

Disinfectant
Chlorine Pucks
Qty 0L

Pump Installed
Submersible
Intake Setting (BTC)
0m

Driller's Log

Well Log	From	End	Colour	Rock Type
1588	**0m**	**0.91m**	**Brown**	**Topsoil**
1588	**0.91m**	**2.13m**	**Brown**	**Gravel**
1588	**2.13m**	**2.74m**	**Brown**	**Shale**
1588	**2.74m**	**13.11m**	**Grey**	**Sandstone**
1588	**13.11m**	**13.41m**	**Brown**	**Sandstone**
1588	**13.41m**	**53.95m**	**Grey**	**Sandstone**

Overall Well Depth
53.95m

Bedrock Level
2.13m

Water Bearing Fracture Zone

Well Log	Depth	Rate
1588	**13.41m**	**9.1 lpm**
1588	**44.81m**	**13.65 lpm**
1588	**50.60m**	**9.1 lpm**

Setbacks

Well Log	Distance	Setback From
1588	**24.38m**	**Septic Tank**
1588	**30.48m**	**Leach Field**

New Nouveau Brunswick

Environment

Report Number **5160**

Well Driller's Report

Date printed 4/13/2021

Drilled by

Well Use	Work Type	Drill Method	Work Completed
Drinking Water, Domestic	New Well	Rotary	05/30/2006

Casing Information

Casing above ground

Drive Shoe Used?

Well Log	Casing Type	Diameter	From	End	Slotted?
5160	**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	18.29m	9.1 lpm	1hr	18.29m	9.1 lpm	No	0 lpm
	(BTC - Below top of casing)						

Well Grouting

There is no Grout information.

Drilling Fluids Used
None

Disinfectant
Bleach (Javex)

Qty 0L

Pump Installed
Submersible
Intake Setting (BTC)
117.04m

Driller's Log

Well Log	From	End	Colour	Rock Type
5160	**0m**	**0.61m**	**Brown**	**Topsoil**
5160	**0.61m**	**2.13m**	**Brown**	**Clay**
5160	**2.13m**	**3.66m**	**Brown**	**Rock**
5160	**3.66m**	**123.14m**	**Blue**	**Rock**

Overall Well Depth
123.14m

Bedrock Level
2.13m

Water Bearing Fracture Zone

Well Log	Depth	Rate
5160	**46.94m**	**9.1 lpm**

Setbacks

There is no Setback information.

New Nouveau Brunswick

Environment

Report Number **15034**

Well Driller's Report

Date printed 4/13/2021

Drilled by

Well Use	Work Type	Drill Method	Work Completed
Drinking Water, Domestic	New Well	Rotary	10/24/2007

Casing Information — Casing above ground — Drive Shoe Used?

Well Log	Casing Type	Diameter	From	End	Slotted?
15034	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	7.62m *(BTC - Below top of casing)*	31.85 lpm	1hr 30min	7.62m	31.85 lpm	No	0 lpm

Well Grouting

There is no Grout information.

Drilling Fluids Used
None

Disinfectant
Bleach (Javex)
Qty 0L

Pump Installed
Submersible
Intake Setting (BTC)
57.91m

Driller's Log

Well Log	From	End	Colour	Rock Type
15034	0m	0.61m	Grey	Gravel
15034	0.61m	1.52m	Brown	Topsoil
15034	1.52m	3.35m	Grey	Gravel
15034	3.35m	3.66m	Brown	Shale
15034	3.66m	21.34m	Grey	Sandstone
15034	21.34m	21.64m	Grey	Sandstone
15034	21.64m	33.53m	Grey	Sandstone
15034	33.53m	34.14m	Brown	Sandstone
15034	34.14m	48.77m	Grey	Sandstone
15034	48.77m	49.38m	Brown	Sandstone
15034	49.38m	61.57m	Grey	Sandstone

Overall Well Depth
61.57m

Bedrock Level
3.66m

Water Bearing Fracture Zone

Well Log	Depth	Rate
15034	21.34m	4.55 lpm
15034	33.53m	9.1 lpm
15034	48.77m	18.2 lpm

Setbacks

Well Log	Distance	Setback From
15034	60.96m	Right of any Public Way Road

New Nouveau Brunswick

Environment

Report Number **19298**

Well Driller's Report

Date printed 4/13/2021

Drilled by

Well Use	Work Type	Drill Method	Work Completed
Non-Drinking Water, Industrial	New Well	Rotary	09/10/2012

Casing Information

Casing above ground

Drive Shoe Used?

Well Log	Casing Type	Diameter	From	End	Slotted?
19298	**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	1.22m	182 lpm	1hr	12.19m	182 lpm	No	0 lpm

(BTC - Below top of casing)

Well Grouting

Well Log	Grout Type	From	End
19298	**Clay(cuttings)**	**0m**	**6.10m**

Drilling Fluids Used
Water

Disinfectant
Bleach (Javex)

Qty 0L

Pump Installed
Submersible
Intake Setting (BTC)
79.25m

Driller's Log

Well Log	From	End	Colour	Rock Type
19298	**0m**	**0.91m**	**Brown**	**Clay**
19298	**0.91m**	**2.13m**	**Brown**	**Shale**
19298	**2.13m**	**86.56m**	**Blue**	**Rock**

Overall Well Depth
86.56m

Bedrock Level
0.91m

Water Bearing Fracture Zone

Well Log	Depth	Rate
19298	**19.51m**	**9.1 lpm**
19298	**28.04m**	**13.65 lpm**
19298	**78.94m**	**159.25 lpm**

Setbacks

Well Log	Distance	Setback From
19298	**42.67m**	**Right of any Public Way Road**
19298	**30.48m**	**Septic Tank**
19298	**36.58m**	**Leach Field**

New Nouveau Brunswick

Environment

Report Number **26380**

Well Driller's Report

Date printed 4/13/2021

Drilled by

Well Use	Work Type	Drill Method	Work Completed
Drinking Water, Farm	New Well	Rotary	08/02/2011

Casing Information — Casing above ground — Drive Shoe Used?

Well Log	Casing Type	Diameter	From	End	Slotted?
26380	**Steel**	**15.24cm**	**0m**	**17.98m**	

Aquifer Test/Yield

Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
Air	5.18m	227.5 lpm	1hr	5.18m	182 lpm	No	0 lpm
	(BTC - Below top of casing)						

Well Grouting

Well Log	Grout Type	From	End
26380	**Other**	**0m**	**6.10m**

Drilling Fluids Used
Water

Disinfectant
Bleach (Javex)
Qty 0L

Pump Installed
Submersible
Intake Setting (BTC)
40.23m

Driller's Log

Well Log	From	End	Colour	Rock Type
26380	**0m**	**0.91m**	**Brown**	**Fill**
26380	**0.91m**	**5.49m**	**Purple & grey**	**Gravel**
26380	**5.49m**	**17.07m**	**Brown**	**Clay**
26380	**17.07m**	**17.68m**	**Brown**	**Rock**
26380	**17.68m**	**49.38m**	**Blue**	**Rock**

Overall Well Depth
49.38m

Bedrock Level
17.07m

Water Bearing Fracture Zone

Well Log	Depth	Rate
26380	**24.69m**	**13.65 lpm**
26380	**42.67m**	**213.85 lpm**

Setbacks

Well Log	Distance	Setback From
26380	**152.40m**	**Right of any Public Way Road**

New Nouveau Brunswick

Environment

Report Number **26386**

Well Driller's Report

Date printed 4/13/2021

Drilled by

Well Use	Work Type	Drill Method	Work Completed
Non-Drinking Water, Industrial	New Well	Rotary	11/09/2011

Casing Information — Casing above ground — Drive Shoe Used?

Well Log	Casing Type	Diameter	From	End	Slotted?
26386	**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	10.67m	81.9 lpm	1hr	10.67m	81.9 lpm	No	0 lpm
	(BTC - Below top of casing)						

Well Grouting

There is no Grout information.

Drilling Fluids Used
None

Disinfectant
Bleach (Javex)
Qty 0L

Pump Installed
N/A
Intake Setting (BTC)
79.25m

Driller's Log

Well Log	From	End	Colour	Rock Type
26386	**0m**	**2.13m**	**Brown**	**Clay**
26386	**2.13m**	**3.05m**	**Brown**	**Rock**
26386	**3.05m**	**86.87m**	**Blue**	**Rock**

Overall Well Depth
86.87m

Bedrock Level
2.13m

Water Bearing Fracture Zone

Well Log	Depth	Rate
26386	**19.51m**	**9.1 lpm**
26386	**72.54m**	**72.8 lpm**

Setbacks

Well Log	Distance	Setback From
26386	**182.88m**	**Right of any Public Way Road**

New Nouveau Brunswick

Environment

Report Number **37197**

Well Driller's Report

Date printed 4/13/2021

Drilled by

Well Use	Work Type	Drill Method	Work Completed
Drinking Water, Domestic	New Well	Rotary	11/08/2018

Casing Information

Casing above ground

Drive Shoe Used?

Well Log	Casing Type	Diameter	From	End	Slotted?
37197	**Steel**	**15.24cm**	**0m**	**21.34m**	

Aquifer Test/Yield

Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
Air	12.19m	136.5 lpm	1hr	12.19m	136.5 lpm	No	0 lpm
	(BTC - Below top of casing)						

Well Grouting

There is no Grout information.

Drilling Fluids Used
None

Disinfectant
Chlorine pellets
Qty 0L

Pump Installed
Submersible
Intake Setting (BTC)
24.38m

Driller's Log

Well Log	From	End	Colour	Rock Type
37197	**0m**	**5.49m**	**Grey**	**Sandstone**
37197	**5.49m**	**19.81m**	**Brown**	**Clay**
37197	**19.81m**	**36.58m**	**Grey**	**Sandstone**
37197	**36.58m**	**42.67m**	**Brown**	**Clay**

Overall Well Depth
42.67m

Bedrock Level
0m

Water Bearing Fracture Zone

Well Log	Depth	Rate
37197	**36.58m**	**136.5 lpm**

Setbacks

Well Log	Distance	Setback From
37197	**18.29m**	**Septic Tank**
37197	**24.38m**	**Leach Field**
37197	**22.86m**	**Right of any Public Way Road**
37197	**24.38m**	**Center of road**

New Nouveau Brunswick

Environment

Report Number **92113500**

Well Driller's Report

Date printed 4/13/2021

Drilled by

Well Use	Work Type	Drill Method	Work Completed
Drinking Water, Farm	New Well (NEW WELL)	Rotary (ROTARY)	10/06/2000

Casing Information

Casing above ground

Drive Shoe Used?

Well Log	Casing Type	Diameter	From	End	Slotted?
92113500	**Steel**	**15.24cm**	**0m**	**7.01m**	

Aquifer Test/Yield

Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
Air	12.19m	18.2 lpm	1hr	0m	18.2 lpm	No	0 lpm

(BTC - Below top of casing)

Well Grouting

There is no Grout information.

Drilling Fluids Used
Water

Disinfectant
Bleach (Javex)
Qty 13.65L

Pump Installed
N/A
Intake Setting (BTC)
86.87m

Driller's Log

Well Log	From	End	Colour	Rock Type
92113500	**0m**	**2.74m**	**Brown**	**Clay and Soil**
92113500	**2.74m**	**3.66m**	**Brown**	**Shale**
92113500	**3.66m**	**6.10m**	**Brown**	**Rock**
92113500	**6.10m**	**92.96m**	**Blue**	**Rock**

Overall Well Depth
92.96m

Bedrock Level
3.66m

Water Bearing Fracture Zone

Well Log	Depth	Rate
92113500	**20.42m**	**4.55 lpm**
92113500	**72.85m**	**13.65 lpm**

Setbacks

There is no Setback information.

Drilled by

Well Use	Work Type	Drill Method	Work Completed
Drinking Water, Farm	New Well (NEW WELL)	Rotary (ROTARY)	10/06/2000

Casing Information

Casing above ground

Drive Shoe Used?

Well Log	Casing Type	Diameter	From	End	Slotted?
92113500	**Steel**	**15.24cm**	**0m**	**7.01m**	

Aquifer Test/Yield

Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Estimated Safe Yield	Flowing Well?	Rate
Air	12.19m	18.2 lpm	1hr	0m	18.2 lpm	No	0 lpm

(BTC - Below top of casing)

Well Grouting

There is no Grout information.

Drilling Fluids Used
Water

Disinfectant
Bleach (Javex)
Qty 13.65L

Pump Installed
N/A
Intake Setting (BTC)
86.87m

Driller's Log

Well Log	From	End	Colour	Rock Type
92113500	**0m**	**2.74m**	**Brown**	**Clay and Soil**
92113500	**2.74m**	**3.66m**	**Brown**	**Shale**
92113500	**3.66m**	**6.10m**	**Brown**	**Rock**
92113500	**6.10m**	**92.96m**	**Blue**	**Rock**

Overall Well Depth
92.96m

Bedrock Level
3.66m

Water Bearing Fracture Zone

Well Log	Depth	Rate
92113500	**20.42m**	**4.55 lpm**
92113500	**72.85m**	**13.65 lpm**

Setbacks

There is no Setback information.

Table D1. Petroleum Hydrocarbons (PHCs) in Groundwater (mg/L)

Sample ID	Sample Date	Groundwater Depth (mbTOC)	B	T	E	X	Total Petroleum Hydrocarbons				
							C_6-C_{10}	C_{10}-C_{16}	C_{16}-C_{21}	C_{21}-C_{32}	Modfied TPH
							F1	F2	-	-	
Provincial Screening Levels											
Human Health[1]			**20**	**20**	**20**	**20**	**-**	**-**	**-**	**-**	**20**
Ecological (Direct contact, Plants and Invertebrates)[2]			**350**	**200**	**110**	**120**	**11**	**3.1**	**-**	**-**	**-**
Ecological (Protection of Freshwater Life)[3]			**4.6**	**4.2**	**3.2**	**2.8**	**-**	**-**	**-**	**-**	**0.48**
Federal Screening Levels											
GDCWQ[5]			**0.005**	**0.06**	**0.14**	**0.09**	**-**	**-**	**-**	**-**	**-**
MW06-1	Dec-06	4.44	< 0.001	< 0.001	< 0.001	< 0.001	-	-	-	-	< 0.1
	Apr-07	5.58	< 0.001	< 0.001	< 0.001	< 0.001	-	-	-	-	< 0.1
	Nov-07	5.57	< 0.001	< 0.001	< 0.001	< 0.001	-	-	-	-	< 0.1
	May-08	5.38	< 0.001	< 0.001	< 0.001	< 0.001	-	-	-	-	< 0.1
	Nov-08	-	-	-	-	-	-	-	-	-	-
	May-09	5.35	< 0.001	< 0.001	< 0.001	< 0.001	-	-	-	-	< 0.1
	Nov-09	5.55	< 0.001	< 0.001	< 0.001	< 0.001	-	-	-	-	< 0.1
	May-10	5.43	< 0.001	< 0.001	< 0.001	< 0.001	< 0.01	< 0.05	< 0.05	< 0.1	< 0.1
	Nov-10	5.54	< 0.001	< 0.001	< 0.001	< 0.001	< 0.01	< 0.05	< 0.05	< 0.1	< 0.1
	Nov-11	4.90	< 0.001	< 0.001	< 0.001	< 0.001	< 0.01	< 0.05	< 0.05	< 0.1	< 0.1
	May-12	5.43	< 0.001	< 0.001	< 0.001	< 0.001	< 0.01	< 0.05	< 0.05	< 0.1	< 0.1
	Nov-12	6.13	< 0.001	< 0.001	< 0.001	< 0.001	< 0.01	< 0.05	< 0.05	< 0.1	< 0.1
	May-13	dry	-	-	-	-	-	-	-	-	-
	Jun-14	5.74	-	-	-	-	-	-	-	-	-
	Nov-14	5.87	-	-	-	-	-	-	-	-	-
	May-15	6.55	-	-	-	-	-	-	-	-	-
MW06-2	Dec-06	8.76	< 0.001	< 0.001	< 0.001	< 0.001	-	-	-	-	< 0.1
	Apr-07	9.13	< 0.001	< 0.001	< 0.001	< 0.001	-	-	-	-	< 0.1
	Nov-07	8.45	< 0.001	< 0.001	< 0.001	< 0.001	-	-	-	-	< 0.1
	May-08	7.52	< 0.001	< 0.001	< 0.001	< 0.001	-	-	-	-	< 0.1
	Nov-08	-	< 0.001	< 0.001	< 0.001	< 0.001	-	-	-	-	< 0.1
	May-09	7.61	< 0.001	< 0.001	< 0.001	< 0.001	-	-	-	-	< 0.1
	Nov-09	9.60	< 0.001	< 0.001	< 0.001	< 0.001	-	-	-	-	< 0.1
	May-10	9.47	< 0.001	< 0.001	< 0.001	< 0.001	< 0.01	< 0.05	< 0.05	< 0.1	< 0.1
	Nov-10	8.05	< 0.001	< 0.001	< 0.001	< 0.001	< 0.01	< 0.05	< 0.05	< 0.1	< 0.1
	Nov-11	8.05	< 0.001	< 0.001	< 0.001	< 0.001	< 0.01	< 0.05	< 0.05	< 0.1	< 0.1
	May-12	8.42	< 0.001	< 0.001	< 0.001	< 0.001	< 0.01	< 0.05	< 0.05	< 0.1	< 0.1
	Nov-12	9.80	< 0.001	< 0.001	< 0.001	< 0.001	< 0.01	< 0.05	< 0.05	< 0.1	< 0.1
	May-13	8.95	< 0.001	< 0.001	< 0.001	< 0.001	< 0.01	< 0.05	< 0.05	< 0.1	< 0.1
	Jun-14	8.22	< 0.001	< 0.001	< 0.001	< 0.001	< 0.01	< 0.05	< 0.05	< 0.1	< 0.1
	Nov-14	8.69	<0.001	<0.001	<0.001	<0.001	<0.01	<0.05	<0.05	<0.1	<0.1
	May-15	5.87	< 0.001	< 0.001	< 0.001	< 0.001	< 0.01	< 0.05	< 0.05	< 0.1	< 0.1
MW06-3	Dec-06	10.35	< 0.001	< 0.001	< 0.001	< 0.001	-	-	-	-	< 0.1
	Apr-07	10.02	< 0.001	< 0.001	< 0.001	< 0.001	-	-	-	-	< 0.1
	Nov-07	9.99	< 0.001	< 0.001	< 0.001	< 0.001	-	-	-	-	< 0.1
	May-08	9.85	< 0.001	< 0.001	< 0.001	< 0.001	-	-	-	-	< 0.1
	Nov-08	9.95	-	-	-	-	-	-	-	-	-
	May-09	9.89	< 0.001	< 0.001	< 0.001	< 0.001	-	-	-	-	< 0.1
	Nov-09	10.49	-	-	-	-	-	-	-	-	-
	May-10	10.10	-	-	-	-	-	-	-	-	-
	Nov-10	9.91	< 0.001	< 0.001	< 0.001	< 0.001	< 0.01	< 0.05	< 0.05	< 0.1	< 0.1
	Nov-11	dry	-	-	-	-	-	-	-	-	-
	May-12	9.94	< 0.001	< 0.001	< 0.001	< 0.001	< 0.01	< 0.05	< 0.05	< 0.1	< 0.1
	Nov-12	10.54	< 0.001	< 0.001	< 0.001	< 0.001	< 0.01	< 0.05	< 0.05	< 0.1	< 0.1
	May-13	10.03	< 0.001	< 0.001	< 0.001	< 0.001	< 0.01	< 0.05	< 0.05	< 0.1	< 0.1
	Jun-14	9.17	< 0.001	< 0.001	< 0.001	< 0.001	< 0.01	< 0.05	< 0.05	< 0.1	< 0.1
	Nov-14	9.93	<0.001	<0.001	<0.001	<0.001	<0.01	<0.05	<0.05	<0.1	<0.1
	May-15	7.91	< 0.001	< 0.001	< 0.001	< 0.001	< 0.01	< 0.05	< 0.05	< 0.1	< 0.1
MW06-4	Dec-06	6.05	< 0.001	< 0.001	< 0.001	< 0.001	-	-	-	-	< 0.1
	Apr-07	5.56	< 0.001	< 0.001	< 0.001	< 0.001	-	-	-	-	< 0.1
	Nov-07	6.03	< 0.001	< 0.001	< 0.001	< 0.001	-	-	-	-	< 0.1
	May-08	5.41	< 0.001	< 0.001	< 0.001	< 0.001	-	-	-	-	< 0.1
	Nov-08	-	-	-	-	-	-	-	-	-	-
	May-09	6.16	< 0.001	< 0.001	< 0.001	< 0.001	-	-	-	-	< 0.1
	Nov-09	6.33	-	-	-	-	-	-	-	-	
	May-10	dry	-	-	-	-	-	-	-	-	-
	Nov-10	4.09	< 0.001	< 0.001	< 0.001	< 0.001	< 0.01	< 0.05	< 0.05	< 0.1	< 0.1
	Nov-11	4.10	< 0.001	< 0.001	< 0.001	< 0.001	< 0.01	< 0.05	< 0.05	< 0.1	< 0.1
	May-12	3.95	< 0.001	< 0.001	< 0.001	< 0.001	< 0.01	< 0.05	< 0.05	< 0.1	< 0.1
	Nov-12	5.13	< 0.001	< 0.001	< 0.001	< 0.001	< 0.01	< 0.05	< 0.05	< 0.1	< 0.1
	May-13	6.05	< 0.001	< 0.001	< 0.001	< 0.001	< 0.01	< 0.05	0.06	< 0.1	< 0.1
	Jun-14	4.74	< 0.001	< 0.001	< 0.001	< 0.001	< 0.01	< 0.05	< 0.05	< 0.1	< 0.1
	Nov-14	6.46	<0.001	<0.001	<0.001	<0.001	<0.01	<0.05	<0.05	< 0.1	<0.1
	May-15	9.85	< 0.001	< 0.001	< 0.001	< 0.001	< 0.01	< 0.05	< 0.05	< 0.1	< 0.1

Notes:

1. Atlantic RBCA Tier I Risk Based Screening Levels (RBSLs) for a commercial potable site with coarse grained soil (2015).
2. Tier I ESLs for Plant and Incvertebrate Direct Contact with Shallow Groundwater (2015). Aquatic receptors identified 150-200 m from the Site.
3. Tier I ESLs for the Protection of Freshwater and Marine Aquatic Life; aquatic receptors identified 150 - 200 m from the Site (2015). Lube oil impacts (most conservative guideline).
4. Federal Interim Groundwater Quality Guidelines for a commercial site and coarse-grained soil (2016).

