Pulp Dryer Modernization

Environmental Impact Assessment

Irving Pulp & Paper, Limited

REVERSING FALLS MILL

Saint John, New Brunswick

12 May 2016

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PROJECT TITLE:	Pulp Dryer Modernization		
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Registration Document	12 May 2016		MDA

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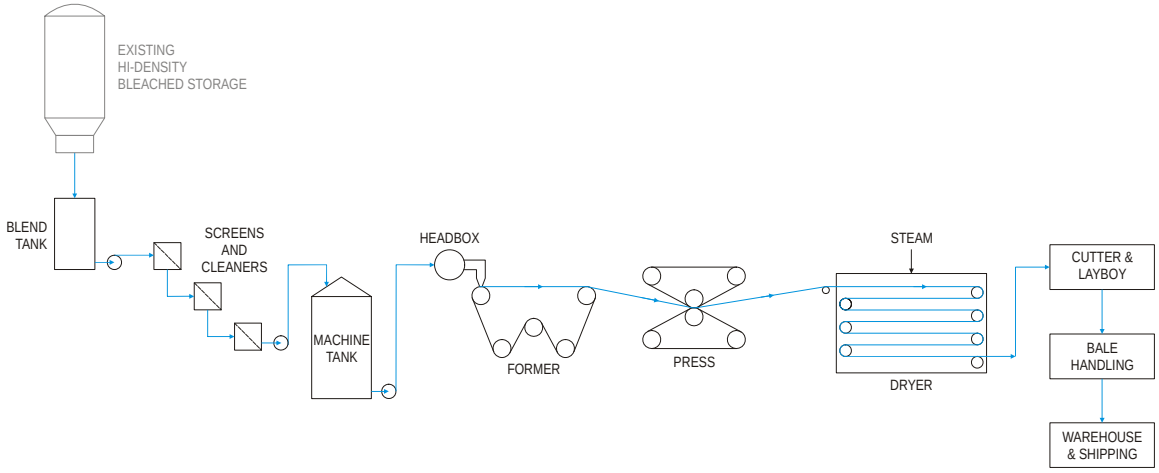
PROFESSIONAL SEAL:

EXECUTIVE SUMMARY

The Irving Pulp & Paper (IPP) Reversing Falls Mill near the mouth of the Saint John River has undergone numerous upgrades to maintain it as a world-class bleached Kraft pulp producer. To sustain the Mill's global competitiveness, IPP is proposing to install new best-available technology in order to replace the existing pulp dryers and associated equipment. This Environmental Impact Assessment (EIA) details the *Pulp Dryer Modernization* project planned for the Mill. The Project comprises installing and operating:

- a bleached stock screening system;
- a new pulp dryer; and
- a new pulp baling line.