Exceedances of Provincial Human Health Screening Levels are **bolded and shaded blue**
Exceedances of the Provincial Ecological Screening Levels are **bolded and shaded green**
Exceedances of the Federal GCDWQ are **bolded and shaded red**

"-" = no guideline / parameter not analysed
mbTOC = metres below top of casing

Table D2. General Chemistry Parameters in Groundwater

Contaminants of Potential Concern	Units	CDWQG[1]	Sample ID										
			MW06-1										
			Dec-06	Apr-07	Nov-07	May-08	Nov-08	May-09	Nov-09	May-10	Nov-10	Nov-11	May-12
Field Measured													
Temperature	°C	-	5.36	6.13	6.02	-	-	7.52	7.71	9.07	6.84	7.76	6.01
Specific conductance	mS/cm	-	0.37	0.03	0.02	-	-	0.16	0.20	249.00	200.00	170.00	
Conductivity	mS/cm	-	0.33	0.01	0.01	-	-	0.08	-	169.00	131.00	114.00	190.00
Resistivity	k Ω·cm	-	3351	96284	95130	-	-	92653	-	6047.00	7642.20	8740.90	-66.60
TDS	g/L	0.5	0.29	0.01	0.01	-	-	0.06	-	0.15	0.13	0.11	
Salinity	%	-	0.16	0.01	0.01	-	-	0.08	-	0.11	0.10	0.08	
Dissolved Oxygen	%	-	28.20	86.80	56.40	-	-	-	184.30	110.90	71.70	68.20	86.10
Dissolved Oxygen mg/L	mg/L	-	3.54	10.84	7.03	-	-	-	-	14.07	8.74	7.98	11.10
pH	-	-	7.66	7.58	7.46	-	-	7.41	8.61	8.17	7.91	7.84	8.26
ORP	-		-198.30	312.10	140.40	-	-	229.10	157.10	218.80	-		107.70
Lab Measured													
Sodium	mg/L	200	4.12	3.56	3.29	2.99	3.50	3.08	3.03	3.44	3.66	3.94	4.06
Potassium	mg/L	-	0.67	0.43	0.31	0.28	0.27	0.22	0.20	0.30	0.34	0.26	0.92
Calcium	mg/L	-	30.90	34.70	34.80	33.60	37.00	31.90	31.9	33.60	34.7	34.8	32.8
Magnesium	mg/L	-	3.78	3.33	3.26	3.08	3.43	3.13	3.01	3.14	3.03	3.16	3.09
Iron	mg/L	0.3	0.21	0.17	0.12	0.15	0.05	0.02	< 0.02	< 0.02	< 0.02	0.12	0.10
Manganese	mg/L	0.12^{MAC} / 0.02^{AO}	0.02	0.022	0.006	0.006	0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.005	0.006
Copper	mg/L	2^{MAC} / 1^{AO}	0.001	0.001	0.002	0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.001	< 0.001	< 0.001
Zinc	mg/L	5^{AO}	0.003	0.002	0.001	0.001	< 0.001	< 0.001	0.001	< 0.001	0.003	< 0.001	< 0.001
Ammonia (as N)	mg/L	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.26	< 0.05	< 0.05	0.06	< 0.05
pH	units	-	8.2	7.5	8.2	7.5	6.8	7.8	8.1	8.1	7.8	8.0	7.9
Alkalinity (as CaCO3)	mg/L	-	99	98	97	100	102	94	90	110	110	100	89
Chloride	mg/L	250^{AO}	1.1	1.2	1.7	< 0.5	2	1	1.6	0.8	< 0.5	0.6	1.6
Sulfate	mg/L	500^{AO}	4	4	3	4	2	2	2	2	3	4	3
Nitrate + Nitrite (as N)	mg/L	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.26	0.07	< 0.05	0.19	< 0.05
o-Phosphate (as P)	mg/L	-	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.02	0.04	< 0.01	< 0.01	< 0.01	0.06
r-Silica (as SiO2)	mg/L	-	11.6	10.2	11.5	10.3	12	11.8	10.8	10.9	12.4	12.6	10.7
Carbon - Total Organic	mg/L	-	0.7	0.6	1	1.1	0.6	< 0.5	0.6	< 0.5	0.6	< 0.5	1.2
COD	mg/L	-	< 10	< 10	< 10	-	-						< 10
Turbidity	NTU	1	>1000	>1000	>1000	>1000	>1000	>1000	986	0	> 1000	> 1000	> 1000
Total Suspended Solids (TSS)	ppm	-	4280	8460	7260	-	-						
Conductivity	µS/cm	-	201	190	177	200	198	200	196	194	203	203	197
Calculated Parameters													
Bicarbonate (as CaCO3)	mg/L	-	97.47	97.69	95.50	99.70	101.94	93.41	88.9	109	109.	99.0	88.3
Carbonate (as CaCO3)	mg/L	-	1.45	0.29	1.42	0.30	0.06	0.55	1.05	1.29	0.648	0.931	0.659
Hydroxide (as CaCO3)	mg/L	-	0.08	0.02	0.08	0.02	0.00	0.03	0.063	0.063	0.032	0.050	0.040
Cation Sum	meq/L	-	2.06	2.18	2.16	2.08	2.29	1.99	2.00	2.09	2.15	2.19	2.10
Anion Sum	meq/L	-	2.09	2.08	2.05	2.08	2.14	1.95	1.91	2.27	2.26	2.11	1.89
Percent Difference	%	-	-0.75	2.49	2.71	-0.14	3.49	1.03	2.28	-4.01	-2.52	1.72	5.19
Ion Sum	mg/L	-	116.79	117.40	117.16	115.00	122.47	110.51	98	111	112	121	111
Saturation pH (5°C)	units	-	8.11	8.06	8.07	8.10	8.01	8.11	8.1	8	8.0	8.1	8.1
Langelier Index (5°C)	-	-	0.09	-0.56	0.13	-0.56	-1.21	-0.31	-0.03	0.07	-0.21	-0.05	-0.22

Notes:

1. Canadian Drinking Water Quality Guidelines (CDWQG; Health Canada, updated 2020).

"-" = no guideline

Exceedances of the Federal GCDWQ are **bolded and shaded red**

Table D2. General Chemistry Parameters in Groundwater

Contaminants of Potential Concern	Units	CDWQG[1]	Sample ID										
			MW06-1		MW06-2								
			Nov-12	Nov-14	Dec-06	Apr-07	Nov-07	May-08	Nov-08	May-09	Nov-09	May-10	Nov-10
Field Measured													
Temperature	°C	-	-	7.77	5.87	7.37	5.82	8.45	-	7.72	6.52	10.31	6.61
Specific conductance	mS/cm	-	-		0.48	0.05	0.05	0.05	-	0.27	0.36	240.00	235.00
Conductivity	mS/cm	-	-	162.00	0.30	0.03	0.03	0.04	-	0.18	-	170.00	152.00
Resistivity	k Ω·cm	-	-		3321.4	29979	34622	27553	-	5630.20	-	5874.00	6559.60
TDS	g/L	0.5	-	0.16	0.31	0.03	0.03	0.03	-	0.17	-	0.16	0.15
Salinity	%	-	-	12.00	0.23	0.02	0.02	0.02	-	0.13	-	0.12	0.11
Dissolved Oxygen	%	-	-	13.70	29.50	98.70	44.10	73.30	-	-	90.90	81.00	69.30
Dissolved Oxygen mg/L	mg/L	-	-	1.60	3.67	11.80	5.45	8.54	-	-	-	9.29	8.48
pH	-	-	-	6.75	7.50	7.89	7.95	7.97	-	8.26	9.13	8.33	8.43
ORP	-		-	64.60	-183.10	210.00	223.20	151.40	-	129.80	150.40	235.40	-
Lab Measured													
Sodium	mg/L	200	3.65	-	30.90	6.71	5.22	2.88	5.35	1.50	2.22	1.74	1.81
Potassium	mg/L	-	0.28	-	1.81	19.90	14.10	7.27	5.56	1.50	4.38	1.97	1.56
Calcium	mg/L	-	33.8	-	19.40	39.50	51.40	47.10	43.90	39.40	51.4	37.80	37.8
Magnesium	mg/L	-	3.09	-	4.18	26.00	30.30	21.60	21.10	7.58	20.8	9.44	8.58
Iron	mg/L	0.3	0.03	-	0.26	< 0.02	< 0.02	< 0.02	0.02	< 0.02	< 0.02	< 0.02	< 0.02
Manganese	mg/L	0.12^{MAC} / 0.02^{AO}	< 0.001	-	0.023	0.021	0.004	0.002	< 0.001	< 0.001	0.004	0.002	0.002
Copper	mg/L	2^{MAC} / 1^{AO}	< 0.001	-	< 0.001	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Zinc	mg/L	5^{AO}	< 0.001	-	0.002	0.002	0.002	0.035	0.002	< 0.001	0.001	0.001	0.003
Ammonia (as N)	mg/L	-	< 0.05	-	< 0.05	0.76	0.31	< 0.05	< 0.05	< 0.05	0.11	< 0.05	< 0.05
pH	units	-	8.0	-	8.8	7.9	8.3	7.9	7.8	7.9	7.9	8.1	7.9
Alkalinity (as CaCO3)	mg/L	-	100	-	46	197	200	154	179	112	150	130	120
Chloride	mg/L	250^{AO}	0.7	-	36.2	2.9	2.3	1	2.1	0.8	1.0	0.7	0.6
Sulfate	mg/L	500^{AO}	2	-	31	26	77	50	50	19	77	20	18
Nitrate + Nitrite (as N)	mg/L	-	0.06	-	< 0.05	0.18	0.51	0.68	0.51	0.32	0.49	0.66	0.89
o-Phosphate (as P)	mg/L	-	0.03	-	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
r-Silica (as SiO2)	mg/L	-	12.1	-	4.6	7.6	7.9	8.5	8.3	7	8.6	7.8	8.4
Carbon - Total Organic	mg/L	-	< 0.5	-	1.1	0.8	1.2	1.8	1.2	1	0.9	0.9	0.9
COD	mg/L	-		-	< 10	< 10	< 10			163	>1000		
Turbidity	NTU	1	> 1000	-	>1000	>1000	>1000	282	>1000	< 5	< 5	0	> 1000
Total Suspended Solids (TSS)	ppm	-		-	759000								
Conductivity	µS/cm	-	203	-	227	526	478	406	373	273	426	257	273
Calculated Parameters													
Bicarbonate (as CaCO3)	mg/L	-	99.0	-		195.5	196.2	153.0	177.9	111.1	149.	128	119.
Carbonate (as CaCO3)	mg/L	-	0.931	-		1.46	3.68	1.14	1.06	0.83	1.11	1.52	0.889
Hydroxide (as CaCO3)	mg/L	-	0.050	-		0.04	0.10	0.04	0.03	0.04	0.040	0.06	0.040
Cation Sum	meq/L	-	2.11	-		4.97	5.67	4.44	4.30	2.69	4.49	2.79	2.71
Anion Sum	meq/L	-	2.07	-		4.57	5.70	4.20	4.71	2.68	4.66	3.08	2.85
Percent Difference	%	-	1.03	-		4.13	-0.29	2.84	-4.55	0.27	-1.87	-4.97	-2.55
Ion Sum	mg/L	-	117	-		250.52	312.86	235.00	247.78	146.51	251	154.00	145
Saturation pH (5°C)	units	-	8.1	-		7.76	7.66	7.80	7.75	7.96	7.8	7.90	8.0
Langelier Index (5°C)	-	-	-0.06	-		0.14	0.64	0.12	0.05	-0.06	0.14	0.18	-0.05

Notes:

1. Canadian Drinking Water Quality Guidelines (CDWQG; Health Canada, updated 2020

"-" = no guideline

Exceedances of the Federal GCDWQ are **bolded and shaded red**

Table D2. General Chemistry Parameters in Groundwater

Contaminants of Potential Concern	Units	CDWQG[1]	Sample ID										
			MW06-2							MW06-3			
			Nov-11	May-12	Nov-12	May-13	Jun-14	Nov-14	May-15	Dec-06	Apr-07	Nov-07	May-08
Field Measured													
Temperature	°C	-	6.70	6.66	-	6.30	6.05	6.06	5.17	4.58	5.30	6.09	10.73
Specific conductance	mS/cm	-	234.00		-					0.29	0.30	0.04	0.05
Conductivity	mS/cm	-	153.00	198.00	-	166.00	180.00	231.00	132.00	0.17	0.02	0.03	0.04
Resistivity	k Ω·cm	-	6548.00	-61.70	-	0.17	2828.00			5611.60	54633	40570	25785
TDS	g/L	0.5	0.15		-			0.24		0.19	0.02	0.03	0.04
Salinity	%	-	0.11		-	0.12		17.00		0.14	0.01	0.02	0.02
Dissolved Oxygen	%	-	67.20	83.10	-	17.30	10.30	6.00	53.30	71.10	105.00	86.10	149.00
Dissolved Oxygen mg/L	mg/L	-	8.21	10.15	-	2.14	1.27	0.73	6.72	9.16	14.17	10.63	16.43
pH	-	-	7.84	8.17	-	8.14	4.39	6.80	7.36	8.37	8.50	8.11	7.95
ORP	-			125.90	-	68.80	278.00	86.20		30.00	118.80	57.30	159.70
Lab Measured													
Sodium	mg/L	200	1.62	1.40	1.58	1.9	1.52	1.96	1.46	6.78	30.7	32.4	15.1
Potassium	mg/L	-	1.25	0.54	0.89	1.07	1.05	0.97	0.91	20.6	1.71	1.9	7.27
Calcium	mg/L	-	40.1	32.5	39.0	37.1	35.4	35.8	37	45.7	29.3	64.8	47.1
Magnesium	mg/L	-	6.81	3.98	6.55	6.95	6.68	13.7	6.15	28.8	5.72	9.94	21.6
Iron	mg/L	0.3	0.26	0.03	< 0.02	0.02	0.18	< 0.02	0.36	< 0.02	1.15	< 0.02	< 0.02
Manganese	mg/L	0.12^{MAC} / 0.02^{AO}	0.008	0.002	< 0.001	0.001	0.008	< 0.001	0.017	0.03	0.041	0.006	0.006
Copper	mg/L	2^{MAC} / 1^{AO}	< 0.001	< 0.001	< 0.001	0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.002	0.001	< 0.001
Zinc	mg/L	5^{AO}	< 0.001	< 0.001	0.001	0.002	0.001	0.004	0.002	0.002	0.003	< 0.001	0.035
Ammonia (as N)	mg/L	-	< 0.05	< 0.05	< 0.05	0.05	< 0.05	< 0.05	< 0.05	0.97	< 0.05	< 0.05	< 0.05
pH	units	-	7.9	8.0	7.9	8.1	8	8.1	8.1	8	8.2	8.1	7.6
Alkalinity (as CaCO3)	mg/L	-	110	89	110	120	98	130	102	224	48	68	101
Chloride	mg/L	250^{AO}	0.6	0.8	0.8	0.8	1	0.7	1.8	5.2	13.4	3.3	1.1
Sulfate	mg/L	500^{AO}	13	7	12	12	13	18	10	27	84	210	70
Nitrate + Nitrite (as N)	mg/L	-	1.01	0.40	0.75	0.59	0.3	0.24	0.3	< 0.05	< 0.05	0.21	< 0.05
o-Phosphate (as P)	mg/L	-	< 0.01	0.05	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
r-Silica (as SiO2)	mg/L	-	8.5	7.5	8.9	8	7.9	8	7.5	8.3	5	6.4	8.1
Carbon - Total Organic	mg/L	-	0.8	1.1	0.6	0.80	0.8	0.7	0.80	1.1	0.9	1.00	1.20
COD	mg/L	-		< 10			< 10	<10	< 10	< 10	< 10	< 10	
Turbidity	NTU	1	> 1000	> 1000	> 1000	> 1000	> 1000	> 1000	> 1000	>1000	>1000	>1000	> 1000
Total Suspended Solids (TSS)	ppm	-								29150	9520	3120.00	
Conductivity	µS/cm	-	246	204	248	238	234	283	223	449	360	485.00	328
Calculated Parameters													
Bicarbonate (as CaCO3)	mg/L	-	109.	88.1	109.	119	97	128	101	221.86	47.22	67.14	101.00
Carbonate (as CaCO3)	mg/L	-	0.815	0.828	0.815	1.40	0.91	1.52	1.19	2.09	0.70	0.79	0.38
Hydroxide (as CaCO3)	mg/L	-	0.040	0.050	0.040	0.06	0.05	0.06	0.06	0.05	0.08	0.06	0.02
Cation Sum	meq/L	-	2.68	2.03	2.58	2.54	2.42	3.02	2.46	5.54	3.38	5.51	3.45
Anion Sum	meq/L	-	2.56	1.98	2.52	2.71	2.28	3.01	2.32	5.18	3.09	5.84	3.51
Percent Difference	%	-	2.29	1.20	1.04	-3.31	2.98	0.25	2.93	3.34	4.48	-2.90	-0.85
Ion Sum	mg/L	-	144	110	140	144.00	128.00	159.00	129.00	280.23	200.31	371.16	209.00
Saturation pH (5°C)	units	-	8.0	8.1	8.0	8.00	8.10	8.00	8.00	7.65	8.48	8.03	8.00
Langelier Index (5°C)	-	-	-0.06	-0.13	-0.07	0.14	-0.06	0.15	0.07	0.35	-0.28	0.07	-0.37

Notes:

1. Canadian Drinking Water Quality Guidelines (CDWQG; Health Canada, updated 2020

"-" = no guideline

Exceedances of the Federal GCDWQ are **bolded and shaded red**

Table D2. General Chemistry Parameters in Groundwater

Contaminants of Potential Concern	Units	CDWQG[1]	Sample ID										
			MW06-3									MW06-4	
			Nov-08	May-09	Nov-09	Nov-10	May-12	May-13	Jun-14	Nov-14	May-15	Dec-06	Apr-07
Field Measured													
Temperature	°C	-	-	8.82	-	6.96	7.99	7.00	6.79	6.60	6.08	3.49	7.05
Specific conductance	mS/cm	-	-	0.24	-	247.00						0.20	0.01
Conductivity	mS/cm	-	-	0.17	-	162.00	293.00	229.00	270.00	264.00	141.00	0.11	0.01
Resistivity	k Ω·cm	-	-	5529	-	6170	-58	0	4			3775.50	12577.30
TDS	g/L	0.5	-	0.15	-	0.16				0.27		0.20	0.01
Salinity	%	-	-	0.12	-	0.12		0.17		20.00		0.10	0.01
Dissolved Oxygen	%	-	-	-	-	61.30	77.90	34.00	8.00	4.80	51.40	85.40	100.30
Dissolved Oxygen mg/L	mg/L	-	-	-	-	7.45	8.43	4.12	0.96	0.58	6.35	11.38	13.40
pH	-	-	-	7.98	-	8.11	8.10	8.10	6.94	6.45	7.64	7.15	7.39
ORP	-		-	118.80	-	-	124.90	95.20	94.30	104.50		288.80	213.60
Lab Measured													
Sodium	mg/L	200	12.5	13.6	12.1	9.36	2.27	5.7	5.45	2.14	2.85	9.1	3.46
Potassium	mg/L	-	1.32	1.28	0.57	1.27	0.56	1.08	1.02	0.61	0.72	2.35	0.91
Calcium	mg/L	-	43	38.6	37.9	47.1	45.0	49.4	50.8	51.8	49.1	33.6	32.9
Magnesium	mg/L	-	6.44	6.07	4.02	7.24	3.50	6.46	7.27	4.02	4.77	2.38	1.46
Iron	mg/L	0.3	0.05	0.07	< 0.02	< 0.02	0.06	0.02	0.34	0.51	0.04	0.49	0.12
Manganese	mg/L	0.12^{MAC} / 0.02^{AO}	0.002	0.001	0.026	0.004	0.005	0.002	0.009	0.008	0.002	0.236	0.034
Copper	mg/L	2^{MAC} / 1^{AO}	< 0.001	< 0.001	0.001	< 0.001	< 0.001	0.002	0.002	0.002	< 0.001	0.004	< 0.001
Zinc	mg/L	5^{AO}	< 0.001	< 0.001	0.002	0.002	< 0.001	0.003	0.001	0.003	0.001	0.003	0.002
Ammonia (as N)	mg/L	-	< 0.05	< 0.05	0.09	< 0.05	< 0.05	0.06	< 0.05	< 0.05	< 0.05	0.14	< 0.05
pH	units	-	7.8	7.8	7.8	7.8	7.9	8	7.8	7.7	7.9	7.8	8
Alkalinity (as CaCO3)	mg/L	-	96	74	60	81	120	120	105	130	120	114	70
Chloride	mg/L	250^{AO}	1.8	1	18.0	0.7	1.0	1.2	1.2	2.1	1.8	2.1	1.5
Sulfate	mg/L	500^{AO}	52	75	56	75	8	40	58	8	23	8	12
Nitrate + Nitrite (as N)	mg/L	-	< 0.05	< 0.05	0.19	< 0.05	0.08	0.12	< 0.05	0.08	0.23	< 0.05	< 0.05
o-Phosphate (as P)	mg/L	-	< 0.01	< 0.01	< 0.01	< 0.01	0.05	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
r-Silica (as SiO2)	mg/L	-	7.9	7.9	6.9	8.5	7.7	9	9.7	8.8	8.9	5.3	5.5
Carbon - Total Organic	mg/L	-	1.00	0.60	2.0	0.6	1.2	0.80	1.10	1.30	0.90	6.30	1.30
COD	mg/L	-					< 10		< 10	< 10	< 10	10.00	< 10
Turbidity	NTU	1	>1000	>1000	375	> 1000	> 1000	> 1000	> 1000	> 1000	760.00	>1000	>1000
Total Suspended Solids (TSS)	ppm	-										280000	13300.00
Conductivity	µS/cm	-	300	333	311	338	252	307	343	284	291	230	147.00
Calculated Parameters													
Bicarbonate (as CaCO3)	mg/L	-	95.40	73.53	59.6	80.5	119.	119.00	104.00	129.00	119.00	113.30	69.30
Carbonate (as CaCO3)	mg/L	-	0.57	0.44	0.353	0.477	0.889	1.12	0.62	0.61	0.89	0.67	0.65
Hydroxide (as CaCO3)	mg/L	-	0.03	0.03	0.032	0.032	0.040	0.05	0.03	0.03	0.04	0.03	0.05
Cation Sum	meq/L	-	3.26	3.05	2.77	3.39	2.65	3.28	3.42	3.05	2.99	2.37	1.94
Anion Sum	meq/L	-	3.05	3.07	2.89	3.20	2.60	3.27	3.34	2.83	2.94	2.50	1.69
Percent Difference	%	-	3.24	-0.24	-2.03	2.82	0.91	0.08	1.11	3.79	0.73	-2.67	6.95
Ion Sum	mg/L	-	183.57	188.66	166	190	142	187	198	158	165	133.27	100.59
Saturation pH (5°C)	units	-	8.00	8.16	8.3	8.0	7.9	7.90	7.90	7.80	7.80	8.01	8.22
Langelier Index (5°C)	-	-	-0.20	-0.36	-0.46	-0.25	0.03	0.15	-0.10	-0.08	0.06	-0.21	-0.22