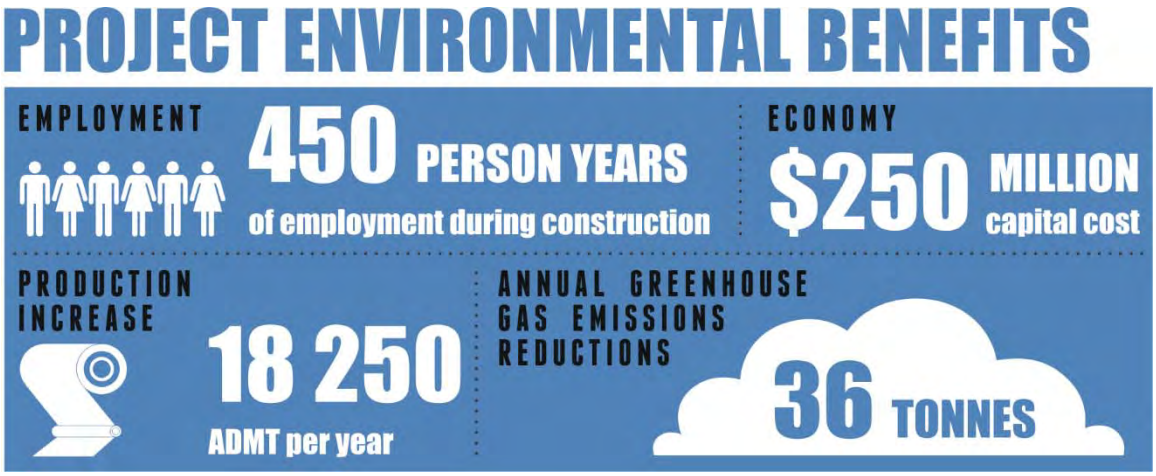


All of the new more efficient and higher quality producing equipment will be constructed and operated within the existing boundaries of the Mill property in Saint John, New Brunswick. That 50 ha brownfield site has supported heavy industry for over a century and has been one of Saint John's larger economic generators.

Currently, the Mill employs a full-time skilled labour force of about 350. Hundreds more are employed at the Mill during routine maintenance, upgrades, and shutdowns. Approximately 935 Air Dry Metric Tonnes of softwood and hardwood pulp are produced daily at the Mill using a variety of physical and chemical processes. Annually, this results in about $50 million of goods and services being purchased within the New Brunswick economy. Spin-off industries from the Mill, such as tissue making and paper making, are such that about 4 % of Saint John's labour force is employed by the forest-related industry.

As per the Environmental Impact Assessment Regulation **[87-83]** of the New Brunswick *Clean Environment Act*, the renewal Project requires Environmental Impact Assessment (EIA) review. An EIA is a planning tool used by the proponent and regulatory authorities. The purpose of an EIA is to identify and evaluate the potential impacts that the Project may have on the environment. Best-management practices are also presented to mitigate any identified potential environmental impacts. The New Brunswick Department of the Environment and Local Government (NBDELG) oversees the EIA process.

For IPP to remain successful in the global Kraft market, it is essential that they update the pulp dryers. This Project offers several socio-economic and environmental benefits, including those shown in the infographic below.

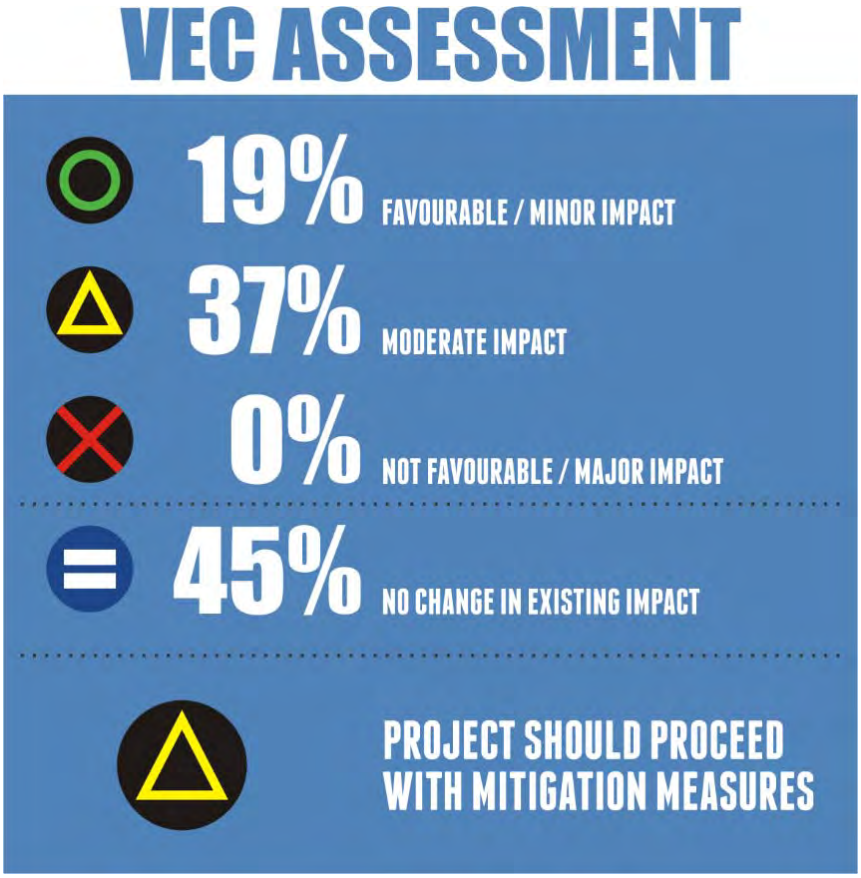


This EIA document provides a detailed Project description and a narrative on the baseline environment. Components of the existing environment that are described include the physio-chemical environment, the biological environment, and the socio-economic environment. The baseline environmental data was overlain by five Project stages (*i.e.*, environmental permitting, construction, operation and maintenance, decommissioning, and mishaps, errors, and / or unforeseen events) to recognize potential environmental interactions. Based on that process, 11 Valued Environmental Components (VECs) were identified. The VECs that were assessed in detail include:

- physio-chemical environment:
  - air quality;
  - sound emissions;
  - surface water quantity and quality; and
  - groundwater quantity and quality;
- biological environment:
  - terrestrial flora and fauna;
  - aquatic flora and fauna; and
- socio-economic environment:
  - labour and economy;
  - transportation network;
  - aesthetics;
  - recreation and tourism; and
  - health and safety.

Within this EIA document, a visual impact assessment process analogous to a traffic light was used for characterizing potential environmental impacts. All told, 150 specific possible impacts were assessed. In many instances, there are no changes anticipated as a result of the Project (n = 65 potential impacts); however, to determine an overall VEC impact assessment, only those interactions with potential impacts (n = 83) were considered. Based on that process, the EIA review yielded a yellow light. There are very

few operational impacts associated with this Project; the majority of the yellow lights applied during the EIA review are for potential impacts during construction and / or mishaps, errors, and unforeseen events (*i.e.*, 95 % of yellow lights). Therefore, the Project should proceed as detailed within this EIA document.



A Project-specific Environmental Protection Plan (EPP) will be developed to mitigate any identified potential impacts. The EPP will dictate the importance of best-management practices that will be undertaken by all those associated with the Project to ensure environmental protection. It will be a dynamic document to be used by Project personnel in the field and at the corporate level for ensuring commitments made in the EIA are implemented and monitored.

The EIA process is an open and transparent process. There is a public consultation process that ensures those individuals and / or groups that may be potentially affected by the Project are made aware of the registration, are able to obtain information on the registration, and are able to express any and / or all concerns they may have. This EIA document is available for public comment until 15 June 2016. Although there is no requirement to host a public meeting, IPP will hold a public open house at a location to be determined and on a date prior to the closing of the public comment period. Story boards will be on display and attendees will have the opportunity to discuss the Project with IPP staff and they will also be able to submit written questions during the open house for inclusion in a Public Consultation report.

Alternatively, comments, questions, and concerns regarding the EIA document can be forwarded to the Environmental Consultant:

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ACRONYMS

ADMT:	Air Dry Metric Tonnes
ACAP:	Atlantic Coastal Action Program
ACCDC:	Atlantic Canada Conservation Data Centre
ACS:	Automated Control System
AOAS:	Approval Of A Source
ATC:	Approval To Construct
ATO:	Approval To Operate
BMPs:	Best-Management Practices
%:	Care Of
CMA:	Census Metropolitan Area
CN:	Canadian National
Co.:	Corporation
CO:	Carbon monoxide
CO_2:	Carbon dioxide
CO_{2eq}:	Carbon dioxide equivalents
CONSEP:	CONtractor Safety and Environmental Program
Corp.:	Corporation
COSEWIC:	Committee On Status of Endangered Wildlife in Canada
cm:	centimeter
dBA:	A-weighted deciBels (*i.e.*, relative loudness)
DDT:	Dichloro-Diphenyl-Trichloroethane
e.g.:	(*exempli gratia*) for example
EIA:	Environmental Impact Assessment
EMS:	Environmental Management System
EPP:	Environmental Protection Plan
ERP&ECP:	Emergency Response Plan & Environmental Contingency Plan
ESA:	Environmentally Significant Area
etc.:	(*et cetera*) and so forth
f*SARA*:	federal *Species At Risk Act*
g:	gram
GHG:	GreenHouse Gases