Notes:

1. Canadian Drinking Water Quality Guidelines (CDWQG; Health Canada, updated 2020

"-" = no guideline

Exceedances of the Federal GCDWQ are **bolded and shaded red**

Table D2. General Chemistry Parameters in Groundwater

Contaminants of Potential Concern	Units	CDWQG[1]	Sample ID											
			MW06-4											
			Nov-07	May-08	May-09	Nov-09	Nov-10	Nov-11	May-12	Nov-12	May-13	Jun-14	Nov-14	May-15
Field Measured														
Temperature	°C	-	-	11.30	-	-	6.83	8.78	5.59	-	5.90	5.12	8.70	6.78
Specific conductance	mS/cm	-	-	0.01	-	-	473.00	321.00		-				
Conductivity	mS/cm	-	-	0.01	-	-	309.00	222.00	251.00	-	250.00	155.00	170.00	242.00
Resistivity	k Ω·cm	-	-	97625	-	-	3237.90	4510.30	12.70	-	0.26	250.00		
TDS	g/L	0.5	-	0.01	-	-	0.31	0.21		-			0.16	
Salinity	%	-	-	0.01	-	-	0.23	0.15		-	0.20		12.00	
Dissolved Oxygen	%	-	-	13.01	-	-	37.00	71.00	91.10	-	22.90	999.90	12.80	15.10
Dissolved Oxygen mg/L	mg/L	-	-	14.22	-	-	10.50	8.23	11.45	-	2.84	274.12	1.48	1.83
pH	-	-	-	7.67	-	-	8.04	8.52	6.80	-	6.43	9.01	6.69	7.63
ORP	-		-	22.40	-	-	-		145.40	-	101.20	223.20	37.10	
Lab Measured														
Sodium	mg/L	200	2.68	4.54	6.92	3.23	21.4	14.1	11.0	17.6	7.94	7.21	4.99	4.05
Potassium	mg/L	-	0.72	0.23	0.27	5.65	0.60	0.50	0.40	0.58	0.71	1.05	1.23	0.48
Calcium	mg/L	-	41.4	12.3	25.2	42.7	53.0	36.7	34.7	47.2	45.6	29.1	45.8	47.9
Magnesium	mg/L	-	2	1.11	2.77	15.1	6.12	3.71	3.35	4.26	6.94	2.31	7.2	8.81
Iron	mg/L	0.3	0.08	0.07	< 0.02	0.03	< 0.02	< 0.02	0.04	< 0.02	0.02	0.17	0.26	0.09
Manganese	mg/L	0.12^{MAC} / 0.02^{AO}	0.006	0.036	0.11	0.006	0.264	0.214	0.123	0.059	0.026	0.051	0.029	0.014
Copper	mg/L	2^{MAC} / 1^{AO}	< 0.001	< 0.001	< 0.001	0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.001	0.001	0.004	< 0.001
Zinc	mg/L	5^{AO}	< 0.001	0.004	< 0.001	0.003	0.004	0.002	0.001	0.002	0.003	0.003	0.008	0.003
Ammonia (as N)	mg/L	-	< 0.05	< 0.05	< 0.05	0.06	< 0.05	< 0.05	< 0.05	< 0.05	0.12	< 0.05	< 0.05	< 0.05
pH	units	-	8.1	7.5	7.4	8.0	6.9	6.2	6.6	7.2	7.2	7.1	7.3	7.6
Alkalinity (as CaCO3)	mg/L	-	95	38	35	130	27	15	14	37	83	40	88	120
Chloride	mg/L	250^{AO}	0.9	4.4	10.3	4.5	32.0	13.4	10.1	19.3	6.4	4.2	6.2	5.1
Sulfate	mg/L	500^{AO}	22	7	38	48	124	101	83	115	70	59	42	37
Nitrate + Nitrite (as N)	mg/L	-	0.07	< 0.05	< 0.05	1.60	0.24	0.33	1.72	0.57	1.04	0.33	1.06	1.43
o-Phosphate (as P)	mg/L	-	< 0.01	< 0.01	0.02	< 0.01	< 0.01	< 0.01	0.03	< 0.01	< 0.01	< 0.01	0.04	< 0.01
r-Silica (as SiO2)	mg/L	-	7.3	5.4	5.9	8.3	7.6	7.1	5.2	6.5	6.3	4.9	8.1	8.1
Carbon - Total Organic	mg/L	-	2.30	1.40	1.60	1.0	2.4	2.3	2.1	2.1	2.00	2.40	54.00	1.70
COD	mg/L	-	< 10						< 10			< 10	210.00	< 10
Turbidity	NTU	1	>1000	369	244.00	>1000	818	234	388	909	> 1000	> 1000	> 1000	> 1000
Total Suspended Solids (TSS)	ppm	-	14500.00											
Conductivity	µS/cm	-	208.00	103	210.00	368	440	308	258	371	338	230	293	329
Calculated Parameters														
Bicarbonate (as CaCO3)	mg/L	-	93.83	37.9	34.91	129.	27.0	15.0	14.0	36.9	82.9	39.9	87.8	120
Carbonate (as CaCO3)	mg/L	-	1.11	0.113	0.08	1.21	0.020	0.002	0.005	0.055	0.124	0.047	0.165	0.447
Hydroxide (as CaCO3)	mg/L	-	0.06	0.016	0.01	0.050	0.004	0.001	0.002	0.008	0.008	0.006	0.01	0.02
Cation Sum	meq/L	-	2.37	0.914	1.80	3.66	4.10	2.77	2.50	3.49	3.22	1.99	3.14	3.31
Anion Sum	meq/L	-	2.39	1.03	1.78	3.84	4.04	2.80	2.42	3.72	3.37	2.17	2.89	3.41
Percent Difference	%	-	-0.35	-5.94	0.42	-2.31	0.77	-0.59	1.75	-3.19	-2.28	-4.23	4.25	-1.56
Ion Sum	mg/L	-	135.35	58	110.84	206	255	187	164	236	199	134	174	191
Saturation pH (5°C)	units	-	8.01	8.9	8.64	7.9	8.5	8.9	8.9	8.4	8	8.5	8	7.9
Langelier Index (5°C)	-	-	0.09	-1.38	-1.24	0.11	-1.59	-2.68	-2.32	-1.19	-0.85	-1.43	-0.71	-0.26

Notes:

1. Canadian Drinking Water Quality Guidelines (CDWQG; Health Canada, updated 2020

"-" = no guideline

Exceedances of the Federal GCDWQ are **bolded and shaded red**

Table D3. Metals in Groundwater

Parameter	Units	GCDWQ[1]	Sample D										
			MW06-1										
			Dec-06	Apr-07	Nov-07	May-08	Nov-08	May-09	Nov-09	May-10	Nov-10	Nov-11	May-12
Aluminum	µg/L	-	301	119	157	84	31	10	8	7	8	57	53
Antimony	µg/L	6	0.4	0.6	0.2	0.2	0.2	0.3	0.2	0.2	0.2	0.3	0.3
Arsenic	µg/L	10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Barium	µg/L	2000	11	8	7	8	7	7	7	7	8	8	14
Beryllium	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Bismuth	µg/L	-	< 1	< 1	< 1	< 1	< 1	0.2	< 1	< 1	< 1	< 1	< 1
Boron	µg/L	5000	5	10	13	2	3	3	4	4	4	5	7
Cadmium	µg/L	7	< 0.1	< 0.1	< 0.1	< 0.1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Calcium	µg/L	-	30900	34700	34800	33600	37000	31900	31900	33600	34700	34800	32800
Chromium	µg/L	50	2	2	1	< 1	1	< 1	< 1	< 1	< 1	< 1	< 1
Cobalt	µg/L	-	0.7	0.9	0.4	0.5	0.2	0.2	0.1	0.1	0.1	0.4	0.3
Copper	µg/L	2000[MAC] / 1000[AO]	1	1	2	1	< 1	< 1	< 1	< 1	1	< 1	< 1
Iron	µg/L	300[AO]	210	170	120	150	50	20	< 20	< 20	< 20	120	100
Lead	µg/L	5	0.6	0.3	0.2	0.2	< 0.1	< 0.1	< 0.1	0.1	< 0.1	0.1	0.1
Lithium	µg/L	-	2	2	1.7	1.6	1.8	1.6	1.6	1.6	1.8	1.9	1.8
Magnesium	µg/L	-	3780	3330	3260	3080	3430	3130	3010	3140	3030	3160	3090
Manganese	µg/L	120[MAC] / 20[AO]	**20**	**22**	6	6	1	< 1	< 1	< 1	< 1	5	6
Mercury	µg/L	1	< 0.05	< 0.05	< 0.05	-	< 0.025	< 0.025	0.03	< 0.025	-	-	< 0.025
Molybdenum	µg/L	-	0.3	1.3	0.2	0.2	0.1	0.1	0.1	0.2	< 0.1	< 0.1	0.2
Nickel	µg/L	-	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Potassium	µg/L	-	670	430	310	280	270	220	200	300	340	260	920
Rubidium	µg/L	-	0.5	0.5	0.4	0.2	0.2	0.2	0.1	0.2	0.2	0.2	0.7
Selenium	µg/L	50	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Silver	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Sodium	µg/L	200000[AO]	4120	3560	3290	2990	3500	3080	3030	3440	3660	3940	4060
Strontium	µg/L	7000	217	204	207	206	216	196	188	210	207	220	203
Tellurium	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Thallium	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Tin	µg/L	-	< 0.1	0.2	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Uranium	µg/L	20	0.4	0.4	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1
Vanadium	µg/L	-	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Zinc	µg/L	5000[AO]	3	2	1	1	< 1	< 1	1	< 1	3	< 1	< 1

Notes:

1. Canadian Drinking Water Quality Guidelines (CDWQG; Health Canada, updated 2020).

"-" not available/no data

MAC = maximum acceptable concentration; AO = aesthetic objective

Exceedances of the Health Based (MAC0 Federal GCDWQ are **bolded and shaded red**

Exccedances of the Aesthetic Objective Federal GCDWQ are **bolded and shaded blue**

Table D3. Metals in Groundwater

Parameter	Units	GCDWQ[1]	Sample ID										
			MW06-1	MW06-2									
			Nov-12	Dec-06	Apr-07	Nov-07	May-08	Nov-08	May-09	Nov-09	May-10	Nov-10	Nov-11
Aluminum	µg/L	-	19	**196**	9	11	14	21	16	20	27	16	57
Antimony	µg/L	6	0.2	0.8	0.9	1.1	0.6	0.3	0.3	0.3	0.3	0.4	0.4
Arsenic	µg/L	10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Barium	µg/L	2000	8	1	32	44	30	21	13	29	15	15	15
Beryllium	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Bismuth	µg/L	-	< 1	< 1	< 1	< 1	< 1	< 1	< 0.1	< 1	< 1	< 1	< 1
Boron	µg/L	5000	5	126	99	85	36	32	10	33	14	7	7
Cadmium	µg/L	7	0.04	**< 0.1**	< 0.1	0.2	< 0.1	0.01	< 0.01	< 0.01	< 0.01	0.01	< 0.01
Calcium	µg/L	-	33800	19400	39500	51400	47100	43900	39400	51400	37800	37800	40100
Chromium	µg/L	50	< 1	< 1	2	< 1	< 1	1	< 1	< 1	< 1	< 1	< 1
Cobalt	µg/L	-	< 0.1	0.6	3.8	0.6	0.4	0.4	0.2	0.4	0.2	0.4	0.6
Copper	µg/L	2000^{MAC} / 1000^{AO}	< 1	**< 1**	1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Iron	µg/L	300^{AO}	30	**260**	< 20	< 20	< 20	20	< 20	< 20	< 20	< 20	260
Lead	µg/L	5	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1
Lithium	µg/L	-	1.9	2.4	36.3	18.6	9.2	6.3	2.2	6.1	2.9	2.8	2.5
Magnesium	µg/L	-	3090	4180	26000	30300	21600	21100	7580	20800	9440	8580	6810
Manganese	µg/L	120^{MAC} / 20^{AO}	< 1	**23**	**21**	4	2	< 1	< 1	4	2	2	8
Mercury	µg/L	1	-	< 0.05	< 0.05	< 0.05	-	< 0.025	< 0.025	< 0.025	< 0.025	-	-
Molybdenum	µg/L	-	0.2	44.7	7.2	11	5.7	2.5	0.7	3.2	0.8	0.6	0.4
Nickel	µg/L	-	< 1	< 1	9	6	3	1	< 1	1	< 1	2	3
Potassium	µg/L	-	280	1810	19900	14100	7270	5560	1500	4380	1970	1560	1250
Rubidium	µg/L	-	0.2	0.8	11.6	8.7	3.8	3.4	1	2.8	1.4	1.1	1
Selenium	µg/L	50	< 1	1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Silver	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Sodium	µg/L	200000^{AO}	3650	30900	6710	5220	2880	5350	1500	2220	1740	1810	1620
Strontium	µg/L	7000	202	109	484	590	515	426	270	449	312	308	302
Tellurium	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Thallium	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Tin	µg/L	-	< 0.1	0.7	0.2	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Uranium	µg/L	20	0.2	< 0.1	0.4	0.5	0.4	0.4	0.2	0.6	0.3	0.2	0.3
Vanadium	µg/L	-	< 1	3	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Zinc	µg/L	5000^{AO}	< 1	2	2	2	35	2	< 1	1	1	3	< 1

Notes:

1. Canadian Drinking Water Quality Guidelines (CDWQG; Health Canada, updated 2020).

"-" not available/no data

MAC = maximum acceptable concentration; AO = aesthetic objective

Exceedances of the Health Based (MAC0 Federal GCDWQ are **bolded and shaded red**

Exccedances of the Aesthetic Objective Federal GCDWQ are **bolded and shaded blue**

Table D3. Metals in Groundwater

Parameter	Units	GCDWQ[1]	Sample ID										
			MW06-2						MW06-3				
			May-12	Nov-12	May-13	Jun-14	Nov-14	May-15	Dec-06	Apr-07	Nov-07	May-08	Nov-08
Aluminum	µg/L	-	26	24	28	73	14	86	28	468	21	28	43
Antimony	µg/L	6	0.1	**< 0.1**	**< 0.1**	0.3	0.1	0.3	0.7	0.6	0.3	0.3	0.3
Arsenic	µg/L	10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Barium	µg/L	2000	9	14	13	16	17	15	33	2	3	2	1
Beryllium	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Bismuth	µg/L	-	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Boron	µg/L	5000	5	6	9	11	7	4	90	129	106	65	64
Cadmium	µg/L	7	< 0.01	< 0.01	0.01	< 0.01	0.02	< 0.01	< 0.1	0.1	< 0.1	< 0.1	0.02
Calcium	µg/L	-	32500	39000	37100	35400	35800	37000	45700	29300	64800	45000	43000
Chromium	µg/L	50	< 1	< 1	< 1	1	< 1	< 1	3	1	< 1	< 1	< 1
Cobalt	µg/L	-	0.2	0.2	0.2	0.4	0.1	0.7	0.8	1.2	0.8	0.2	0.2
Copper	µg/L	2000[MAC] / 1000[AO]	< 1	< 1	1	< 1	< 1	< 1	< 1	2	1	< 1	< 1
Iron	µg/L	300[AO]	30	< 20	20	180	< 20	360	< 20	1150	< 20	< 20	50
Lead	µg/L	5	< 0.1	< 0.1	< 0.1	0.2	< 0.1	0.2	< 0.1	0.1	< 0.1	< 0.1	< 0.1
Lithium	µg/L	-	1.2	2	2	1.8	2	1.8	33.3	2	1.7	1.3	1.2
Magnesium	µg/L	-	3980	6550	6950	6680	13700	6150	28800	5720	9940	6160	6440
Manganese	µg/L	120[MAC] / 20[AO]	2	< 1	1	8	< 1	17	**30**	**41**	6	6	2
Mercury	µg/L	1	< 0.025	-	< 0.025	< 0.025	< 0.025	< 0.025	< 0.05	< 0.05	< 0.05	-	< 0.025
Molybdenum	µg/L	-	0.1	0.6	0.4	0.5	0.4	0.2	5.5	53.8	34.4	11.6	8.4
Nickel	µg/L	-	< 1	< 1	< 1	1	< 1	1	2	2	2	< 1	< 1
Potassium	µg/L	-	540	890	1070	1050	970	910	20600	1710	1900	1490	1320
Rubidium	µg/L	-	0.5	0.8	1	0.9	0.8	0.8	12.4	0.8	0.9	0.9	0.9
Selenium	µg/L	50	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Silver	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Sodium	µg/L	200000[AO]	1400	1580	1900	1520	1960	1460	6780	30700	32400	15100	12500
Strontium	µg/L	7000	214	270	262	257	300	257	490	156	363	252	229
Tellurium	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Thallium	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Tin	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.9	0.3	0.2	0.1
Uranium	µg/L	20	0.2	0.2	0.2	0.2	0.3	0.2	0.6	0.1	0.5	0.4	0.4
Vanadium	µg/L	-	< 1	< 1	< 1	< 1	< 1	< 1	< 1	5	1	3	3
Zinc	µg/L	5000[AO]	< 1	1	2	1	4	2	2	3	< 1	< 1	< 1

Notes:

1. Canadian Drinking Water Quality Guidelines (CDWQG; Health Canada, updated 2020).

"-" not available/no data

MAC = maximum acceptable concentration; AO = aesthetic objective

Exceedances of the Health Based (MAC0 Federal GCDWQ are **bolded and shaded red**

Exccedances of the Aesthetic Objective Federal GCDWQ are **bolded and shaded blue**

Table D3. Metals in Groundwater

Parameter	Units	GCDWQ[1]	Sample ID										
			MW06-3								MW06-4		
			May-09	Nov-09	Nov-10	May-12	May-13	Jun-14	Nov-14	May-15	Dec-06	Apr-07	Nov-07
Aluminum	µg/L	-	45	8	18	30	20	141	205	21	641	116	74
Antimony	µg/L	6	0.4	0.1	0.3	0.1	0.2	0.2	0.2	0.3	0.6	0.4	0.2
Arsenic	µg/L	10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Barium	µg/L	2000	1	36	1	1	1	2	1	1	13	8	10
Beryllium	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Bismuth	µg/L	-	< 0.1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Boron	µg/L	5000	93	799	60	12	34	38	11	16	10	6	8
Cadmium	µg/L	7	0.02	0.02	0.01	< 0.01	0.02	< 0.01	< 0.01	< 0.01	< 0.1	< 0.1	< 0.1
Calcium	µg/L	-	38600	37900	47100	45000	49400	50800	51800	49100	33600	32900	41400
Chromium	µg/L	50	< 1	3	< 1	< 1	< 1	1	1	< 1	2	1	1
Cobalt	µg/L	-	0.2	0.1	0.1	< 0.1	< 0.1	0.3	0.4	0.1	1.5	0.4	0.2
Copper	µg/L	2000[MAC] / 1000[AO]	< 1	1	< 1	< 1	2	2	2	< 1	4	< 1	< 1
Iron	µg/L	300[AO]	70	< 20	< 20	60	20	340	510	40	490	120	80
Lead	µg/L	5	< 0.1	< 0.1	< 0.1	< 0.1	0.1	0.1	< 0.1	< 0.1	0.8	< 0.1	< 0.1
Lithium	µg/L	-	1.1	0.2	1	0.5	1.3	1	0.8	0.7	0.8	0.3	0.2
Magnesium	µg/L	-	6070	4020	7240	3500	6460	7270	4020	4770	2380	1460	2000
Manganese	µg/L	120[MAC] / 20[AO]	1	**26**	4	5	2	9	8	2	**236**	**34**	6
Mercury	µg/L	1	< 0.025	< 0.025	-	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.05	< 0.05	< 0.05
Molybdenum	µg/L	-	13.1	0.5	8.5	0.5	2.8	2.3	0.2	0.5	3.7	2.8	0.7
Nickel	µg/L	-	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	3	< 1	< 1
Potassium	µg/L	-	1280	570	1270	560	1080	1020	610	720	2350	910	720
Rubidium	µg/L	-	0.9	0.5	0.8	0.4	0.9	0.8	0.5	0.5	1.6	0.9	0.5
Selenium	µg/L	50	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Silver	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Sodium	µg/L	200000[AO]	13600	12100	9360	2270	5700	5450	2140	2850	9100	3460	2680
Strontium	µg/L	7000	218	241	251	221	246	258	243	237	178	183	234
Tellurium	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Thallium	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Tin	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.3	< 0.1	< 0.1
Uranium	µg/L	20	0.4	< 0.1	0.5	0.3	0.4	0.5	0.3	0.3	0.2	0.1	0.1
Vanadium	µg/L	-	4	< 1	4	2	3	4	4	3	< 1	< 1	< 1
Zinc	µg/L	5000[AO]	< 1	2	2	< 1	3	1	3	1	3	2	< 1

Notes:

1. Canadian Drinking Water Quality Guidelines (CDWQG; Health Canada, updated 2020).
"-" not available/no data
MAC = maximum acceptable concentration; AO = aesthetic objective
Exceedances of the Health Based (MAC0 Federal GCDWQ are **bolded and shaded red**
Exccedances of the Aesthetic Objective Federal GCDWQ are **bolded and shaded blue**

Table D3. Metals in Groundwater

Parameter	Units	GCDWQ[1]	Sample ID										
			MW06-4										
			May-08	May-09	Nov-09	Nov-10	Nov-11	May-12	Nov-12	May-13	Jun-14	Nov-14	May-15
Aluminum	µg/L	-	66	14	30	234	106	59	20	25	217	296	123
Antimony	µg/L	6	0.2	0.2	1.4	0.2	0.2	0.2	< 0.1	< 0.1	0.4	2.1	0.2
Arsenic	µg/L	10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Barium	µg/L	2000	8	26	25	133	101	57	80	59	39	38	37
Beryllium	µg/L	-	< 0.1	< 0.1	< 0.1	0.2	0.2	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Bismuth	µg/L	-	< 1	< 0.1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Boron	µg/L	5000	50	475	30	1320	1430	1050	1490	498	554	216	103
Cadmium	µg/L	7	< 0.1	0.04	< 0.01	0.24	0.2	0.08	0.07	0.13	0.04	0.03	0.02
Calcium	µg/L	-	12300	25200	42700	49800	36700	34700	47200	45600	29100	45800	47900
Chromium	µg/L	50	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1	< 1
Cobalt	µg/L	-	0.3	0.2	0.3	0.7	0.7	0.5	0.4	0.3	0.6	0.6	0.3
Copper	µg/L	2000[MAC] / 1000[AO]	< 1	< 1	1	< 1	< 1	< 1	< 1	1	1	4	< 1
Iron	µg/L	300[AO]	70	< 20	30	< 20	< 20	40	< 20	20	170	260	90
Lead	µg/L	5	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.3	0.3	0.1
Lithium	µg/L	-	0.3	0.2	5.1	0.5	0.3	0.3	0.3	0.4	0.4	0.4	0.4
Magnesium	µg/L	-	1110	2770	15100	6050	3710	3350	4260	6940	2310	7200	8810
Manganese	µg/L	120[MAC] / 20[AO]	**36**	**110**	6	**323**	**214**	**123**	**59**	**26**	**51**	**29**	14
Mercury	µg/L	1	-	< 0.025	< 0.025			< 0.025		< 0.025	< 0.025	< 0.025	< 0.025
Molybdenum	µg/L	-	0.2	0.4	2.1	< 0.1	< 0.1	< 0.1	< 0.1	0.2	< 0.1	0.1	< 0.1
Nickel	µg/L	-	< 1	1	1	6	5	3	3	2	4	2	< 1
Potassium	µg/L	-	230	270	5650	470	500	400	580	710	1050	1230	480
Rubidium	µg/L	-	0.2	0.3	3.1	0.4	0.5	0.4	0.5	1	0.9	1.2	0.4
Selenium	µg/L	50	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Silver	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Sodium	µg/L	200000[AO]	4540	6920	3230	21500	14100	11000	17600	7940	7210	4990	4050
Strontium	µg/L	7000	74	163	382	258	179	175	231	274	137	304	351
Tellurium	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Thallium	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Tin	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	0.1	< 0.1
Uranium	µg/L	20	< 0.1	< 0.1	0.5	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	0.2
Vanadium	µg/L	-	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Zinc	µg/L	5000[AO]	4	< 1	3	6	2	1	2	3	3	8	3

Notes:

1. Canadian Drinking Water Quality Guidelines (CDWQG; Health Canada, updated 2020).
"-" not available/no data
MAC = maximum acceptable concentration; AO = aesthetic objective
Exceedances of the Health Based (MAC0 Federal GCDWQ are **bolded and shaded red**
Exccedances of the Aesthetic Objective Federal GCDWQ are **bolded and shaded blue**

Atlantic Canada Conservation Data Centre
Centre de données sur la conservation du Canada atlantique

DATA REPORT 6927: Grand Falls Parish, NB

Prepared 26 April 2021
by C. Robicheau, Data Manager

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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
GrFallsParisNB_6927ob.xls	Rare or legally-protected Flora and Fauna in your study area
GrFallsParisNB_6927ob100km.xls	A list of Rare and legally protected Flora and Fauna within 100 km of your study area

1.2 RESTRICTIONS

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

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

1.3 ADDITIONAL INFORMATION

The accompanying Data Dictionary provides metadata for the data provided.