GHGRP:	GreenHouse Gas Reporting Program
GIS:	Geographical Information System
GP:	General Partnership
ha:	hectare
hp:	horsepower
hr:	hour
HRDC:	Human Resources Development Corporation
i.e.:	(*id est*) namely / that is
IBA:	Important Bird Area
ID:	IDentification
IPP:	Irving Pulp and Paper
ISO:	International Standards Organization
JDI:	J.D. Irving, Limited
JOHSC:	Joint Occupational Health and Safety Committee
kg:	kilogram
km:	kilometer
km^2:	kilometers squared
kt:	kilotonne
L.P.:	Limited Partnership
LNG:	Liquefied Natural Gas
Ltd.:	Limited
m:	meters
m^2:	square meters
m^3:	cubic meters
mm:	millimeter
mya:	million years ago
n:	statistical value that refers to the number of observations
N:	North
NAPS:	National Air Pollution Surveillance
n.b.:	(*nota bene*) note well / take note
NB:	New Brunswick
NBDELG:	New Brunswick Department of Environment and Local Government
NBFPI:	New Brunswick Forest Products Industry

NBM:	New Brunswick Museum
NBSR:	New Brunswick Southern Railway
NO_2:	Nitrogen Oxides
NPRI:	National Pollutant Release Inventory
O_3:	Ozone
OBF:	Outer Bay of Fundy
OHSA:	*Occupational Health and Safety Act*
P.Eng.:	Professional Engineer
PALS:	Partners Assisting Local Schools
PID:	Property IDentifier
PM:	Particulate Matter
$PM_{2.5}$:	Particulate Matter less than 2.5 microns
PM_{10}:	Particulate Matter less than 10 microns
PMP:	Project Management Professional
PO:	Post Office
ppb:	parts per billion
PPE:	Personal Protective Equipment
ppm:	parts per million
p*SARA*:	provincial *Species At Risk Act*
SARA:	*Species At Risk Act*
StatsCan:	Statistics Canada
SO_2:	Sulfur Dioxide
t:	tonnes
™:	Trade Mark
TRC:	Technical Review Committee
US:	United States
USBL:	Underwriter's Survey Bureau Limited
VEC:	Valued Environmental Component
VOCs:	Volatile Organic Compounds
yr:	year
YSJ:	Saint John Airport
W:	West
WMO:	World Meteorological Organization

°C:	degrees Celsius
%:	percent
µ:	microns
>:	greater than
<:	less than
~:	approximately

1.0 PROPONENT

1.1 PROPONENT NAME

The proponent for this Project is Irving Pulp & Paper (IPP), Limited, which is a division of J.D. Irving, Limited (JDI).

1.2 PROPONENT ADDRESS

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1.3 PROPONENT CONTACT

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1.4 PRINCIPAL CONTACT FOR PURPOSES OF ENVIRONMENTAL IMPACT ASSESSMENT

Fundy Engineering & Consulting Ltd. (Fundy Engineering) prepared this Environmental Impact Assessment (EIA) Registration Document. The principal contact at Fundy Engineering with respect to this EIA is:

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1.5 PROPERTY OWNERSHIP

The proposed Project will occur on the land parcels identified in the New Brunswick Geomatics Information Centre database as Property IDentification (PID) numbers 00036673 and 55162416, which are owned by Irving Consumer Products Limited and Irving Pulp & Paper, Limited, respectively. Both owners are affiliates of JDI and are part of the Reversing Falls Mill at the mouth of the Saint John River (Figure 1). Detailed PID information is included in Appendix I.

Figure 1. Aerial photograph, circa 2014, showing the Irving Pulp & Paper, Limited Reversing Falls Mill at the mouth of the Saint John River in Saint John, New Brunswick.

The Reversing Falls Mill is zoned I-2 (*i.e.*, for heavy industrial use; Figure 2). The area where the Pulp Dryer Modernization will be undertaken is shown in Figure 3.

Figure 2. Aerial photograph, circa 2014, showing the land zoning in the vicinity of the Reversing Falls Mill at the mouth of the Saint John River in Saint John, New Brunswick.