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

Plants, Lichens, Ranking Methods, All other Inquiries
Sean Blaney, Senior Scientist, Executive Director
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: Emma Vost
(902) 670-8187
Emma.Vost@novascotia.ca

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

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

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

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

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

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

2.0 RARE AND ENDANGERED SPECIES

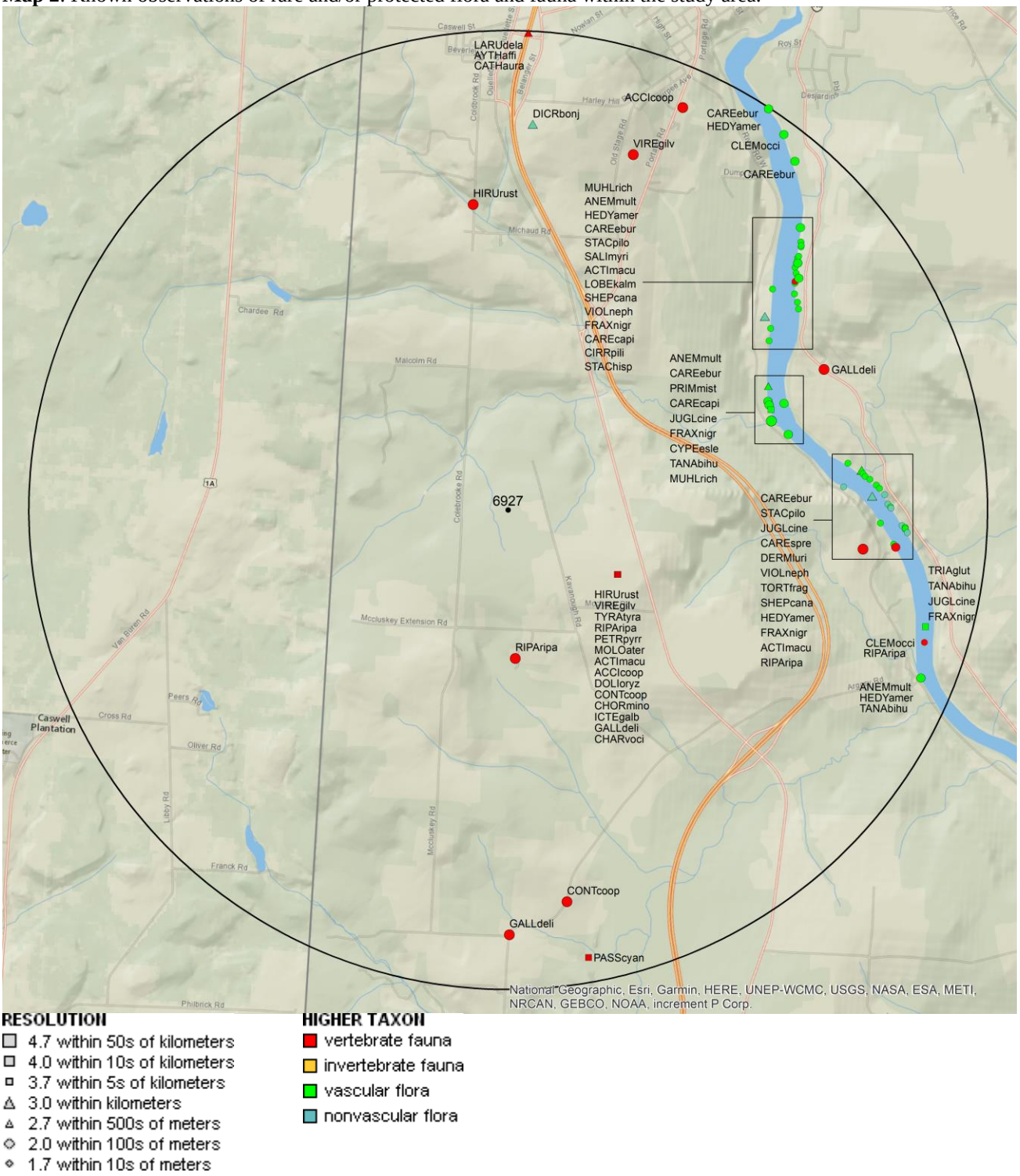
2.1 FLORA

The study area contains 59 records of 19 vascular, 9 records of 4 nonvascular flora (Map 2 and attached: *ob.xls).

2.2 FAUNA

The study area contains 34 records of 18 vertebrate and no records of 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

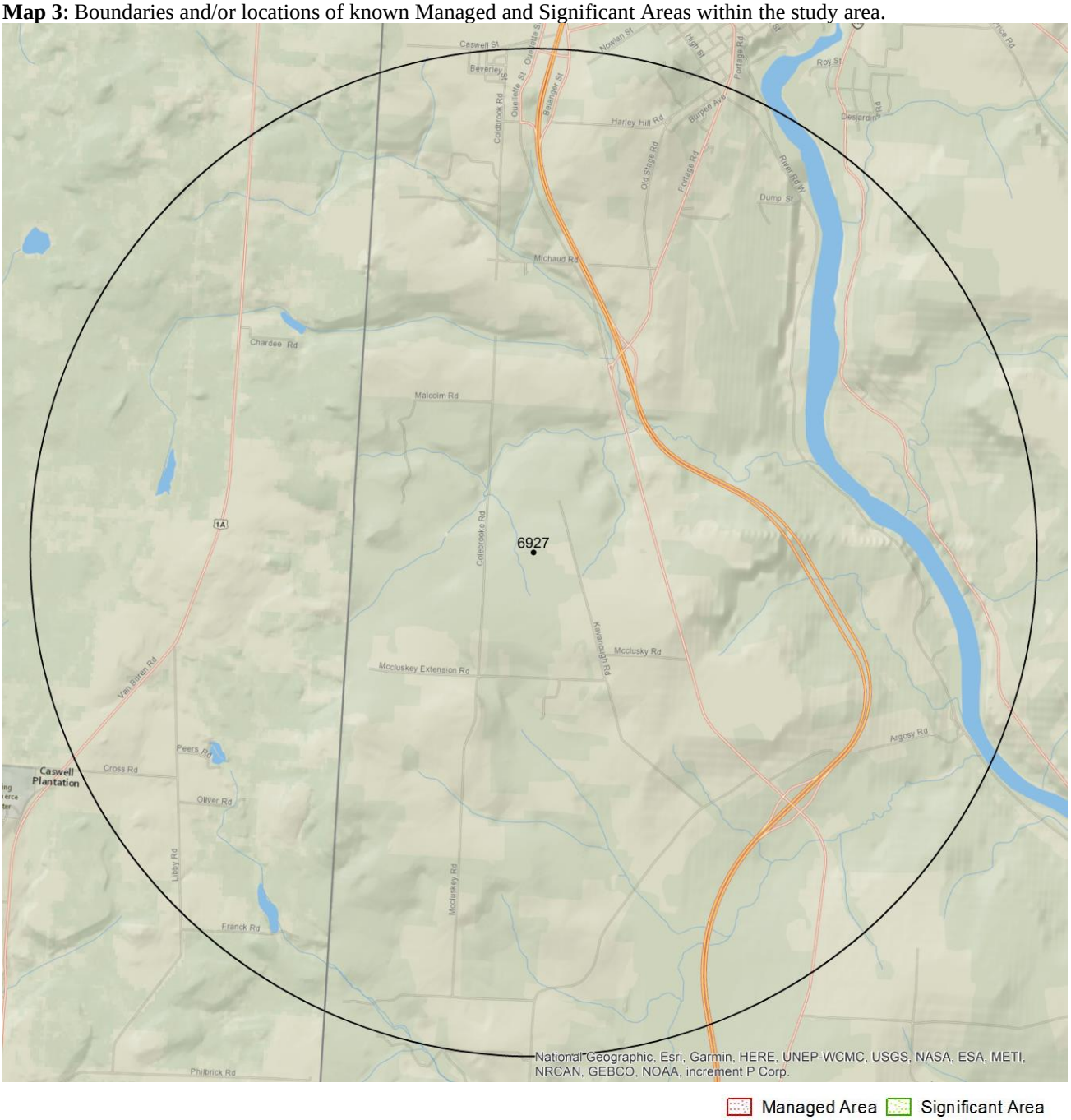
3.1 MANAGED AREAS

The GIS scan identified no managed areas in the vicinity of the study area (Map 3 and attached file: *msa.xls).

3.2 SIGNIFICANT AREAS

The GIS scan identified no biologically significant sites in the vicinity of the study area (Map 3 and attached file: *msa.xls).

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



4.0 RARE SPECIES LISTS

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

4.1 FLORA

	Scientific *Name*	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	# recs	Distance (km)
N	*Dicranum bonjeanii*	Bonjean's Broom Moss				S1?	1	4.0 ± 1.0
N	*Cirriphyllum piliferum*	Hair-pointed Moss				S2	1	3.4 ± 1.0
N	*Tortella fragilis*	Fragile Twisted Moss				S3	1	3.8 ± 2.0
N	*Dermatocarpon luridum*	Brookside Stippleback Lichen				S3S4	6	3.5 ± 0.0
P	*Juglans cinerea*	Butternut	Endangered	Endangered	Endangered	S1	3	2.9 ± 3.0
P	*Fraxinus nigra*	Black Ash	Threatened			S4S5	4	2.9 ± 3.0
P	*Shepherdia canadensis*	Soapberry				S2	2	3.6 ± 0.0
P	*Anemone multifida*	Cut-leaved Anemone				S2	5	2.9 ± 0.0
P	*Carex sprengelii*	Longbeak Sedge				S2	2	3.7 ± 1.0
P	*Salix myricoides*	Bayberry Willow				S2?	2	3.3 ± 0.0
P	*Tanacetum bipinnatum ssp. huronense*	Lake Huron Tansy				S3	5	2.9 ± 0.0
P	*Hedysarum americanum*	Alpine Hedysarum				S3	7	4.0 ± 0.0
P	*Stachys hispida*	Smooth Hedge-Nettle				S3	2	3.2 ± 0.0
P	*Primula mistassinica*	Mistassini Primrose				S3	1	2.9 ± 0.0
P	*Clematis occidentalis*	Purple Clematis				S3	2	4.5 ± 5.0
P	*Viola nephrophylla*	Northern Bog Violet				S3	3	3.7 ± 0.0
P	*Carex capillaris*	Hairlike Sedge				S3	2	2.9 ± 0.0
P	*Carex eburnea*	Bristle-leaved Sedge				S3	8	3.1 ± 0.0
P	*Cyperus esculentus var. leptostachyus*	Perennial Yellow Nutsedge				S3	1	2.9 ± 0.0
P	*Triantha glutinosa*	Sticky False-Asphodel				S3	1	4.5 ± 5.0
P	*Muhlenbergia richardsonis*	Mat Muhly				S3	3	2.9 ± 0.0
P	*Lobelia kalmii*	Brook Lobelia				S3S4	1	3.8 ± 0.0
P	*Stachys pilosa*	Hairy Hedge-Nettle				S3S4	5	3.7 ± 0.0

4.2 FAUNA

	Scientific *Name*	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	# recs	Distance (km)
A	*Hirundo rustica*	Barn Swallow	Threatened	Threatened	Threatened	S2B,S2M	4	1.3 ± 7.0
A	*Riparia riparia*	Bank Swallow	Threatened	Threatened		S2S3B,S2S3M	4	1.3 ± 7.0
A	*Dolichonyx oryzivorus*	Bobolink	Threatened	Threatened	Threatened	S3B,S3M	2	1.3 ± 7.0
A	*Contopus cooperi*	Olive-sided Flycatcher	Special Concern	Threatened	Threatened	S3B,S3M	2	1.3 ± 7.0
A	*Chordeiles minor*	Common Nighthawk	Special Concern	Threatened	Threatened	S3B,S4M	1	1.3 ± 7.0
A	*Accipiter cooperii*	Cooper's Hawk	Not At Risk			S1S2B,S1S2M	2	1.3 ± 7.0
A	*Aythya affinis*	Lesser Scaup				S1B,S4M	1	5.0 ± 0.0
A	*Petrochelidon pyrrhonota*	Cliff Swallow				S2S3B,S2S3M	1	1.3 ± 7.0
A	*Cathartes aura*	Turkey Vulture				S3B,S3M	1	5.0 ± 0.0
A	*Charadrius vociferus*	Killdeer				S3B,S3M	2	1.3 ± 7.0
A	*Vireo gilvus*	Warbling Vireo				S3B,S3M	2	1.3 ± 7.0
A	*Passerina cyanea*	Indigo Bunting				S3B,S3M	1	4.7 ± 7.0
A	*Molothrus ater*	Brown-headed Cowbird				S3B,S3M	1	1.3 ± 7.0
A	*Icterus galbula*	Baltimore Oriole				S3B,S3M	1	1.3 ± 7.0
A	*Tyrannus tyrannus*	Eastern Kingbird				S3S4B,S3S4M	2	1.3 ± 7.0
A	*Actitis macularius*	Spotted Sandpiper				S3S4B,S5M	3	1.3 ± 7.0
A	*Gallinago delicata*	Wilson's Snipe				S3S4B,S5M	3	1.3 ± 7.0
A	*Larus delawarensis*	Ring-billed Gull				S3S4B,S5M	1	5.0 ± 0.0

4.3 LOCATION SENSITIVE SPECIES

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

New Brunswick

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

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

4.4 SOURCE BIBLIOGRAPHY

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

# recs	CITATION
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1	Benedict, B. Connell Herbarium Specimen Database Download 2004. Connell Memorial Herbarium, University of New Brunswick. 2004.
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5.0 RARE SPECIES WITHIN 100 KM

A 100 km buffer around the study area contains 11,193 records of 105 vertebrate and 430 records of 46 invertebrate fauna; 11,261 records of 285 vascular and 496 records of 142 nonvascular flora (attached: *ob100km.xls).

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

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	# recs	Distance (km)	Prov
A	*Myotis lucifugus*	Little Brown Myotis	Endangered	Endangered	Endangered	S1	4	65.8 ± 1.0	NB
A	*Myotis septentrionalis*	Northern Long-eared Myotis	Endangered	Endangered	Endangered	S1	2	45.8 ± 1.0	NB
A	*Salmo salar pop. 1*	Atlantic Salmon - Inner Bay of Fundy pop.	Endangered	Endangered	Endangered	S2	427	69.6 ± 50.0	NB
A	*Icteria virens*	Yellow-Breasted Chat	Endangered	Endangered		SNA	1	81.5 ± 7.0	NB

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	# recs	Distance (km)	Prov
A	*Salmo salar pop. 7*	Atlantic Salmon - Outer Bay of Fundy pop.	Endangered		Endangered	SNR	2	30.4 ± 0.0	NB
A	*Rangifer tarandus pop. 2*	Woodland Caribou (Atlantic-Gasp ├⌐sie pop.)	Endangered	Endangered	Extirpated	SX	2	30.5 ± 1.0	NB
A	*Emydoidea blandingii*	Blanding's Turtle - Nova Scotia pop.	Endangered	Endangered			1	80.6 ± 1.0	NB
A	*Sturnella magna*	Eastern Meadowlark	Threatened	Threatened	Threatened	S1B,S1M	22	8.7 ± 7.0	NB
A	*Ixobrychus exilis*	Least Bittern	Threatened	Threatened	Threatened	S1S2B,S1S2M	5	35.0 ± 7.0	NB
A	*Hylocichla mustelina*	Wood Thrush	Threatened	Threatened	Threatened	S1S2B,S1S2M	163	5.6 ± 7.0	NB
A	*Antrostomus vociferus*	Eastern Whip-Poor-Will	Threatened	Threatened	Threatened	S2B,S2M	9	41.6 ± 7.0	NB
A	*Hirundo rustica*	Barn Swallow	Threatened	Threatened	Threatened	S2B,S2M	524	1.3 ± 7.0	NB
A	*Catharus bicknelli*	Bicknell's Thrush	Threatened	Threatened	Threatened	S2B,S2M	728	51.3 ± 7.0	NB
A	*Glyptemys insculpta*	Wood Turtle	Threatened	Threatened	Threatened	S2S3	56	29.2 ± 1.0	NB
A	*Chaetura pelagica*	Chimney Swift	Threatened	Threatened	Threatened	S2S3B,S2M	218	9.4 ± 0.0	NB
A	*Riparia riparia*	Bank Swallow	Threatened	Threatened		S2S3B,S2S3M	259	1.3 ± 7.0	NB
A	*Cardellina canadensis*	Canada Warbler	Threatened	Threatened	Threatened	S3B,S3M	859	8.1 ± 1.0	NB
A	*Dolichonyx oryzivorus*	Bobolink	Threatened	Threatened	Threatened	S3B,S3M	347	1.3 ± 7.0	NB
A	*Anguilla rostrata*	American Eel	Threatened		Threatened	S4	4	43.8 ± 0.0	NB
A	*Asio flammeus*	Short-eared Owl	Special Concern	Special Concern	Special Concern	S2B,S2M	11	27.1 ± 0.0	NB
A	*Bucephala islandica (Eastern pop.)*	Barrow's Goldeneye - Eastern pop.	Special Concern	Special Concern	Special Concern	S2M,S2N	2	57.2 ± 5.0	NB
A	*Salmo salar pop. 12*	Atlantic Salmon - Gaspe - Southern Gulf of St Lawrence pop.	Special Concern		Special Concern	S2S3	774	61.0 ± 0.0	NB
A	*Chelydra serpentina*	Snapping Turtle	Special Concern	Special Concern	Special Concern	S3	4	70.8 ± 0.0	NB
A	*Euphagus carolinus*	Rusty Blackbird	Special Concern	Special Concern	Special Concern	S3B,S3M	257	5.0 ± 0.0	NB
A	*Contopus cooperi*	Olive-sided Flycatcher	Special Concern	Threatened	Threatened	S3B,S3M	771	1.3 ± 7.0	NB
A	*Coccothraustes vespertinus*	Evening Grosbeak	Special Concern	Special Concern		S3B,S3S4N,SUM	321	9.5 ± 7.0	NB
A	*Chordeiles minor*	Common Nighthawk	Special Concern	Threatened	Threatened	S3B,S4M	251	1.3 ± 7.0	NB
A	*Phalaropus lobatus*	Red-necked Phalarope	Special Concern	Special Concern		S3M	2	22.2 ± 0.0	NB
A	*Contopus virens*	Eastern Wood-Pewee	Special Concern	Special Concern	Special Concern	S4B,S4M	430	8.2 ± 7.0	NB
A	*Podiceps auritus*	Horned Grebe	Special Concern	Special Concern	Special Concern	S4N,S4M	3	70.0 ± 2.0	NB
A	*Bubo scandiacus*	Snowy Owl	Not At Risk			S1N,S2S3M	5	8.2 ± 0.0	NB
A	*Accipiter cooperii*	Cooper's Hawk	Not At Risk			S1S2B,S1S2M	13	1.3 ± 7.0	NB
A	*Fulica americana*	American Coot	Not At Risk			S1S2B,S1S2M	2	73.5 ± 0.0	NB
A	*Aegolius funereus*	Boreal Owl	Not At Risk			S1S2B,SUM	2	90.3 ± 7.0	NB
A	*Sorex dispar*	Long-tailed Shrew	Not At Risk			S2	25	44.7 ± 1.0	NB
A	*Buteo lineatus*	Red-shouldered Hawk	Not At Risk			S2B,S2M	16	8.4 ± 0.0	NB
A	*Chlidonias niger*	Black Tern	Not At Risk			S2B,S2M	3	65.9 ± 7.0	NB
A	*Lynx canadensis*	Canadian Lynx	Not At Risk		Endangered	S3	125	20.3 ± 100.0	NB
A	*Desmognathus fuscus (Quebec/New Brunswick pop.)*	Northern Dusky Salamander (Quebec/New Brunswick pop.)	Not At Risk			S3	1	94.4 ± 0.0	NB
A	*Sterna hirundo*	Common Tern	Not At Risk			S3B,SUM	47	29.9 ± 0.0	NB
A	*Podiceps grisegena*	Red-necked Grebe	Not At Risk			S3M,S2N	2	70.0 ± 0.0	NB
A	*Haliaeetus leucocephalus*	Bald Eagle	Not At Risk		Endangered	S4	228	1.3 ± 7.0	NB
A	*Puma concolor pop. 1*	Eastern Cougar	Data Deficient		Endangered	SNA	18	30.6 ± 1.0	NB
A	*Thryothorus ludovicianus*	Carolina Wren				S1	27	55.4 ± 7.0	NB
A	*Salvelinus alpinus*	Arctic Char				S1	2	97.3 ± 1.0	NB
A	*Synaptomys borealis sphagnicola*	Northern Bog Lemming				S1	1	79.6 ± 1.0	NB
A	*Tringa melanoleuca*	Greater Yellowlegs				S1?B,S5M	24	22.2 ± 0.0	NB
A	*Gallinula galeata*	Common Gallinule				S1B,S1M	1	86.4 ± 0.0	NB
A	*Antigone canadensis*	Sandhill Crane				S1B,S1M	2	59.5 ± 7.0	NB
A	*Progne subis*	Purple Martin				S1B,S1M	66	20.6 ± 7.0	NB
A	*Oxyura jamaicensis*	Ruddy Duck				S1B,S2S3M	5	21.4 ± 7.0	NB
A	*Aythya affinis*	Lesser Scaup				S1B,S4M	8	5.0 ± 0.0	NB