Figure 3. Aerial photograph, circa 2014, showing the area where the Pulp Dryer Modernization Project will take place at the Reversing Falls Mill in Saint John, New Brunswick.

2.0 PROJECT DESCRIPTION

2.1 PROJECT NAME

For the purposes of this EIA, the Project is referred to as:

PULP DRYER
MODERNIZATION

2.2 PROJECT OVERVIEW

IPP has operated a bleached Kraft pulp mill at Reversing Falls (*i.e.*, the Mill) near the mouth of the Saint John River in Saint John, New Brunswick (Figure 4) since the late 1940s. The Mill has undergone numerous upgrades to become the world class pulp producing facility that it is today. Presently, the Mill produces approximately 935 Air Dry Metric Tonnes (ADMT) of softwood and hardwood pulp each day using a variety of physical and chemical processes.

Figure 4. The Irving Pulp & Paper, Limited Reversing Falls Mill located near the mouth of the Saint John River in Saint John, New Brunswick.

The existing pulp dryers and baling lines at the Mill are shown in Figure 5 through Figure 7. Pulp dryers #1, #2, and #3 were installed, respectively, in 1972, 1959, and 1965. The average age of the dryers is 51 years, which means they have been working for their planned useful life. To remain competitive, these dryers require updating. Dryer technology has improved to the point where one dryer can completely replace the three existing dryers at the Mill.

Figure 5. Photograph showing the existing #1 and #2 pulp dryers at the Reversing Falls Mill in Saint John, New Brunswick.

Although the three existing pulp dryers will become redundant once the new pulp dryer is brought online, they will not be removed. Instead, they will remain in place until such time in the future that it is determined that their footprints are needed for other upgrades or operations.

To remain current and maintain efficient and environmentally-sound processes, the Mill routinely undergoes modernization. As part of an on-going long-term multi-phase upgrade program to maintain the Mill's global competitiveness, IPP is proposing to install new best-available technology to replace the existing pulp dryers and associated equipment (*i.e.*, the Project). **It is important to note that this Project replaces an existing system at the Mill and all new equipment will be fully integrated into the Mill's existing advanced control systems and operations.**

The pulp dryer modernization represents the third phase (*i.e.*, Phase 3) of the Mill's required upgrades. Phase 1 involved installing a new lime kiln and upgrading the pulp washing equipment. That work was completed between 2004 and 2013. Phase 2 involved renewing the chip handling processes and the continuous cooking and digester plant. The Phase 2 equipment should be fully operational by November 2016. Once Phase 2 is operational, the Mill's overall production will increase slightly to 970 ADMT per day. Figure 8 conceptually shows the three phases of the Mill's modernization.

Figure 6. Photograph showing the existing #3 pulp dryer at the Reversing Falls Mill in Saint John, New Brunswick.

Figure 7. Photograph showing the existing baling lines at the Reversing Falls Mill in Saint John, New Brunswick.

Figure 8. Three-dimensional model looking northwest showing three phases of the long-term multi-phase upgrade program at the Reversing Falls Mill in Saint John, New Brunswick. Phase 1, new lime kiln and pulp washing equipment upgrade, is shown in blue, Phase 2, new chip handling processes and continuous cooking digester plant renewal, is shown in green, and Phase 3, pulp dryer modernization, is shown in red.

Pulp and paper production is the most capital-intensive manufacturing industry in North America. Because of this, long time horizons of between 25 and 50 years are typical when undertaking large capital projects. As with many capital-intensive industries, economies of scale apply, giving lower specific investment costs for larger equipment.

Briefly, the Project comprises installing and operating:

- a bleached stock screening system;
- a new pulp dryer; and
- a new pulp baling line.

The bleached stock screening system, pulp dryer, and auxiliary process equipment will be housed in a new machine hall. The baling line will be installed within a warehouse that is slated for construction starting in spring 2016. Construction of the warehouse did not require EIA approval, which was confirmed with NBDELG personnel. All of the Project construction and Project-related activities will occur on the existing Mill site.