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	# recs	Distance (km)	Prov
A	*Eremophila alpestris*	Horned Lark				S1B,S4N,S5M	48	5.4 ± 7.0	NB
A	*Chroicocephalus ridibundus*	Black-headed Gull				S1N,S2M	1	6.0 ± 0.0	NB
A	*Butorides virescens*	Green Heron				S1S2B,S1S2M	15	29.1 ± 7.0	NB
A	*Nycticorax nycticorax*	Black-crowned Night-heron				S1S2B,S1S2M	18	21.4 ± 7.0	NB
A	*Empidonax traillii*	Willow Flycatcher				S1S2B,S1S2M	15	61.8 ± 2.0	NB
A	*Stelgidopteryx serripennis*	Northern Rough-winged Swallow				S1S2B,S1S2M	3	62.9 ± 7.0	NB
A	*Troglodytes aedon*	House Wren				S1S2B,S1S2M	6	21.4 ± 7.0	NB
A	*Calidris bairdii*	Baird's Sandpiper				S1S2M	2	53.6 ± 0.0	NB
A	*Microtus chrotorrhinus*	Rock Vole				S2?	35	31.3 ± 1.0	NB
A	*Mimus polyglottos*	Northern Mockingbird				S2B,S2M	51	7.6 ± 7.0	NB
A	*Toxostoma rufum*	Brown Thrasher				S2B,S2M	79	5.6 ± 7.0	NB
A	*Pooecetes gramineus*	Vesper Sparrow				S2B,S2M	35	18.8 ± 0.0	NB
A	*Mareca strepera*	Gadwall				S2B,S3M	1	98.1 ± 0.0	NB
A	*Pinicola enucleator*	Pine Grosbeak				S2B,S4S5N,S4S5M	103	21.0 ± 7.0	NB
A	*Tringa solitaria*	Solitary Sandpiper				S2B,S5M	35	22.2 ± 0.0	NB
A	*Anser caerulescens*	Snow Goose				S2M	1	82.2 ± 0.0	NB
A	*Phalacrocorax carbo*	Great Cormorant				S2N,S2M	1	68.7 ± 1.0	NB
A	*Asio otus*	Long-eared Owl				S2S3	15	8.6 ± 0.0	NB
A	*Picoides dorsalis*	American Three-toed Woodpecker				S2S3	46	36.2 ± 0.0	NB
A	*Spatula clypeata*	Northern Shoveler				S2S3B,S2S3M	19	21.4 ± 7.0	NB
A	*Myiarchus crinitus*	Great Crested Flycatcher				S2S3B,S2S3M	65	9.5 ± 7.0	NB
A	*Petrochelidon pyrrhonota*	Cliff Swallow				S2S3B,S2S3M	199	1.3 ± 7.0	NB
A	*Pluvialis dominica*	American Golden-Plover				S2S3M	3	53.6 ± 0.0	NB
A	*Calcarius lapponicus*	Lapland Longspur				S2S3N,SUM	1	83.3 ± 2.0	NB
A	*Loxia curvirostra*	Red Crossbill				S3	45	20.5 ± 0.0	NB
A	*Spinus pinus*	Pine Siskin				S3	176	9.5 ± 7.0	NB
A	*Prosopium cylindraceum*	Round Whitefish				S3	7	27.6 ± 1.0	NB
A	*Salvelinus namaycush*	Lake Trout				S3	10	61.2 ± 0.0	NB
A	*Eptesicus fuscus*	Big Brown Bat				S3	1	13.0 ± 0.0	NB
A	*Cathartes aura*	Turkey Vulture				S3B,S3M	60	5.0 ± 0.0	NB
A	*Rallus limicola*	Virginia Rail				S3B,S3M	14	10.7 ± 7.0	NB
A	*Charadrius vociferus*	Killdeer				S3B,S3M	363	1.3 ± 7.0	NB
A	*Coccyzus erythropthalmus*	Black-billed Cuckoo				S3B,S3M	30	11.8 ± 0.0	NB
A	*Vireo gilvus*	Warbling Vireo				S3B,S3M	94	1.3 ± 7.0	NB
A	*Piranga olivacea*	Scarlet Tanager				S3B,S3M	233	15.4 ± 7.0	NB
A	*Passerina cyanea*	Indigo Bunting				S3B,S3M	33	4.7 ± 7.0	NB
A	*Molothrus ater*	Brown-headed Cowbird				S3B,S3M	108	1.3 ± 7.0	NB
A	*Icterus galbula*	Baltimore Oriole				S3B,S3M	97	1.3 ± 7.0	NB
A	*Somateria mollissima*	Common Eider				S3B,S4M,S3N	2	64.0 ± 0.0	NB
A	*Setophaga tigrina*	Cape May Warbler				S3B,S4S5M	148	10.7 ± 7.0	NB
A	*Anas acuta*	Northern Pintail				S3B,S5M	9	35.0 ± 7.0	NB
A	*Mergus serrator*	Red-breasted Merganser				S3B,S5M,S4S5N	29	9.5 ± 7.0	NB
A	*Arenaria interpres*	Ruddy Turnstone				S3M	1	53.6 ± 0.0	NB
A	*Bucephala albeola*	Bufflehead				S3M,S2N	6	47.8 ± 0.0	NB
A	*Calidris maritima*	Purple Sandpiper				S3M,S3N	1	68.7 ± 1.0	NB
A	*Tyrannus tyrannus*	Eastern Kingbird				S3S4B,S3S4M	325	1.3 ± 7.0	NB
A	*Actitis macularius*	Spotted Sandpiper				S3S4B,S5M	433	1.3 ± 7.0	NB
A	*Gallinago delicata*	Wilson's Snipe				S3S4B,S5M	264	1.3 ± 7.0	NB
A	*Larus delawarensis*	Ring-billed Gull				S3S4B,S5M	84	5.0 ± 0.0	NB
A	*Setophaga striata*	Blackpoll Warbler				S3S4B,S5M	719	16.0 ± 0.0	NB
A	*Calidris pusilla*	Semipalmated Sandpiper				S3S4M	12	22.2 ± 0.0	NB
A	*Calidris melanotos*	Pectoral Sandpiper				S3S4M	7	53.6 ± 0.0	NB
A	*Calidris alba*	Sanderling				S3S4M,S1N	3	53.6 ± 0.0	NB
C	*Acer saccharum - Fraxinus*	Sugar Maple - White Ash /				S3	2	69.8 ± 0.0	NB

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	# recs	Distance (km)	Prov
	americana / Gymnocarpium dryopteris - Deparia acrostichoides Forest	Common Oak Fern - Silvery Glade Fern Forest							
I	*Cicindela marginipennis*	Cobblestone Tiger Beetle	Endangered	Endangered	Endangered	S1	20	60.9 ± 0.0	NB
I	*Danaus plexippus*	Monarch	Endangered	Special Concern	Special Concern	S3B,S3M	17	12.9 ± 0.0	NB
I	*Ophiogomphus howei*	Pygmy Snaketail	Special Concern	Special Concern	Special Concern	S2	3	64.9 ± 0.0	NB
I	*Bombus terricola*	Yellow-banded Bumblebee	Special Concern	Special Concern		S3?	16	13.9 ± 0.0	NB
I	*Coccinella transversoguttata richardsoni*	Transverse Lady Beetle	Special Concern			SH	2	6.4 ± 1.0	NB
I	*Lycaena dorcas*	Dorcas Copper				S1	14	70.4 ± 1.0	NB
I	*Erora laeta*	Early Hairstreak				S1	10	36.6 ± 0.0	NB
I	*Somatochlora septentrionalis*	Muskeg Emerald				S1	4	86.0 ± 0.0	NB
I	*Leucorrhinia patricia*	Canada Whiteface				S1	7	83.2 ± 1.0	NB
I	*Plebejus saepiolus*	Greenish Blue				S1S2	24	18.9 ± 1.0	NB
I	*Ophiogomphus colubrinus*	Boreal Snaketail				S1S2	2	76.4 ± 0.0	NB
I	*Cicindela ancocisconensis*	Appalachian Tiger Beetle				S2	3	60.9 ± 0.0	NB
I	*Encyclops caerulea*	a Longhorned Beetle				S2	2	86.4 ± 0.0	NB
I	*Satyrium calanus*	Banded Hairstreak				S2	4	85.9 ± 0.0	NB
I	*Aeshna juncea*	Rush Darner				S2	9	77.2 ± 0.0	NB
I	*Somatochlora brevicincta*	Quebec Emerald				S2	8	82.2 ± 0.0	NB
I	*Hetaerina americana*	American Rubyspot				S2	1	87.4 ± 0.0	NB
I	*Coenagrion interrogatum*	Subarctic Bluet				S2	14	40.2 ± 1.0	NB
I	*Callophrys henrici*	Henry's Elfin				S2S3	3	20.5 ± 2.0	NB
I	*Hesperia sassacus*	Indian Skipper				S3	2	62.8 ± 7.0	NB
I	*Euphyes bimacula*	Two-spotted Skipper				S3	1	90.6 ± 7.0	NB
I	*Satyrium acadica*	Acadian Hairstreak				S3	7	20.2 ± 0.0	NB
I	*Callophrys polios*	Hoary Elfin				S3	9	19.0 ± 0.0	NB
I	*Callophrys eryphon*	Western Pine Elfin				S3	12	90.6 ± 1.0	NB
I	*Speyeria aphrodite*	Aphrodite Fritillary				S3	13	33.8 ± 0.0	NB
I	*Boloria eunomia*	Bog Fritillary				S3	20	28.4 ± 0.0	NB
I	*Boloria bellona*	Meadow Fritillary				S3	9	44.3 ± 0.0	NB
I	*Boloria chariclea*	Arctic Fritillary				S3	13	71.9 ± 7.0	NB
I	*Polygonia satyrus*	Satyr Comma				S3	23	32.1 ± 0.0	NB
I	*Polygonia gracilis*	Hoary Comma				S3	31	46.1 ± 2.0	NB
I	*Nymphalis l-album*	Compton Tortoiseshell				S3	13	22.0 ± 1.0	NB
I	*Gomphus vastus*	Cobra Clubtail				S3	2	30.2 ± 0.0	NB
I	*Gomphus abbreviatus*	Spine-crowned Clubtail				S3	7	31.0 ± 0.0	NB
I	*Somatochlora albicincta*	Ringed Emerald				S3	30	60.4 ± 0.0	NB
I	*Somatochlora cingulata*	Lake Emerald				S3	23	40.9 ± 0.0	NB
I	*Somatochlora forcipata*	Forcipate Emerald				S3	9	60.1 ± 1.0	NB
I	*Williamsonia fletcheri*	Ebony Boghaunter				S3	3	72.1 ± 0.0	NB
I	*Lestes eurinus*	Amber-Winged Spreadwing				S3	6	66.8 ± 0.0	NB
I	*Enallagma geminatum*	Skimming Bluet				S3	4	70.9 ± 0.0	NB
I	*Enallagma signatum*	Orange Bluet				S3	3	73.8 ± 0.0	NB
I	*Stylurus scudderi*	Zebra Clubtail				S3	5	59.3 ± 0.0	NB
I	*Alasmidonta undulata*	Triangle Floater				S3	4	6.7 ± 0.0	NB
I	*Leptodea ochracea*	Tidewater Mucket				S3	1	95.4 ± 1.0	NB
I	*Pantala hymenaea*	Spot-Winged Glider				S3B,S3M	2	76.8 ± 1.0	NB
I	*Satyrium liparops*	Striped Hairstreak				S3S4	13	16.1 ± 0.0	NB
I	*Cupido comyntas*	Eastern Tailed Blue				S3S4	2	59.0 ± 2.0	NB
N	*Fuscopannaria leucosticta*	White-rimmed Shingle Lichen	Threatened			S2	2	79.1 ± 0.0	NB
N	*Aphanorrhegma serratum*	a Moss				S1	2	30.4 ± 0.0	NB
N	*Arctoa fulvella*	a Moss				S1	2	79.6 ± 1.0	NB
N	*Campylium halleri*	Haller's Fine Wet Moss				S1	2	6.4 ± 1.0	NB
N	*Drepanocladus capillifolius*	Hair Hook Moss				S1	1	18.5 ± 1.0	NB
N	*Grimmia donniana*	Donn's Grimmia Moss				S1	4	79.6 ± 1.0	NB
N	*Grimmia incurva*	Black Grimmia				S1	4	79.6 ± 1.0	NB

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N	*Grimmia unicolor*	a Moss				S1	1	20.1 ± 1.0	NB
N	*Hypnum recurvatum*	Recurved Plait Moss				S1	3	6.4 ± 1.0	NB
N	*Kiaeria starkei*	Starke's Fork Moss				S1	1	79.6 ± 1.0	NB
N	*Placynthium asperellum*	Lilliput Ink Lichen				S1	1	50.8 ± 0.0	NB
N	*Collema tenax*	Soil Tarpaper Lichen				S1	5	30.2 ± 0.0	NB
N	*Cetraria ericetorum ssp. ericetorum*	a Lichen				S1	2	81.6 ± 20.0	NB
N	*Atrichum angustatum*	Lesser Smoothcap Moss				S1?	1	95.3 ± 2.0	NB
N	*Bryum pallens*	a Moss				S1?	3	6.4 ± 1.0	NB
N	*Catoscopium nigritum*	Black Golf Club Moss				S1?	5	6.4 ± 1.0	NB
N	*Cinclidium stygium*	Sooty Cupola Moss				S1?	2	34.3 ± 0.0	NB
N	*Dicranum bonjeanii*	Bonjean's Broom Moss				S1?	2	4.0 ± 1.0	NB
N	*Entodon brevisetus*	a Moss				S1?	1	49.4 ± 1.0	NB
N	*Eurhynchium hians*	Light Beaked Moss				S1?	1	71.7 ± 0.0	NB
N	*Paludella squarrosa*	Tufted Fen Moss				S1?	1	34.3 ± 0.0	NB
N	*Seligeria recurvata*	a Moss				S1?	5	6.4 ± 1.0	NB
N	*Splachnum sphaericum*	Round-fruited Dung Moss				S1?	1	61.6 ± 1.0	NB
N	*Timmia megapolitana*	Metropolitan Timmia Moss				S1?	3	8.3 ± 1.0	NB
N	*Rhizomnium pseudopunctatum*	Felted Leafy Moss				S1?	1	79.7 ± 1.0	NB
N	*Euopsis granatina*	Lesser Rockbud Lichen				S1?	1	93.1 ± 0.0	NB
N	*Spilonema revertens*	Rock Hairball Lichen				S1?	1	93.1 ± 0.0	NB
N	*Peltigera venosa*	Fan Pelt Lichen				S1?	4	96.0 ± 0.0	NB
N	*Lophozia heterocolpos*	Whip Notchwort				S1S2	1	98.4 ± 0.0	NB
N	*Metacalypogeia schusterana*	Schuster's Pouchwort				S1S2	2	87.3 ± 1.0	NB
N	*Calliergon richardsonii*	Richardson's Spear Moss				S1S2	4	34.4 ± 0.0	NB
N	*Campylium radicale*	Long-stalked Fine Wet Moss				S1S2	2	30.4 ± 0.0	NB
N	*Ditrichum pallidum*	Pale Cow-hair Moss				S1S2	2	71.1 ± 0.0	NB
N	*Drummondia prorepens*	a Moss				S1S2	1	81.7 ± 1.0	NB
N	*Fissidens taxifolius*	Yew-leaved Pocket Moss				S1S2	4	30.3 ± 0.0	NB
N	*Grimmia longirostris*	a Moss				S1S2	1	6.4 ± 1.0	NB
N	*Hygrohypnum bestii*	Best's Brook Moss				S1S2	1	6.4 ± 10.0	NB
N	*Oncophorus virens*	Green Spur Moss				S1S2	3	6.4 ± 1.0	NB
N	*Platydictya confervoides*	a Moss				S1S2	5	6.4 ± 1.0	NB
N	*Seligeria brevifolia*	a Moss				S1S2	2	93.1 ± 1.0	NB
N	*Timmia austriaca*	Austrian Timmia Moss				S1S2	3	81.3 ± 1.0	NB
N	*Tomentypnum falcifolium*	Sickle-leaved Golden Moss				S1S2	2	12.7 ± 1.0	NB
N	*Hamatocaulis vernicosus*	a Moss				S1S2	2	34.3 ± 0.0	NB
N	*Bryohaplocladium microphyllum*	Tiny-leaved Haplocladium Moss				S1S2	7	9.3 ± 1.0	NB
N	*Cystocoleus ebeneus*	Rockgossamer Lichen				S1S2	2	63.5 ± 0.0	NB
N	*Anaptychia crinalis*	Hanging Fringed Lichen				S1S2	1	51.1 ± 0.0	NB
N	*Frullania selwyniana*	Selwyn's Scalewort				S1S3	1	51.1 ± 0.0	NB
N	*Lophozia obtusa*	Obtuse Notchwort				S1S3	1	78.8 ± 0.0	NB
N	*Tritomaria scitula*	Mountain Notchwort				S1S3	1	97.4 ± 1.0	NB
N	*Anomodon viticulosus*	a Moss				S2	3	83.3 ± 0.0	NB
N	*Cirriphyllum piliferum*	Hair-pointed Moss				S2	2	3.4 ± 1.0	NB
N	*Didymodon ferrugineus*	a moss				S2	3	6.4 ± 1.0	NB
N	*Ditrichum flexicaule*	Flexible Cow-hair Moss				S2	7	6.4 ± 1.0	NB
N	*Fontinalis hypnoides*	a moss				S2	1	76.1 ± 15.0	NB
N	*Anomodon tristis*	a Moss				S2	1	50.8 ± 0.0	NB
N	*Hypnum pratense*	Meadow Plait Moss				S2	4	67.1 ± 1.0	NB
N	*Isopterygiopsis pulchella*	Neat Silk Moss				S2	2	70.1 ± 1.0	NB
N	*Meesia triquetra*	Three-ranked Cold Moss				S2	1	39.1 ± 100.0	NB
N	*Physcomitrium immersum*	a Moss				S2	2	6.4 ± 1.0	NB
N	*Pohlia elongata*	Long-necked Nodding Moss				S2	1	92.1 ± 2.0	NB
N	*Pohlia sphagnicola*	a moss				S2	1	85.9 ± 1.0	NB
N	*Seligeria calcarea*	Chalk Brittle Moss				S2	1	80.2 ± 0.0	NB

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N	*Sphagnum centrale*	Central Peat Moss				S2	1	34.4 ± 0.0	NB
N	*Tayloria serrata*	Serrate Trumpet Moss				S2	1	77.1 ± 0.0	NB
N	*Tortula mucronifolia*	Mucronate Screw Moss				S2	3	6.4 ± 1.0	NB
N	*Zygodon viridissimus var. rupestris*	a moss				S2	2	17.6 ± 0.0	NB
N	*Anomobryum filiforme*	a moss				S2	1	6.4 ± 1.0	NB
N	*Leptogium milligranum*	Stretched Jellyskin Lichen				S2	2	61.9 ± 0.0	NB
N	*Nephroma laevigatum*	Mustard Kidney Lichen				S2	1	64.6 ± 0.0	NB
N	*Peltigera lepidophora*	Scaly Pelt Lichen				S2	8	47.1 ± 0.0	NB
N	*Barbilophozia lycopodioides*	Greater Pawwort				S2?	2	54.1 ± 1.0	NB
N	*Anomodon minor*	Blunt-leaved Anomodon Moss				S2?	3	9.3 ± 1.0	NB
N	*Bryum pallescens*	Pale Bryum Moss				S2?	1	6.4 ± 1.0	NB
N	*Dicranum spurium*	Spurred Broom Moss				S2?	1	93.0 ± 0.0	NB
N	*Hygrohypnum montanum*	a Moss				S2?	2	77.0 ± 0.0	NB
N	*Schistostega pennata*	Luminous Moss				S2?	3	71.7 ± 1.0	NB
N	*Seligeria campylopoda*	a Moss				S2?	5	6.4 ± 1.0	NB
N	*Seligeria diversifolia*	a Moss				S2?	2	79.2 ± 1.0	NB
N	*Trichodon cylindricus*	Cylindric Hairy-teeth Moss				S2?	3	79.1 ± 0.0	NB
N	*Plagiomnium rostratum*	Long-beaked Leafy Moss				S2?	3	40.8 ± 1.0	NB
N	*Collema leptaleum*	Crumpled Bat's Wing Lichen				S2?	4	71.7 ± 0.0	NB
N	*Imshaugia placorodia*	Eyed Starburst Lichen				S2?	1	49.4 ± 0.0	NB
N	*Bryum uliginosum*	a Moss				S2S3	2	6.4 ± 1.0	NB
N	*Bryum weigelii*	Weigel's Bryum Moss				S2S3	1	78.8 ± 3.0	NB
N	*Calliergonella cuspidata*	Common Large Wetland Moss				S2S3	2	34.4 ± 0.0	NB
N	*Campylium polygamum*	a Moss				S2S3	3	6.4 ± 1.0	NB
N	*Didymodon rigidulus*	Rigid Screw Moss				S2S3	6	6.4 ± 1.0	NB
N	*Fissidens bushii*	Bush's Pocket Moss				S2S3	4	55.7 ± 0.0	NB
N	*Orthotrichum speciosum*	Showy Bristle Moss				S2S3	5	24.0 ± 3.0	NB
N	*Pohlia proligera*	Cottony Nodding Moss				S2S3	1	92.1 ± 2.0	NB
N	*Saelania glaucescens*	Blue Dew Moss				S2S3	2	76.1 ± 15.0	NB
N	*Scorpidium scorpioides*	Hooked Scorpion Moss				S2S3	4	34.3 ± 0.0	NB
N	*Sphagnum subfulvum*	a Peatmoss				S2S3	1	78.6 ± 0.0	NB
N	*Taxiphyllum deplanatum*	Imbricate Yew-leaved Moss				S2S3	2	46.7 ± 5.0	NB
N	*Plagiomnium drummondii*	Drummond's Leafy Moss				S2S3	2	24.0 ± 3.0	NB
N	*Cyrtomnium hymenophylloides*	Short-pointed Lantern Moss				S2S3	2	49.7 ± 0.0	NB
N	*Dendriscocaulon umhausense*	a lichen				S2S3	2	39.0 ± 0.0	NB
N	*Punctelia caseana*					S2S3	3	65.2 ± 0.0	NB
N	*Hypnum curvifolium*	Curved-leaved Plait Moss				S3	1	71.7 ± 0.0	NB
N	*Tortella fragilis*	Fragile Twisted Moss				S3	4	3.8 ± 2.0	NB
N	*Hymenostylium recurvirostre*	Hymenostylium Moss				S3	5	6.4 ± 1.0	NB
N	*Collema nigrescens*	Blistered Tarpaper Lichen				S3	6	71.7 ± 0.0	NB
N	*Solorina saccata*	Woodland Owl Lichen				S3	23	49.7 ± 0.0	NB
N	*Ahtiana aurescens*	Eastern Candlewax Lichen				S3	2	55.6 ± 0.0	NB
N	*Cladonia strepsilis*	Olive Cladonia Lichen				S3	1	81.7 ± 0.0	NB
N	*Leptogium lichenoides*	Tattered Jellyskin Lichen				S3	4	30.4 ± 0.0	NB
N	*Nephroma resupinatum*	a lichen				S3	5	65.2 ± 0.0	NB
N	*Usnea strigosa*	Bushy Beard Lichen				S3	1	64.4 ± 0.0	NB
N	*Leptogium laceroides*	Short-bearded Jellyskin Lichen				S3	4	51.0 ± 0.0	NB
N	*Peltigera membranacea*	Membranous Pelt Lichen				S3	8	55.4 ± 0.0	NB
N	*Bryum amblyodon*	a Moss				S3?	1	49.7 ± 0.0	NB
N	*Anomodon rugelii*	Rugel's Anomodon Moss				S3S4	11	6.4 ± 1.0	NB
N	*Barbula convoluta*	Lesser Bird's-claw Beard Moss				S3S4	2	6.4 ± 1.0	NB

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N	*Brachythecium velutinum*	Velvet Ragged Moss				S3S4	2	86.0 ± 3.0	NB
N	*Calliergon giganteum*	Giant Spear Moss				S3S4	1	10.0 ± 3.0	NB
N	*Dicranella cerviculata*	a Moss				S3S4	2	68.8 ± 1.0	NB
N	*Dicranella varia*	a Moss				S3S4	8	6.4 ± 1.0	NB
N	*Encalypta ciliata*	Fringed Extinguisher Moss				S3S4	1	46.7 ± 5.0	NB
N	*Fissidens bryoides*	Lesser Pocket Moss				S3S4	5	76.1 ± 15.0	NB
N	*Helodium blandowii*	Wetland-plume Moss				S3S4	4	20.7 ± 3.0	NB
N	*Heterocladium dimorphum*	Dimorphous Tangle Moss				S3S4	2	76.1 ± 15.0	NB
N	*Isopterygiopsis muelleriana*	a Moss				S3S4	4	76.1 ± 15.0	NB
N	*Myurella julacea*	Small Mouse-tail Moss				S3S4	6	6.4 ± 1.0	NB
N	*Physcomitrium pyriforme*	Pear-shaped Urn Moss				S3S4	2	73.9 ± 1.0	NB
N	*Pogonatum dentatum*	Mountain Hair Moss				S3S4	2	68.8 ± 1.0	NB
N	*Splachnum rubrum*	Red Collar Moss				S3S4	1	87.6 ± 2.0	NB
N	*Tomentypnum nitens*	Golden Fuzzy Fen Moss				S3S4	4	20.7 ± 3.0	NB
N	*Weissia controversa*	Green-Cushioned Weissia				S3S4	4	6.4 ± 1.0	NB
N	*Abietinella abietina*	Wiry Fern Moss				S3S4	7	6.3 ± 0.0	NB
N	*Trichostomum tenuirostre*	Acid-Soil Moss				S3S4	3	76.1 ± 15.0	NB
N	*Limprichtia revolvens*	a Moss				S3S4	2	34.3 ± 0.0	NB
N	*Rauiella scita*	Smaller Fern Moss				S3S4	5	17.5 ± 0.0	NB
N	*Pannaria rubiginosa*	Brown-eyed Shingle Lichen				S3S4	11	51.0 ± 0.0	NB
N	*Pseudocyphellaria holarctica*	Yellow Specklebelly Lichen				S3S4	8	39.7 ± 0.0	NB
N	*Vahliella leucophaea*	Shelter Shingle Lichen				S3S4	6	63.5 ± 0.0	NB
N	*Montanelia panniformis*	Shingled Camouflage Lichen				S3S4	1	63.5 ± 0.0	NB
N	*Nephroma parile*	Powdery Kidney Lichen				S3S4	7	17.4 ± 0.0	NB
N	*Protopannaria pezizoides*	Brown-gray Moss-shingle Lichen				S3S4	6	47.2 ± 0.0	NB
N	*Fuscopannaria sorediata*	a Lichen				S3S4	1	51.0 ± 0.0	NB
N	*Pannaria conoplea*	Mealy-rimmed Shingle Lichen				S3S4	8	39.6 ± 0.0	NB
N	*Anaptychia palmulata*	Shaggy Fringed Lichen				S3S4	3	55.9 ± 0.0	NB
N	*Dermatocarpon luridum*	Brookside Stippleback Lichen				S3S4	72	3.5 ± 0.0	NB
P	*Juglans cinerea*	Butternut	Endangered	Endangered	Endangered	S1	608	2.9 ± 3.0	NB
P	*Pedicularis furbishiae*	Furbish Lousewort	Endangered	Endangered	Endangered	S1	55	6.7 ± 1.0	NB
P	*Fraxinus nigra*	Black Ash	Threatened			S4S5	969	2.9 ± 3.0	NB
P	*Isoetes prototypus*	Prototype Quillwort	Special Concern	Special Concern	Endangered	S2	1	86.7 ± 0.0	NB
P	*Symphyotrichum anticostense*	Anticosti Aster	Special Concern	Special Concern	Endangered	S2S3	131	6.5 ± 0.0	NB
P	*Pterospora andromedea*	Woodland Pinedrops			Endangered	S1	1	85.8 ± 0.0	NB
P	*Cryptotaenia canadensis*	Canada Honewort				S1	8	8.2 ± 1.0	NB
P	*Sanicula trifoliata*	Large-Fruited Sanicle				S1	23	44.4 ± 0.0	NB
P	*Antennaria parlinii ssp. fallax*	Parlin's Pussytoes				S1	1	94.1 ± 0.0	NB
P	*Arnica lonchophylla*	Northern Arnica				S1	10	49.7 ± 1.0	NB
P	*Hieracium robinsonii*	Robinson's Hawkweed				S1	3	6.4 ± 1.0	NB
P	*Symphyotrichum laeve*	Smooth Aster				S1	3	46.7 ± 1.0	NB
P	*Canadanthus modestus*	Great Northern Aster				S1	55	59.3 ± 0.0	NB
P	*Betula glandulosa*	Glandular Birch				S1	5	79.7 ± 0.0	NB
P	*Andersonglossum boreale*	Northern Wild Comfrey				S1	19	20.2 ± 1.0	NB
P	*Cardamine concatenata*	Cut-leaved Toothwort				S1	15	28.4 ± 0.0	NB
P	*Draba cana*	Lance-leaved Draba				S1	1	89.2 ± 1.0	NB
P	*Moehringia macrophylla*	Large-Leaved Sandwort				S1	2	91.6 ± 0.0	NB
P	*Chenopodiastrum simplex*	Maple-leaved Goosefoot				S1	1	91.1 ± 0.0	NB
P	*Blitum capitatum*	strawberry-blite				S1	8	10.9 ± 0.0	NB
P	*Drosera anglica*	English Sundew				S1	5	34.3 ± 0.0	NB
P	*Drosera linearis*	Slender-Leaved Sundew				S1	4	34.3 ± 0.0	NB
P	*Vaccinium boreale*	Northern Blueberry				S1	1	88.0 ± 0.0	NB
P	*Vaccinium uliginosum*	Alpine Bilberry				S1	1	79.7 ± 0.0	NB
P	*Hylodesmum glutinosum*	Large Tick-trefoil				S1	7	87.1 ± 0.0	NB

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P	*Oxytropis deflexa var. foliolosa*	Nodding Locoweed				S1	8	30.2 ± 0.0	NB
P	*Gentiana rubricaulis*	Purple-stemmed Gentian				S1	1	83.4 ± 0.0	NB
P	*Ribes cynosbati*	Prickly Gooseberry				S1	1	94.0 ± 0.0	NB
P	*Hepatica acutiloba*	Sharp-lobed Hepatica				S1	11	63.6 ± 0.0	NB
P	*Coptidium lapponicum*	Lapland Buttercup				S1	29	30.5 ± 0.0	NB
P	*Amelanchier fernaldii*	Fernald's Serviceberry				S1	1	82.6 ± 0.0	NB
P	*Galium brevipes*	Limestone Swamp Bedstraw				S1	3	49.6 ± 0.0	NB
P	*Agalinis purpurea var. parviflora*	Small-flowered Purple False Foxglove				S1	3	18.7 ± 0.0	NB
P	*Viola canadensis*	Canada Violet				S1	87	16.0 ± 0.0	NB
P	*Alisma subcordatum*	Southern Water Plantain				S1	1	94.8 ± 1.0	NB
P	*Carex annectens*	Yellow-Fruited Sedge				S1	1	93.5 ± 0.0	NB
P	*Carex blanda*	Eastern Woodland Sedge				S1	2	58.6 ± 2.0	NB
P	*Carex cephaloidea*	Thin-leaved Sedge				S1	31	8.3 ± 0.0	NB
P	*Carex merritt-fernaldii*	Merritt Fernald's Sedge				S1	1	44.6 ± 0.0	NB
P	*Carex media*	Intermediate Sedge				S1	24	52.3 ± 0.0	NB
P	*Carex scirpoidea*	Scirpuslike Sedge				S1	2	21.3 ± 1.0	NB
P	*Carex sterilis*	Sterile Sedge				S1	14	15.4 ± 0.0	NB
P	*Carex grisea*	Inflated Narrow-leaved Sedge				S1	5	8.3 ± 0.0	NB
P	*Carex saxatilis*	Russet Sedge				S1	6	75.6 ± 0.0	NB
P	*Carex bigelowii*	Bigelow's Sedge				S1	6	79.6 ± 0.0	NB
P	*Rhynchospora capillacea*	Slender Beakrush				S1	5	20.1 ± 1.0	NB
P	*Sisyrinchium angustifolium*	Narrow-leaved Blue-eyed-grass				S1	1	96.9 ± 0.0	NB
P	*Juncus stygius ssp. americanus*	Moor Rush				S1	1	20.5 ± 10.0	NB
P	*Juncus subtilis*	Creeping Rush				S1	1	76.3 ± 0.0	NB
P	*Allium canadense*	Canada Garlic				S1	10	69.9 ± 0.0	NB
P	*Malaxis monophyllos var. brachypoda*	North American White Adder's-mouth				S1	2	68.1 ± 1.0	NB
P	*Platanthera macrophylla*	Large Round-Leaved Orchid				S1	2	34.9 ± 1.0	NB
P	*Dichanthelium xanthophysum*	Slender Panic Grass				S1	2	90.5 ± 0.0	NB
P	*Elymus hystrix*	Spreading Wild Rye				S1	30	48.4 ± 0.0	NB
P	*Festuca subverticillata*	Nodding Fescue				S1	38	8.0 ± 0.0	NB
P	*Potamogeton friesii*	Fries' Pondweed				S1	5	93.9 ± 0.0	NB
P	*Potamogeton nodosus*	Long-leaved Pondweed				S1	10	85.8 ± 0.0	NB
P	*Dryopteris clintoniana*	Clinton's Wood Fern				S1	13	20.5 ± 10.0	NB
P	*Gymnocarpium continentale*	Nahanni Oak Fern				S1	5	49.8 ± 0.0	NB
P	*Gymnocarpium robertianum*	Limestone Oak Fern				S1	5	22.5 ± 0.0	NB
P	*Huperzia selago*	Northern Firmoss				S1	9	31.2 ± 0.0	NB
P	*Botrychium lunaria*	Common Moonwort				S1	7	20.3 ± 0.0	NB
P	*Sceptridium oneidense*	Blunt-lobed Moonwort				S1	4	93.2 ± 0.0	NB
P	*Sceptridium rugulosum*	Rugulose Grapefern				S1	4	93.1 ± 0.0	NB
P	*Polygonum aviculare ssp. neglectum*	Narrow-leaved Knotweed				S1?	1	89.3 ± 1.0	NB
P	*Galium trifidum ssp. subbiflorum*	Three-petaled Bedstraw				S1?	5	82.6 ± 0.0	NB
P	*Carex laxiflora*	Loose-Flowered Sedge				S1?	2	65.5 ± 0.0	NB
P	*Carex appalachica*	Appalachian Sedge				S1?	1	90.4 ± 0.0	NB
P	*Sisyrinchium mucronatum*	Michaux's Blue-eyed-grass				S1?	10	85.2 ± 0.0	NB
P	*Micranthes virginiensis*	Early Saxifrage				S1S2	5	56.7 ± 0.0	NB
P	*Carex crawei*	Crawe's Sedge				S1S2	3	93.5 ± 0.0	NB
P	*Selaginella rupestris*	Rock Spikemoss				S1S2	4	75.5 ± 0.0	NB
P	*Cuscuta cephalanthi*	Buttonbush Dodder				S1S3	10	19.6 ± 0.0	NB
P	*Osmorhiza depauperata*	Blunt Sweet Cicely				S2	7	41.8 ± 10.0	NB

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	# recs	Distance (km)	Prov
P	*Osmorhiza longistylis*	Smooth Sweet Cicely				S2	11	8.3 ± 0.0	NB
P	*Sanicula odorata*	Clustered Sanicle				S2	29	8.3 ± 1.0	NB
P	*Solidago racemosa*	Racemose Goldenrod				S2	40	19.7 ± 0.0	NB
P	*Pseudognaphalium macounii*	Macoun's Cudweed				S2	1	85.8 ± 0.0	NB
P	*Impatiens pallida*	Pale Jewelweed				S2	15	8.2 ± 0.0	NB
P	*Betula minor*	Dwarf White Birch				S2	11	53.8 ± 0.0	NB
P	*Boechera stricta*	Drummond's Rockcress				S2	8	6.2 ± 0.0	NB
P	*Stellaria longifolia*	Long-leaved Starwort				S2	6	82.5 ± 0.0	NB
P	*Hypericum x dissimulatum*	Disguised St. John's-wort				S2	1	83.0 ± 1.0	NB
P	*Triosteum aurantiacum*	Orange-fruited Tinker's Weed				S2	168	19.6 ± 0.0	NB
P	*Viburnum lentago*	Nannyberry				S2	29	80.2 ± 0.0	NB
P	*Shepherdia canadensis*	Soapberry				S2	23	3.6 ± 0.0	NB
P	*Astragalus eucosmus*	Elegant Milk-vetch				S2	14	17.0 ± 0.0	NB
P	*Oxytropis campestris*	Field Locoweed				S2	9	58.2 ± 0.0	NB
P	*Oxytropis campestris var. johannensis*	Field Locoweed				S2	73	12.2 ± 0.0	NB
P	*Quercus macrocarpa*	Bur Oak				S2	2	28.3 ± 1.0	NB
P	*Gentiana linearis*	Narrow-Leaved Gentian				S2	1	94.6 ± 1.0	NB
P	*Nuphar x rubrodisca*	Red-disk Yellow Pond-lily				S2	9	34.0 ± 5.0	NB
P	*Aphyllon uniflorum*	One-flowered Broomrape				S2	4	17.6 ± 0.0	NB
P	*Polygaloides paucifolia*	Fringed Milkwort				S2	1	45.0 ± 0.0	NB
P	*Polygala senega*	Seneca Snakeroot				S2	52	19.5 ± 5.0	NB
P	*Persicaria amphibia var. emersa*	Long-root Smartweed				S2	6	20.9 ± 0.0	NB
P	*Anemone multifida*	Cut-leaved Anemone				S2	101	2.9 ± 0.0	NB
P	*Hepatica americana*	Round-lobed Hepatica				S2	18	44.9 ± 0.0	NB
P	*Crataegus scabrida*	Rough Hawthorn				S2	2	55.4 ± 1.0	NB
P	*Rosa acicularis ssp. sayi*	Prickly Rose				S2	41	86.4 ± 0.0	NB
P	*Galium kamtschaticum*	Northern Wild Licorice				S2	18	75.8 ± 0.0	NB
P	*Salix candida*	Sage Willow				S2	36	30.5 ± 0.0	NB
P	*Castilleja septentrionalis*	Northeastern Paintbrush				S2	34	17.7 ± 0.0	NB
P	*Scrophularia lanceolata*	Lance-leaved Figwort				S2	10	28.8 ± 0.0	NB
P	*Dirca palustris*	Eastern Leatherwood				S2	92	30.6 ± 0.0	NB
P	*Phryma leptostachya*	American Lopseed				S2	99	8.3 ± 0.0	NB
P	*Verbena urticifolia*	White Vervain				S2	19	24.0 ± 1.0	NB
P	*Viola novae-angliae*	New England Violet				S2	35	50.2 ± 0.0	NB
P	*Symplocarpus foetidus*	Eastern Skunk Cabbage				S2	4	70.2 ± 0.0	NB
P	*Carex comosa*	Bearded Sedge				S2	8	69.6 ± 0.0	NB
P	*Carex concinna*	Beautiful Sedge				S2	46	30.4 ± 0.0	NB
P	*Carex granularis*	Limestone Meadow Sedge				S2	25	69.2 ± 0.0	NB
P	*Carex gynocrates*	Northern Bog Sedge				S2	54	25.5 ± 10.0	NB
P	*Carex hirtifolia*	Pubescent Sedge				S2	52	8.3 ± 0.0	NB
P	*Carex livida*	Livid Sedge				S2	35	20.5 ± 5.0	NB
P	*Carex plantaginea*	Plantain-Leaved Sedge				S2	173	19.0 ± 0.0	NB
P	*Carex prairea*	Prairie Sedge				S2	53	31.5 ± 0.0	NB
P	*Carex rostrata*	Narrow-leaved Beaked Sedge				S2	16	34.6 ± 0.0	NB
P	*Carex sprengelii*	Longbeak Sedge				S2	67	3.7 ± 1.0	NB
P	*Carex tenuiflora*	Sparse-Flowered Sedge				S2	28	20.5 ± 5.0	NB
P	*Carex albicans var. emmonsii*	White-tinged Sedge				S2	2	15.5 ± 1.0	NB
P	*Eriophorum gracile*	Slender Cottongrass				S2	12	73.7 ± 0.0	NB
P	*Elodea nuttallii*	Nuttall's Waterweed				S2	44	6.7 ± 0.0	NB
P	*Juncus vaseyi*	Vasey Rush				S2	8	85.7 ± 0.0	NB
P	*Allium tricoccum*	Wild Leek				S2	13	78.6 ± 0.0	NB
P	*Galearis rotundifolia*	Small Round-leaved Orchid				S2	32	20.5 ± 5.0	NB
P	*Calypso bulbosa*	Calypso				S2	2	57.6 ± 0.0	NB

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	# recs	Distance (km)	Prov
P	*Calypso bulbosa var. americana*	Calypso				S2	38	28.9 ± 5.0	NB
P	*Coeloglossum viride*	Long-bracted Frog Orchid				S2	10	44.3 ± 1.0	NB
P	*Cypripedium parviflorum var. makasin*	Small Yellow Lady's-Slipper				S2	36	8.4 ± 0.0	NB
P	*Galearis spectabilis*	Showy Orchis				S2	75	8.3 ± 0.0	NB
P	*Goodyera oblongifolia*	Menzies' Rattlesnake-plantain				S2	18	35.0 ± 0.0	NB
P	*Spiranthes lucida*	Shining Ladies'-Tresses				S2	14	19.0 ± 0.0	NB
P	*Agrostis mertensii*	Northern Bent Grass				S2	2	88.0 ± 0.0	NB
P	*Dichanthelium linearifolium*	Narrow-leaved Panic Grass				S2	3	70.1 ± 0.0	NB
P	*Elymus canadensis*	Canada Wild Rye				S2	8	20.5 ± 5.0	NB
P	*Poa glauca*	Glaucous Blue Grass				S2	17	19.7 ± 0.0	NB
P	*Schizachyrium scoparium*	Little Bluestem				S2	83	11.3 ± 0.0	NB
P	*Piptatheropsis pungens*	Slender Ricegrass				S2	6	87.1 ± 0.0	NB
P	*Potamogeton vaseyi*	Vasey's Pondweed				S2	2	50.7 ± 0.0	NB
P	*Asplenium trichomanes*	Maidenhair Spleenwort				S2	4	61.3 ± 0.0	NB
P	*Woodsia alpina*	Alpine Cliff Fern				S2	45	20.9 ± 0.0	NB
P	*Diphasiastrum sitchense*	Sitka Ground-cedar				S2	17	30.9 ± 0.0	NB
P	*Botrychium minganense*	Mingan Moonwort				S2	25	9.7 ± 0.0	NB
P	*Selaginella selaginoides*	Low Spikemoss				S2	13	25.5 ± 5.0	NB
P	*Toxicodendron radicans var. radicans*	Eastern Poison Ivy				S2?	1	93.3 ± 0.0	NB
P	*Symphyotrichum novi-belgii var. crenifolium*	New York Aster				S2?	1	79.1 ± 1.0	NB
P	*Humulus lupulus var. lupuloides*	Common Hop				S2?	1	88.3 ± 0.0	NB
P	*Galium obtusum*	Blunt-leaved Bedstraw				S2?	1	76.3 ± 1.0	NB
P	*Salix myricoides*	Bayberry Willow				S2?	55	3.3 ± 0.0	NB
P	*Platanthera huronensis*	Fragrant Green Orchid				S2?	6	6.0 ± 0.0	NB
P	*Solidago altissima*	Tall Goldenrod				S2S3	103	10.6 ± 0.0	NB
P	*Callitriche hermaphroditica*	Northern Water-starwort				S2S3	18	24.9 ± 0.0	NB
P	*Lonicera oblongifolia*	Swamp Fly Honeysuckle				S2S3	170	23.2 ± 5.0	NB
P	*Epilobium coloratum*	Purple-veined Willowherb				S2S3	11	14.1 ± 0.0	NB
P	*Rumex pallidus*	Seabeach Dock				S2S3	1	58.8 ± 0.0	NB
P	*Rumex occidentalis*	Western Dock				S2S3	35	54.3 ± 0.0	NB
P	*Amelanchier gaspensis*	Gasp ├ Serviceberry				S2S3	5	71.2 ± 0.0	NB
P	*Rubus pensilvanicus*	Pennsylvania Blackberry				S2S3	1	34.9 ± 1.0	NB
P	*Galium labradoricum*	Labrador Bedstraw				S2S3	109	34.1 ± 0.0	NB
P	*Valeriana uliginosa*	Swamp Valerian				S2S3	81	27.1 ± 0.0	NB
P	*Carex adusta*	Lesser Brown Sedge				S2S3	6	15.5 ± 1.0	NB
P	*Scirpus atrovirens*	Dark-green Bulrush				S2S3	94	7.0 ± 0.0	NB
P	*Juncus brachycephalus*	Small-Head Rush				S2S3	81	6.6 ± 0.0	NB
P	*Corallorhiza maculata var. occidentalis*	Spotted Coralroot				S2S3	2	93.8 ± 0.0	NB
P	*Corallorhiza maculata var. maculata*	Spotted Coralroot				S2S3	9	59.9 ± 0.0	NB
P	*Neottia auriculata*	Auricled Twayblade				S2S3	9	39.1 ± 0.0	NB
P	*Spiranthes cernua*	Nodding Ladies'-Tresses				S2S3	14	20.7 ± 0.0	NB
P	*Eragrostis pectinacea*	Tufted Love Grass				S2S3	2	16.0 ± 0.0	NB
P	*Stuckenia filiformis*	Thread-leaved Pondweed				S2S3	26	45.4 ± 1.0	NB
P	*Potamogeton praelongus*	White-stemmed Pondweed				S2S3	25	34.6 ± 1.0	NB
P	*Ophioglossum pusillum*	Northern Adder's-tongue				S2S3	36	20.3 ± 0.0	NB
P	*Arnica lanceolata*	Lance-leaved Arnica				S3	54	20.3 ± 1.0	NB
P	*Artemisia campestris ssp. caudata*	Tall Wormwood				S3	27	16.9 ± 0.0	NB
P	*Artemisia campestris*	Field Wormwood				S3	12	5.6 ± 0.0	NB
P	*Erigeron hyssopifolius*	Hyssop-leaved Fleabane				S3	99	5.8 ± 0.0	NB