The pulp dryer modernization project offers environmental benefits, which are highlighted and summarized in Table 1. Most notable will be the reduction in air emissions. The reduction in local pulp trucking between the Mill and the Tissue Mill and the Mill and the east Saint John warehouse (*i.e.*, shunting) is expected to reduce greenhouse gas emissions by 36.3 $t \cdot yr^{-1}$. There will be a small increase in pulp production, which will result in a small increase (*i.e.*, 1.5 %) in BOD and TSS; however, there are no operational issues foreseen to negatively impact these modest increases (*i.e.*, the Mill's effluent will continue to comply with the limits outlined in the Water Quality ATO and federal requlatory requirements. The project will yield a significant socioeconomic benefit through the increase of jobs locally during construction.

Table 1. Expected benefits and consequences of the proposed pulp dryer modernization project at the Reversing Falls Mill in Saint John, New Brunswick.

Parameter	Anticipated Change	Results From
NET PROJECT BENEFITS		
Energy consumption	Slight increase	Mill power consumption will increase by about 2 MW (~ 6.5 %) to operate the new pulp dryer
Shunting*	8 380 trucks · yr^{-1} decrease	Due to reductions in shunting pulp bales from the Mill to the Tissue Mill and from the Mill to the east Saint John warehouse
Trucking GHG emissions	36.3 t · yr^{-1} decrease	Due to reduced pulp bale trucking (increased storage in new warehouse and Tissue Mill clamptrucks can move bales from the new warehouse into the Tissue Mill)
Biomass fuel consumption	No change	Steam consumption will be approximately the same between the new pulp dryer and the three existing pulp dryers
Bark ash production	No change	
NO_X emissions	No change	
Biomass fuel consumption particulate emissions	No change	
Biomass GHG emissions	No change	
Pulp production	50 ADMT per day (5.2 % increase)	Increase in pulp dried with the new pulp dryer (from 970 ADMT to 1 020 ADMT per day)
Chip handling dust emissions	No change	
Construction jobs	450 person years	Project construction (900 000 person hours)
PROJECT CONSEQUENCES		
Effluent BOD	1.5 % increase (125 kg · day^{-1})	Increase in pulp production rate
Effluent TSS	1.5 % increase (143 kg · day^{-1})	Increase in bio-solids generated in the moving bed bio-reactor used for BOD removal

NOTES:
*Shunting is local pulp trucking between the Mill and the Tissue Mill and the Mill and the east Saint John warehouse

2.3 PURPOSE OF THIS ENVIRONMENTAL IMPACT ASSESSMENT

The purpose of an EIA is to identify and evaluate the potential impacts that the proposed Project may have on the environment. As per Schedule A, item k) (*i.e.*, all facilities for the commercial processing or treatment of timber resources…) of the Environmental Impact Assessment Regulation **[87-83]** of the New Brunswick *Clean Environment Act*, the Project triggers EIA review. This EIA was prepared by Fundy Engineering & Consulting Ltd. (Fundy Engineering) on behalf of IPP (% Mr. David Muir). The EIA identifies any potential environmental impacts this Project may pose and presents measures to mitigate those potential environmental impacts. This EIA meets the requirements of the *NBDELG* [2012] guide to EIAs and the *NBDELG* [2004] Sector Guidelines for Timber Processing Projects.

2.4 PROJECT PURPOSE / RATIONALE / NEED

The New Brunswick Forest Products Industry (NBFPI) is an integral component of the Province's natural resource-based economy. More than 7 million hectares of forested lands are managed throughout the Province. In 2010, forestry accounted for 5.1 % of the Province's Gross Domestic Product. Throughout the Province the NBFPI is a direct employer to about 11 600, who in 2010 earned more than $1 billion in wages and salaries.

Saint John is the hub of the NBFPI; about one out of every 25 people in Saint John is employed by the forest-related industry. One of the largest NBFPI employers in Saint John is the IPP Mill, which has a labour force of approximately 350. Those employees provide a crucial link in the use of the Province's wood resource by processing sawmill by-products (*i.e.*, wood chips). Annually, the Mill purchases over $50 million in goods and services from NB suppliers and the employees contribute to the Saint John community and economy.