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	# recs	Distance (km)	Prov
P	*Nabalus racemosus*	Glaucous Rattlesnakeroot				S3	39	15.8 ± 0.0	NB
P	*Tanacetum bipinnatum ssp. huronense*	Lake Huron Tansy				S3	157	2.9 ± 0.0	NB
P	*Tanacetum bipinnatum*	Lake Huron Tansy				S3	1	79.8 ± 0.0	NB
P	*Symphyotrichum boreale*	Boreal Aster				S3	133	19.7 ± 1.0	NB
P	*Betula pumila*	Bog Birch				S3	15	34.3 ± 0.0	NB
P	*Turritis glabra*	Tower Mustard				S3	26	38.3 ± 1.0	NB
P	*Arabis pycnocarpa*	Cream-flowered Rockcress				S3	25	5.6 ± 0.0	NB
P	*Cardamine maxima*	Large Toothwort				S3	95	47.2 ± 0.0	NB
P	*Subularia aquatica ssp. americana*	American Water Awlwort				S3	1	95.0 ± 1.0	NB
P	*Elatine minima*	Small Waterwort				S3	1	79.4 ± 0.0	NB
P	*Astragalus alpinus*	Alpine Milk-vetch				S3	1	79.4 ± 0.0	NB
P	*Astragalus alpinus var. brunetianus*	Alpine Milk-Vetch				S3	129	5.6 ± 0.0	NB
P	*Hedysarum americanum*	Alpine Hedysarum				S3	188	4.0 ± 0.0	NB
P	*Gentianella amarella*	Northern Gentian				S3	6	20.3 ± 0.0	NB
P	*Gentianella amarella ssp. acuta*	Northern Gentian				S3	17	20.9 ± 0.0	NB
P	*Geranium bicknellii*	Bicknell's Crane's-bill				S3	1	99.1 ± 0.0	NB
P	*Myriophyllum farwellii*	Farwell's Water Milfoil				S3	1	84.0 ± 0.0	NB
P	*Myriophyllum verticillatum*	Whorled Water Milfoil				S3	2	75.5 ± 0.0	NB
P	*Stachys hispida*	Smooth Hedge-Nettle				S3	86	3.2 ± 0.0	NB
P	*Nuphar microphylla*	Small Yellow Pond-lily				S3	19	24.8 ± 0.0	NB
P	*Epilobium hornemannii*	Hornemann's Willowherb				S3	28	44.8 ± 5.0	NB
P	*Epilobium strictum*	Downy Willowherb				S3	46	34.3 ± 0.0	NB
P	*Polygala sanguinea*	Blood Milkwort				S3	3	95.9 ± 1.0	NB
P	*Fallopia scandens*	Climbing False Buckwheat				S3	11	22.7 ± 0.0	NB
P	*Littorella americana*	American Shoreweed				S3	4	79.0 ± 1.0	NB
P	*Primula mistassinica*	Mistassini Primrose				S3	42	2.9 ± 0.0	NB
P	*Pyrola minor*	Lesser Pyrola				S3	30	34.4 ± 0.0	NB
P	*Clematis occidentalis*	Purple Clematis				S3	16	4.5 ± 5.0	NB
P	*Ranunculus gmelinii*	Gmelin's Water Buttercup				S3	25	38.7 ± 0.0	NB
P	*Thalictrum confine*	Northern Meadow-rue				S3	47	6.7 ± 0.0	NB
P	*Rosa palustris*	Swamp Rose				S3	1	70.0 ± 0.0	NB
P	*Rubus occidentalis*	Black Raspberry				S3	129	35.2 ± 1.0	NB
P	*Galium boreale*	Northern Bedstraw				S3	18	32.0 ± 0.0	NB
P	*Salix pedicellaris*	Bog Willow				S3	45	30.5 ± 0.0	NB
P	*Salix interior*	Sandbar Willow				S3	116	6.4 ± 0.0	NB
P	*Parnassia glauca*	Fen Grass-of-Parnassus				S3	182	5.1 ± 0.0	NB
P	*Boehmeria cylindrica*	Small-spike False-nettle				S3	9	86.3 ± 0.0	NB
P	*Pilea pumila*	Dwarf Clearweed				S3	31	51.4 ± 0.0	NB
P	*Viola adunca*	Hooked Violet				S3	5	78.8 ± 1.0	NB
P	*Viola adunca var. adunca*	Hooked Violet				S3	1	88.1 ± 0.0	NB
P	*Viola nephrophylla*	Northern Bog Violet				S3	256	3.7 ± 0.0	NB
P	*Carex arcta*	Northern Clustered Sedge				S3	20	20.5 ± 5.0	NB
P	*Carex capillaris*	Hairlike Sedge				S3	228	2.9 ± 0.0	NB
P	*Carex chordorrhiza*	Creeping Sedge				S3	78	15.5 ± 0.0	NB
P	*Carex conoidea*	Field Sedge				S3	18	58.2 ± 0.0	NB
P	*Carex eburnea*	Bristle-leaved Sedge				S3	104	3.1 ± 0.0	NB
P	*Carex exilis*	Coastal Sedge				S3	40	31.4 ± 0.0	NB
P	*Carex garberi*	Garber's Sedge				S3	46	14.3 ± 0.0	NB
P	*Carex haydenii*	Hayden's Sedge				S3	59	6.7 ± 0.0	NB
P	*Carex michauxiana*	Michaux's Sedge				S3	7	68.6 ± 1.0	NB
P	*Carex ormostachya*	Necklace Spike Sedge				S3	24	21.6 ± 0.0	NB
P	*Carex rosea*	Rosy Sedge				S3	241	20.5 ± 10.0	NB
P	*Carex tenera*	Tender Sedge				S3	20	13.2 ± 0.0	NB
P	*Carex tuckermanii*	Tuckerman's Sedge				S3	25	24.9 ± 0.0	NB

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	# recs	Distance (km)	Prov
P	*Carex vaginata*	Sheathed Sedge				S3	49	25.5 ± 10.0	NB
P	*Carex wiegandii*	Wiegand's Sedge				S3	7	22.1 ± 5.0	NB
P	*Carex atratiformis*	Scabrous Black Sedge				S3	228	31.9 ± 8.0	NB
P	*Cyperus dentatus*	Toothed Flatsedge				S3	2	18.1 ± 0.0	NB
P	*Cyperus esculentus*	Perennial Yellow Nutsedge				S3	16	12.4 ± 0.0	NB
P	*Cyperus esculentus var. leptostachyus*	Perennial Yellow Nutsedge				S3	18	2.9 ± 0.0	NB
P	*Eleocharis intermedia*	Matted Spikerush				S3	33	6.3 ± 0.0	NB
P	*Eleocharis quinqueflora*	Few-flowered Spikerush				S3	67	18.5 ± 0.0	NB
P	*Rhynchospora capitellata*	Small-headed Beakrush				S3	21	58.2 ± 0.0	NB
P	*Rhynchospora fusca*	Brown Beakrush				S3	6	74.5 ± 0.0	NB
P	*Trichophorum clintonii*	Clinton's Clubrush				S3	85	6.4 ± 0.0	NB
P	*Lemna trisulca*	Star Duckweed				S3	1	34.4 ± 0.0	NB
P	*Triantha glutinosa*	Sticky False-Asphodel				S3	140	4.5 ± 5.0	NB
P	*Cypripedium reginae*	Showy Lady's-Slipper				S3	142	19.1 ± 1.0	NB
P	*Liparis loeselii*	Loesel's Twayblade				S3	20	17.2 ± 0.0	NB
P	*Platanthera blephariglottis*	White Fringed Orchid				S3	20	21.7 ± 1.0	NB
P	*Platanthera grandiflora*	Large Purple Fringed Orchid				S3	1	76.5 ± 0.0	NB
P	*Bromus latiglumis*	Broad-Glumed Brome				S3	130	5.2 ± 0.0	NB
P	*Muhlenbergia richardsonis*	Mat Muhly				S3	123	2.9 ± 0.0	NB
P	*Potamogeton obtusifolius*	Blunt-leaved Pondweed				S3	30	6.7 ± 0.0	NB
P	*Potamogeton richardsonii*	Richardson's Pondweed				S3	48	30.5 ± 0.0	NB
P	*Adiantum pedatum*	Northern Maidenhair Fern				S3	468	9.7 ± 0.0	NB
P	*Cryptogramma stelleri*	Steller's Rockbrake				S3	34	6.4 ± 0.0	NB
P	*Asplenium viride*	Green Spleenwort				S3	21	49.0 ± 0.0	NB
P	*Dryopteris fragrans*	Fragrant Wood Fern				S3	41	29.0 ± 1.0	NB
P	*Dryopteris goldiana*	Goldie's Woodfern				S3	320	8.2 ± 0.0	NB
P	*Woodsia glabella*	Smooth Cliff Fern				S3	23	19.8 ± 1.0	NB
P	*Equisetum palustre*	Marsh Horsetail				S3	45	5.5 ± 0.0	NB
P	*Isoetes tuckermanii ssp. tuckermanii*	Tuckerman's Quillwort				S3	2	85.4 ± 1.0	NB
P	*Diphasiastrum x sabinifolium*	Savin-leaved Ground-cedar				S3	16	5.8 ± 5.0	NB
P	*Huperzia appressa*	Mountain Firmoss				S3	1	76.2 ± 0.0	NB
P	*Sceptridium dissectum*	Dissected Moonwort				S3	28	31.7 ± 10.0	NB
P	*Botrychium lanceolatum*	Triangle Moonwort				S3	4	20.5 ± 0.0	NB
P	*Botrychium lanceolatum ssp. angustisegmentum*	Narrow Triangle Moonwort				S3	15	5.0 ± 0.0	NB
P	*Botrychium simplex*	Least Moonwort				S3	41	16.8 ± 0.0	NB
P	*Polypodium appalachianum*	Appalachian Polypody				S3	31	39.7 ± 0.0	NB
P	*Crataegus submollis*	Quebec Hawthorn				S3?	3	29.9 ± 1.0	NB
P	*Mertensia maritima*	Sea Lungwort				S3S4	1	93.2 ± 50.0	NB
P	*Lobelia kalmii*	Brook Lobelia				S3S4	164	3.8 ± 0.0	NB
P	*Myriophyllum sibiricum*	Siberian Water Milfoil				S3S4	43	60.0 ± 0.0	NB
P	*Stachys pilosa*	Hairy Hedge-Nettle				S3S4	97	3.7 ± 0.0	NB
P	*Stachys pilosa var. pilosa*	Marsh Hedge-Nettle				S3S4	1	30.4 ± 1.0	NB
P	*Drymocallis arguta*	Tall Wood Beauty				S3S4	98	19.8 ± 0.0	NB
P	*Rubus chamaemorus*	Cloudberry				S3S4	1	88.0 ± 0.0	NB
P	*Geocaulon lividum*	Northern Comandra				S3S4	9	20.5 ± 0.0	NB
P	*Cladium mariscoides*	Smooth Twigrush				S3S4	41	32.4 ± 0.0	NB
P	*Eriophorum russeolum*	Russet Cottongrass				S3S4	3	32.2 ± 10.0	NB
P	*Spirodela polyrhiza*	great duckweed				S3S4	7	25.4 ± 0.0	NB
P	*Corallorhiza maculata*	Spotted Coralroot				S3S4	16	30.6 ± 0.0	NB
P	*Calamagrostis stricta*	Slim-stemmed Reed Grass				S3S4	13	18.5 ± 0.0	NB
P	*Calamagrostis stricta ssp. stricta*	Slim-stemmed Reed Grass				S3S4	4	86.6 ± 0.0	NB
P	*Potamogeton oakesianus*	Oakes' Pondweed				S3S4	1	30.3 ± 1.0	NB
P	*Botrychium lineare*	Narrow-leaved Moonwort				SH	1	69.8 ± 5.0	NB
P	*Solidago ptarmicoides*	Upland White Goldenrod				SX	3	95.5 ± 10.0	NB

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	# recs	Distance (km)	Prov
P	*Celastrus scandens*	Climbing Bittersweet				SX	1	96.3 ± 1.0	NB

5.1 SOURCE BIBLIOGRAPHY (100 km)

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

# recs	CITATION
4246	Lepage, D. 2014. Maritime Breeding Bird Atlas Database. Bird Studies Canada, Sackville NB, 407,838 recs.
2036	Erskine, A.J. 1992. Maritime Breeding Bird Atlas Database. NS Museum & Nimbus Publ., Halifax, 82,125 recs.
1450	Blaney, C.S.; Mazerolle, D.M.; Belliveau, A.B. 2015. Atlantic Canada Conservation Data Centre Fieldwork 2015. Atlantic Canada Conservation Data Centre, # recs.
1239	Blaney, C.S.; Mazerolle, D.M.; Belliveau, A.B. 2014. Atlantic Canada Conservation Data Centre Fieldwork 2014. Atlantic Canada Conservation Data Centre, # recs.
1156	Cowie, F. 2007. Electrofishing Population Estimates 1979-98. Canadian Rivers Institute, 2698 recs.
854	Blaney, C.S.; Mazerolle, D.M.; Belliveau, A.B. 2013. Atlantic Canada Conservation Data Centre Fieldwork 2013. Atlantic Canada Conservation Data Centre, 9000+ recs.
639	Kouwenberg, Amy-Lee. 2019. Mountain Birdwatch database 2012-2018. Bird Studies Canada, Sackville, NB, 6484 recs.
627	Pardieck, K.L. & Ziolkowski Jr., D.J.; Hudson, M.-A.R. 2014. North American Breeding Bird Survey Dataset 1966 - 2013, version 2013.0. U.S. Geological Survey, Patuxent Wildlife Research Center <www.pwrc.usgs.gov/BBS/RawData/>.
588	Stantec. 2014. Energy East Pipeline Corridor Species Occurrence Data. Stantec Inc., 4934 records.
556	Benedict, B. Connell Herbarium Specimens. University New Brunswick, Fredericton. 2003.
537	Mazerolle, D.M. 2018. Atlantic Canada Conservation Data Centre botanical fieldwork 2018. Atlantic Canada Conservation Data Centre, 13515 recs.
525	eBird. 2014. eBird Basic Dataset. Version: EBD_relNov-2014. Ithaca, New York. Nov 2014. Cornell Lab of Ornithology, 25036 recs.
485	Chapman, C.J. 2019. Atlantic Canada Conservation Data Centre 2019 botanical fieldwork. Atlantic Canada Conservation Data Centre, 11729 recs.
483	Wisniowski, C. & Dowding, A. 2019. NB species occurrence data for 2016-2018. Nature Trust of New Brunswick.
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426	Goltz, J.P. 2012. Field Notes, 1989-2005. , 1091 recs.
367	Chapman, C.J. 2018. Atlantic Canada Conservation Data Centre botanical fieldwork 2018. Atlantic Canada Conservation Data Centre, 11171 recs.
327	Blaney, C.S.; Spicer, C.D. 2001. Fieldwork 2001. Atlantic Canada Conservation Data Centre. Sackville NB, 981 recs.
324	Campbell, G. 2017. Maritimes Bicknell's Thrush database 2002-2015. Bird Studies Canada, Sackville NB, 609 recs.
303	Belliveau, A.G. 2016. Atlantic Canada Conservation Data Centre Fieldwork 2016. Atlantic Canada Conservation Data Centre, 10695 recs.
260	Clayden, S.R. 1998. NBM Science Collections databases: vascular plants. New Brunswick Museum, Saint John NB, 19759 recs.
252	Blaney, C.S.; Mazerolle, D.M.; Oberndorfer, E. 2007. Fieldwork 2007. Atlantic Canada Conservation Data Centre. Sackville NB, 13770 recs.
243	Mazerolle, D.M. 2016. Atlantic Canada Conservation Data Centre Fieldwork 2017. Atlantic Canada Conservation Data Centre.
232	Blaney, C.S.; Mazerolle, D.M. 2009. Fieldwork 2009. Atlantic Canada Conservation Data Centre. Sackville NB, 13395 recs.
223	MacDougall, A.; Bishop, G.; et al. 1998. 1997 Appalachian Hardwood Field Data. Nature Trust of New Brunswick, 4473 recs.
205	Wisniowski, C. & Dowding, A. 2020. NB species occurrence data for 2020. Nature Trust of New Brunswick.
204	Tims, J. & Craig, N. 1995. Environmentally Significant Areas in New Brunswick (NBESA). NB Dept of Environment & Nature Trust of New Brunswick Inc, 6042 recs. https://doi.org/10.1037/arc0000014.
197	Benedict, B. Connell Herbarium Specimens (Data) . University New Brunswick, Fredericton. 2003.
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164	Honeyman, K. 2019. Unique Areas Database, 2018. J.D. Irving Ltd.
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151	Anonymous. 2017. Observations from protected sources. Atlantic Canada Conservation Data Centre.
149	iNaturalist. 2020. iNaturalist Data Export 2020. iNaturalist.org and iNaturalist.ca, Web site: 128728 recs.
140	Belliveau, A.G. 2018. Atlantic Canada Conservation Data Centre Fieldwork 2017. Atlantic Canada Conservation Data Centre.
139	Blaney, C.S. 2000. Fieldwork 2000. Atlantic Canada Conservation Data Centre. Sackville NB, 1265 recs.
130	Hinds, H.R. 1986. Notes on New Brunswick plant collections. Connell Memorial Herbarium, unpubl, 739 recs.
129	Sabine, M. 2016. Black Ash records from the NB DNR Forest Development Survey. New Brunswick Department of Natural Resources.
120	Mazerolle, D.M. 2017. Atlantic Canada Conservation Data Centre Fieldwork 2017. Atlantic Canada Conservation Data Centre.
118	Wallace, S. 2020. Stewardship Department species occurrence data on NTNB preserves. Nature Trust of New Brunswick.
112	Bagnell, B.A. 2001. New Brunswick Bryophyte Occurrences. B&B Botanical, Sussex, 478 recs.
107	Brunelle, P.-M. (compiler). 2009. ADIP/MDDS Odonata Database: data to 2006 inclusive. Atlantic Dragonfly Inventory Program (ADIP), 24200 recs.
105	Benedict, B. Connell Herbarium Specimen Database Download 2004. Connell Memorial Herbarium, University of New Brunswick. 2004.
99	Klymko, J. 2019. Atlantic Canada Conservation Data Centre zoological fieldwork 2018. Atlantic Canada Conservation Data Centre.
93	Blaney, C.S.; Mazerolle, D.M.; Klymko, J; Spicer, C.D. 2006. Fieldwork 2006. Atlantic Canada Conservation Data Centre. Sackville NB, 8399 recs.
92	Belliveau, A.G. 2018. E.C. Smith Herbarium and Atlantic Canada Conservation Data Centre Fieldwork 2018. E.C. Smith Herbarium, 6226 recs.
91	Morrison, Guy. 2011. Maritime Shorebird Survey (MSS) database. Canadian Wildlife Service, Ottawa, 15939 surveys. 86171 recs.