The global market for supplying Kraft pulp to paper and allied product manufacturers is extremely aggressive. For IPP to remain successful in that competitive market, it is essential that they continuously upgrade major equipment with more efficient and higher quality producing technologies. This Project is one such required upgrade that is part of a long-term asset renewal program for ensuring the Mill remains economically viable.

The Project will improve the pulp quality for some hardwood customers from what is currently being produced. For example, today, a small amount of softwood pulp must be mixed in with hardwood pulp in order to allow processing through the existing pulp dryers. To some customers, this mixing of pulps interferes with their intended use in the manufacturing of their products. The new dryer will not have this limitation, allowing hardwood pulp production to be 100 % pure and free of any softwood content. This will be a significant advantage to some customers.

Overall, this Project will maintain a livelihood for many New Brunswickers by ensuring that the Mill, which is an anchor of New Brunswick's forest products industry, remains efficient to ensure effective productivity, product quality, and profitability. The two year construction stage of the Project will provide a substantial volume of jobs (*i.e.*, 450 person years of work) to the Saint John region.

2.5 PROJECT LOCATION

Operationally, it is necessary to site the new pulp dryer in close proximity to existing processes. The pulp drying process is only one step in the sequential process in producing Kraft pulp. Intermediate products pass from one unit to the next through the Mill. Therefore, it is critical that this Project site is in close proximity to other Mill processes.

Through considerable engineering effort, the Project will be constructed on the Mill property in a location that is the most appropriate for integration into the Mill's existing production and environmental systems. The permanent Project infrastructure will be constructed and operated adjacent to IPP's existing tissue mill (Figure 9) and entirely within the boundaries of the current Mill (*i.e.*, PIDs 55162416 and 00036673) with central coordinates of 45°15'46.02"N and 66°05'45.77"W, refer to Figure 1).

Figure 9. Bird's eye view looking northeast towards the Reversing Falls Mill in Saint John, New Brunswick.

The new pulp dryer will be located in a different location on the Mill site compared to where the three existing pulp dryers are located. There are several beneficial reasons for relocating to a new area at the Mill. It makes the most sense in terms of process flow through the Mill. Also, connecting the Tissue Mill allows pulp bales to be more easily transferred into the Tissue Mill versus transporting (i.e., shunting) them by truck. This trucking requirement currently in place will be eliminated with the new pulp dryer set-up. Finally, construction of the new pulp dryer will allow the Mill to operate uninterrupted during the entire construction stage and once the new pulp dryer is in operation, valuable site real estate, currently occupied by the existing pulp dryers will be freed up for future mill improvements.

2.6 PROJECT DETAILS

The main components of the Dryer Modernization Project (Figure 10) include installing and operating:

- a new bleached stock screening system;
- a new pulp dryer (*i.e.*, headbox, former, dryer, cutter, and layboy); and
- a new pulp baling line.

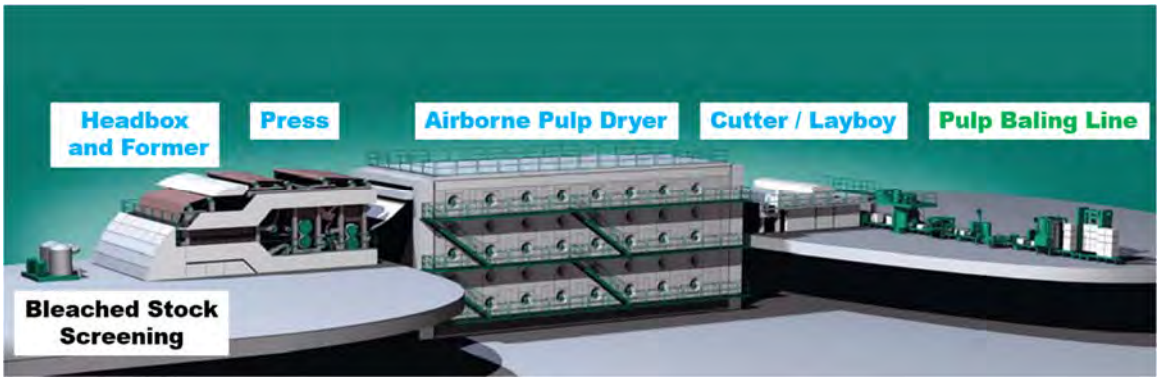


Figure 10. Generalized three-dimensional model of the bleached stock screening system, the pulp dryer (*n.b.*, text of the major components is blue), and the baling line proposed for the Reversing Falls Mill in Saint John, New Brunswick.