# recs	CITATION
88	Klymko, J. 2020. Atlantic Canada Conservation Data Centre zoological fieldwork 2019. Atlantic Canada Conservation Data Centre.
87	Belland, R.J. Maritimes moss records from various herbarium databases. 2014.
80	Clayden, S.R. 2007. NBM Science Collections databases: vascular plants. New Brunswick Museum, Saint John NB, download Mar. 2007, 6914 recs.
80	Neily, T. H. 2018. Lichen and Bryophyte records, AEI 2017-2018. Tom Neily; Atlantic Canada Conservation Data Centre.
77	Busby, D.G. 1999. 1997-1999 Bicknell's Thrush data, unpublished files. Canadian Wildlife Service, Sackville, 17 recs.
74	Sollows, M.C,. 2008. NBM Science Collections databases: mammals. New Brunswick Museum, Saint John NB, download Jan. 2008, 4983 recs.
58	Blaney, C.S.; Spicer, C.D.; Rothfels, C. 2004. Fieldwork 2004. Atlantic Canada Conservation Data Centre. Sackville NB, 1343 recs.
55	Klymko, J. 2018. Maritimes Butterfly Atlas database. Atlantic Canada Conservation Data Centre.
54	Neily, T.H. 2017. Maritmes Lichen and Bryophyte records. Atlantic Canada Conservation Data Centre, 1015 recs.
50	e-Butterfly. 2016. Export of Maritimes records and photos. Maxim Larrivee, Sambo Zhang (ed.) e-butterfly.org.
50	eBird. 2020. eBird Basic Dataset. Version: EBD_relNov-2019. Ithaca, New York. Nov 2019, Cape Breton Bras d'Or Lakes Watershed subset. Cornell Lab of Ornithology.
43	Blaney, C.S. 1999. Fieldwork 1999. Atlantic Canada Conservation Data Centre. Sackville NB, 292 recs.
32	Thomas, A.W. 1996. A preliminary atlas of the butterflies of New Brunswick. New Brunswick Museum.
31	Paquet, Julie. 2018. Atlantic Canada Shorebird Survey (ACSS) database 2012-2018. Environment Canada, Canadian Wildlife Service.
29	Klymko, J. Henry Hensel's Butterfly Collection Database. Atlantic Canada Conservation Data Centre. 2016.
28	Klymko, J.J.D. 2018. 2017 field data. Atlantic Canada Conservation Data Centre.
27	Toner, M. 2005. Lynx Records 1996-2005. NB Dept of Natural Resources, 48 recs.
23	Keppie, D.M. 2005. Rare Small Mammal Records in NB, PE. Pers. comm. to K. Bredin; PE 1 rec., NB 24 recs, 23 recs.
22	Hinds, H.R. 1999. Connell Herbarium Database. University New Brunswick, Fredericton, 131 recs.
21	Mills, E. Connell Herbarium Specimens, 1957-2009. University New Brunswick, Fredericton. 2012.
18	Bishop, G. 2002. A floristic survey of known & potential sites of Furbish's lousewort. , 18 recs.
18	Scott, Fred W. 1998. Updated Status Report on the Cougar (Puma Concolor couguar) [Eastern population]. Committee on the Status of Endangered Wildlife in Canada, 298 recs.
18	Toner, M. 2001. Lynx Records 1973-2000. NB Dept of Natural Resources, 29 recs.
16	Erskine, A.J. 1999. Maritime Nest Records Scheme (MNRS) 1937-1999. Canadian Wildlife Service, Sackville, 313 recs.
15	Blaney, C.S.; Mazerolle, D.M. 2008. Fieldwork 2008. Atlantic Canada Conservation Data Centre. Sackville NB, 13343 recs.
15	Manthorne, A. 2014. MaritimesSwiftwatch Project database 2013-2014. Bird Studies Canada, Sackville NB, 326 recs.
14	Blaney, C.S.; Mazerolle, D.M. 2010. Fieldwork 2010. Atlantic Canada Conservation Data Centre. Sackville NB, 15508 recs.
14	Dubé, Joanie. 2018. Wood Turtle and invasive species observations in the Madawaska River, NB. Société d'aménagement de la rivière Madawaska.
14	Shortt, R. Connell Herbarium Black Ash specimens. University New Brunswick, Fredericton. 2019.
14	Speers, L. 2008. Butterflies of Canada database: New Brunswick 1897-1999. Agriculture & Agri-Food Canada, Biological Resources Program, Ottawa, 2048 recs.
13	Askanas, H. 2016. New Brunswick Wood Turtle Database. New Brunswick Department of Energy and Resource Development.
13	Cronin, P. & Ayer, C.; Dubee, B.; Hooper, W.C.; LeBlanc, E.; Madden, A.; Pettigrew, T.; Seymour, P. 1998. Fish Species Management Plans (draft). NB DNRE Internal Report. Fredericton, 164pp.
13	Jasmin, M.; Pelletier, S. 2017. Bas St. Laurent Wood Turtle Localization 2016-2017. MFFP, 13 records.
12	Sabine, M. 2016. NB DNR staff incidental Black Ash observations. New Brunswick Department of Natural Resources.
11	Blaney, C.S. 2017. Atlantic Canada Conservation Data Centre Fieldwork 2017. Atlantic Canada Conservation Data Centre.
10	Blaney, C.S.; Mazerolle, D.M. 2011. Fieldwork 2011. Atlantic Canada Conservation Data Centre. Sackville NB.
9	Bateman, M.C. 2000. Waterfowl Brood Surveys Database, 1990-2000 . Canadian Wildlife Service, Sackville, unpublished data. 149 recs.
9	Benedict, B. Connell Herbarium Specimens, Digital photos. University New Brunswick, Fredericton. 2005.
9	Cowie, Faye. 2007. Surveyed Lakes in New Brunswick. Canadian Rivers Institute, 781 recs.
9	Doucet, D.A. 2008. Fieldwork 2008: Odonata. ACCDC Staff, 625 recs.
9	Klymko, J.J.D. 2016. 2014 field data. Atlantic Canada Conservation Data Centre.
8	Benedict, B. Connell Herbarium Specimens. University New Brunswick, Fredericton. 2000.
8	Daigle, C. 2008. Wood Turtle Survey in the Madawaska River region, spring 2007. Pers. comm. to M. Toner, NBDNR, Feb. 20, 2 maps, 8 recs.
8	McAlpine, D.F. 1998. NBM Science Collections databases to 1998. New Brunswick Museum, Saint John NB, 241 recs.
8	Turgeon, M.N. Database of Martin Turgeon's Butterfly Collection. Turgeon, M.N. 2012.
7	Klymko, J. Dataset of butterfly records at the New Brunswick Museum not yet accessioned by the museum. Atlantic Canada Conservation Data Centre. 2016.
7	Webster, R.P. 2006. Survey for Suitable Salt Marshes for the Maritime Ringlet, New Populations of the Cobblestone Tiger Beetle, & New Localities of Three Rare Butterfly Species. New Brunswick WTF Report, 28 recs.
6	Dowding, A.; Mandula, M. 2017. Observation of Hepatica acutiloba in New Brunswick. Nature Trust New Brunswick.
6	Downes, C. 1998-2000. Breeding Bird Survey Data. Canadian Wildlife Service, Ottawa, 111 recs.
6	Edsall, J. 2007. Personal Butterfly Collection: specimens collected in the Canadian Maritimes, 1961-2007. J. Edsall, unpubl. report, 137 recs.
6	Goltz, J.P. 2008. Email to Sean Blaney re: discovery of Cryptotaenia canadensis and other rare species at the mouth of the Salmon River, Victoria Co., NB. pers. comm.
6	Webster, R.P. Database of R.P. Webster butterfly collection. 2017.
6	Wilhelm, S.I. et al. 2011. Colonial Waterbird Database. Canadian Wildlife Service, Sackville, 2698 sites, 9718 recs (8192 obs).
5	Anon. 2017. Export of Maritimes Butterfly records. Global Biodiversity Information Facility (GBIF).
5	Beardmore, T. 2017. 2017 Butternut observations. Natural Resources Canada.
5	Sabine, M. 2016. Black Ash records from NB DNR permanent forest sampling Plots. New Brunswick Department of Natural Resources, 39 recs.
5	Scott, F.W. 1988. Status Report on the Gaspé Shrew (Sorex gaspensis) in Canada. Committee on the Status of Endangered Wildlife in Canada, 12 recs.
4	Blaney, C.S.; Mazerolle, D.M. 2012. Fieldwork 2012. Atlantic Canada Conservation Data Centre, 13,278 recs.

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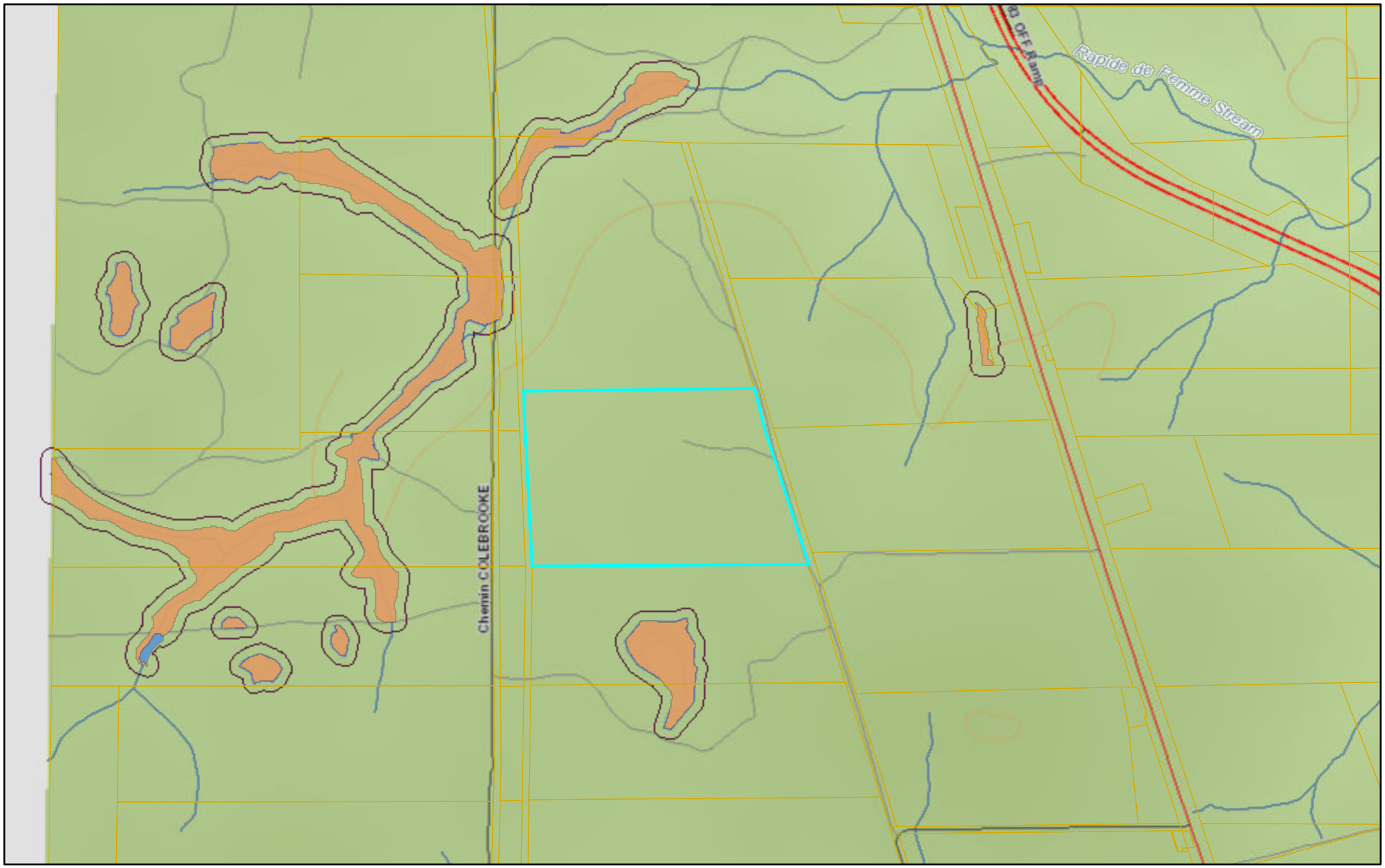
4	Dalton, M. & Saba, B.A. 1980. A preliminary report on the natural history of the Gaspé shrew. The Atlantic Center for the Environment, Ipwich, MA, 29 pp.
4	Fournier, R. 2010. Rare plant observation records in Baker Brook and Grew Island areas. Pers. comm., 4 recs.
4	iNaturalist. 2018. iNaturalist Data Export 2018. iNaturalist.org and iNaturalist.ca, Web site: 11700 recs.
4	Klymko, J.J.D. 2012. Insect fieldwork & submissions, 2011. Atlantic Canada Conservation Data Centre. Sackville NB, 760 recs.
4	Sollows, M.C,. 2009. NBM Science Collections databases: molluscs. New Brunswick Museum, Saint John NB, download Jan. 2009, 6951 recs (2957 in Atlantic Canada).
4	Webster, R.P. 1999. Insects of the Stillwater Watershed, A Preliminary Study. , 11 recs.
3	Basquill, S.P. 2003. Fieldwork 2003. Atlantic Canada Conservation Data Centre, Sackville NB, 69 recs.
3	Doucet, D.A. & Edsall, J.; Brunelle, P.-M. 2007. Miramichi Watershed Rare Odonata Survey. New Brunswick ETF & WTF Report, 1211 recs.
3	Goltz, J.P. 2001. Botany Ramblings April 29-June 30, 2001. N.B. Naturalist, 28 (2): 51-2. 8 recs.
3	Klymko, J. 2016. Atlantic Canada Conservation Data Centre Fieldwork 2016. Atlantic Canada Conservation Data Centre.
3	McAlpine, D.F. 1998. NBM Science Collections: Wood Turtle records. New Brunswick Museum, Saint John NB, 329 recs.
3	Sollows, M.C. 2008. NBM Science Collections databases: herpetiles. New Brunswick Museum, Saint John NB, download Jan. 2008, 8636 recs.
3	Speers, L. 2001. Butterflies of Canada database. Agriculture & Agri-Food Canada, Biological Resources Program, Ottawa, 190 recs.
3	Tingley, S. (compiler). 2001. Butterflies of New Brunswick. , Web site: www.geocities.com/Yosemite/8425/buttrfly. 142 recs.
3	Turgeon, M.N. 2009. Showy Lady-slipper & Round-leaved Orchis observed at Loon Lake, Madawaska Co., NB. Pers. comm. to D.M. Mazerolle, 3 recs.
3	Webster, R.P. & Edsall, J. 2007. 2005 New Brunswick Rare Butterfly Survey. Environmental Trust Fund, unpublished report, 232 recs.
2	Blaney, C.S. Miscellaneous specimens received by ACCDC (botany). Various persons. 2001-08.
2	Chaput, G. 2002. Atlantic Salmon: Maritime Provinces Overview for 2001. Dept of Fisheries & Oceans, Atlantic Region, Science Stock Status Report D3-14. 39 recs.
2	Consortium of North American Lichen Herbaria. 2018. Cetraria ericetorum records from CNALH. CNALH, 3.
2	Edsall, J. 2001. Lepidopteran records in New Brunswick, 1997-99. , Pers. comm. to K.A. Bredin. 91 recs.
2	Haughian, S.R. 2018. Description of Fuscopannaria leucosticta field work in 2017. New Brunswick Museum, 314 recs.
2	Majka, C. 2009. Université de Moncton Insect Collection: Carabidae, Cerambycidae, Coccinellidae. Université de Moncton, 540 recs.
2	NatureServe Canada. 2019. iNaturalist Maritimes Butterfly Records. iNaturalist.org and iNaturalist.ca.
2	Newell, R.E. 2000. E.C. Smith Herbarium Database. Acadia University, Wolfville NS, 7139 recs.
2	Pike, E., Tingley, S. & Christie, D.S. 2000. Nature NB Listserve. University of New Brunswick, listserv.unb.ca/archives/naturenb. 68 recs.
2	Simpson, D. Collection sites for Black Ash seed lots preserved at the National Tree Seed Centre in Fredericton NB. National Tree Seed Centre, Canadian Forest Service. 2016.
1	Bagnell, B.A. 2003. Update to New Brunswick Rare Bryophyte Occurrences. B&B Botanical, Sussex, 5 recs.
1	Belliveau, A.G. E.C. Smith Herbarium Specimen Database 2019. E.C. Smith Herbarium, Acadia University. 2019.
1	Bishop, G. 2012. Field data from September 2012 Anticosti Aster collection trip. , 135 rec.
1	Blaney, C.S. 2003. Fieldwork 2003. Atlantic Canada Conservation Data Centre. Sackville NB, 1042 recs.
1	Doucet, D.A. 2007. Lepidopteran Records, 1988-2006. Doucet, 700 recs.
1	e-Butterfly. 2018. Selected Maritimes butterfly records from 2016 and 2017. Maxim Larrivee, Sambo Zhang (ed.) e-butterfly.org.
1	Edsall, J. 1993. Spring 1993 Report. New Brunswick Bird Info Line, 3 recs.
1	Edsall, J. 1993. Summer 1993 Report. New Brunswick Bird Info Line, 2 recs.
1	Goltz, J.P. & Bishop, G. 2005. Confidential supplement to Status Report on Prototype Quillwort (Isoetes prototypus). Committee on the Status of Endangered Wildlife in Canada, 111 recs.
1	Goltz, J.P. 2002. Botany Ramblings: 1 July to 30 September, 2002. N.B. Naturalist, 29 (3):84-92. 7 recs.
1	Hinds, H.R. 2000. Flora of New Brunswick (2nd Ed.). University New Brunswick, 694 pp.
1	Madden, A. 1998. Wood Turtle records in northern NB. New Brunswick Dept of Natural Resources & Energy, Campbellton, Pers. comm. to S.H. Gerriets. 16 recs.
1	Mandula, M. 2017. Nature Trust of New Brunswick Site Report: Jackson Falls, NB – new rare plant station. Nature Trust of New Brunswick, 2 pp.
1	Munro, Marian K. Nova Scotia Provincial Museum of Natural History Herbarium Database. Nova Scotia Provincial Museum of Natural History, Halifax, Nova Scotia. 2013.
1	NatureServe Canada. 2017. iNaturalist Butterfly Data Export . iNaturalist.org and iNaturalist.ca.
1	Norton, Barb. 2010. Personal communication concerning Botrychium oneidense near Ayers Lake, NB. , One record.
1	Parkinson, K. 2017. Wood Turtle record in the Meduxnekeag Valley Nature Preserve. Pers. comm. to AC CDC.
1	Sabine, D.L. 2005. 2001 Freshwater Mussel Surveys. New Brunswick Dept of Natural Resources & Energy, 590 recs.
1	Sabine, D.L. 2013. Dwaine Sabine butterfly records, 2009 and earlier.
1	Sollows, M.C,. 2009. NBM Science Collections databases: Coccinellid & Cerambycid Beetles. New Brunswick Museum, Saint John NB, download Feb. 2009, 569 recs.
1	Webster, R.P. 2001. R.P. Webster Collection. R. P. Webster, 39 recs.
1	Webster, R.P. Reggie Webster's records of Encyclops caerulea . pers. collection. 2018.
1	Wilhelm, S.I. et al. 2019. Colonial Waterbird Database. Canadian Wildlife Service.

WAWA Reference Map



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0 0.2 0.4 0.8 km

Property

1

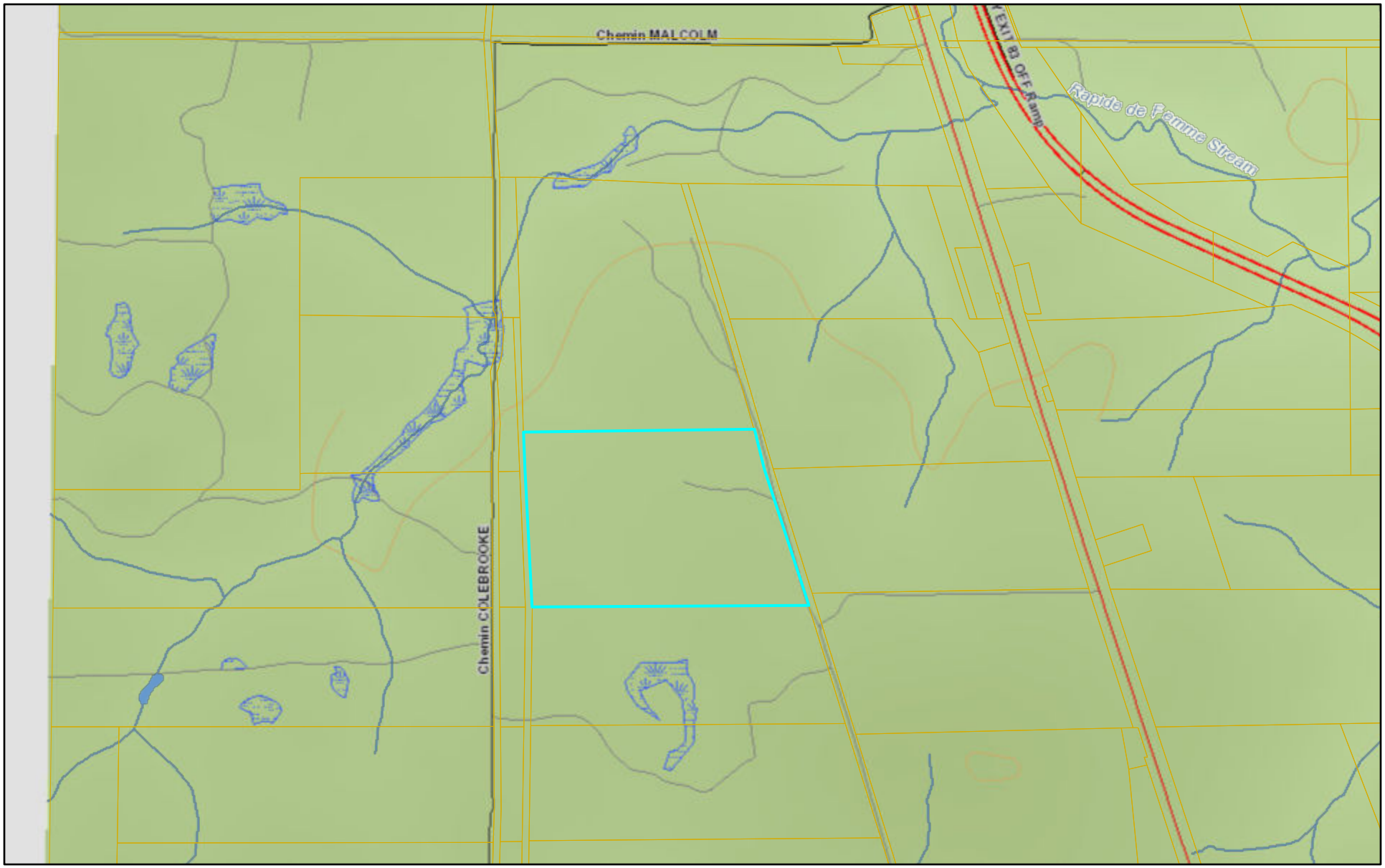
Water Bodies

2

30 meters

Water Courses

Watercourse Mapping



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Property

Water Courses

Water Bodies

Treasury Board of Canada Secretariat

DFRP/FCSI - Map Navigator

Area: Victoria, United States of America **Content:** 0 Federal Property, 0 Federal Building, 0 Federal Contaminated Site

Layers

- 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

APPENDIX E

Site Photographs

Photo 1. Entering the site from just inside the gate, facing northwest.

Photo 2. Equipment parking area to the south of the capped C & D cells.

Photo 3. View from the western edge of the capped C & D cell, facing east across site towards entrance.

Photo 4. Taken from southwestern edge of capped C & D cell, facing northeast across site. Location of active C & D cell in the background.

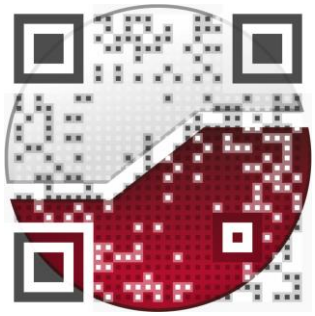
Photo 5. Taken from southwestern edge of capped C & D cell, facing west.

Photo 6. Taken from northern edge of capped C & D cell, facing north.

Photo 7. Taken from southwestern corner of capped C & D cell, facing north.

Photo 8. Main access road leaving site. Photo taken from southeastern portion of site, facing southeast.

experience • knowledge • integrity



civil	civil
geotechnical	géotechnique
environmental	environnement
structural	structures
field services	surveillance de chantier
materials testing	service de laboratoire des matériaux

expérience • connaissance • intégrité