All new equipment will be fully integrated within the Mill's existing advanced process control systems and operations. Each of the aforementioned Project components is described in the sections that follow. Schematics showing the existing and new process flow are shown in Figure 11 and Figure 12, respectively.

The input and outputs to the existing and future pulp drying system are summarized in Table 2.

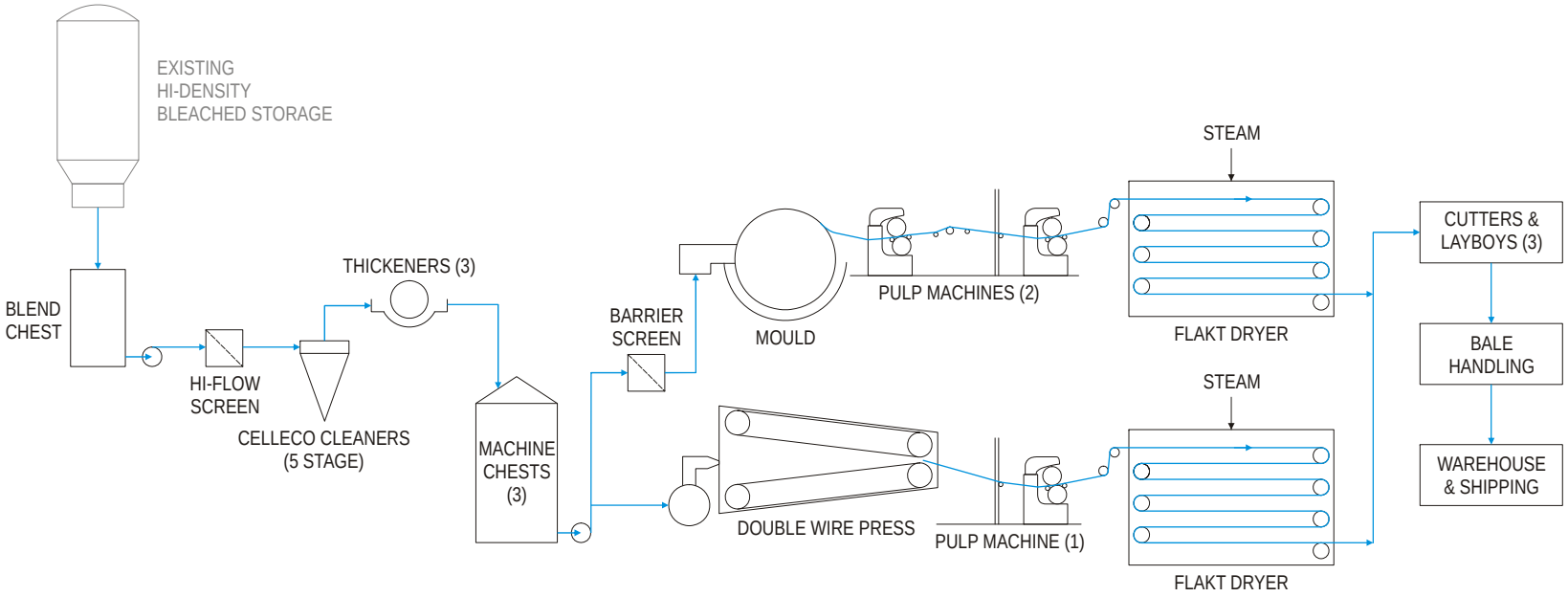


Figure 11. Schematic showing the existing bleached stock screening system, pulp dryer, and pulp baling line at the Reversing Falls Mill in Saint John, New Brunswick.

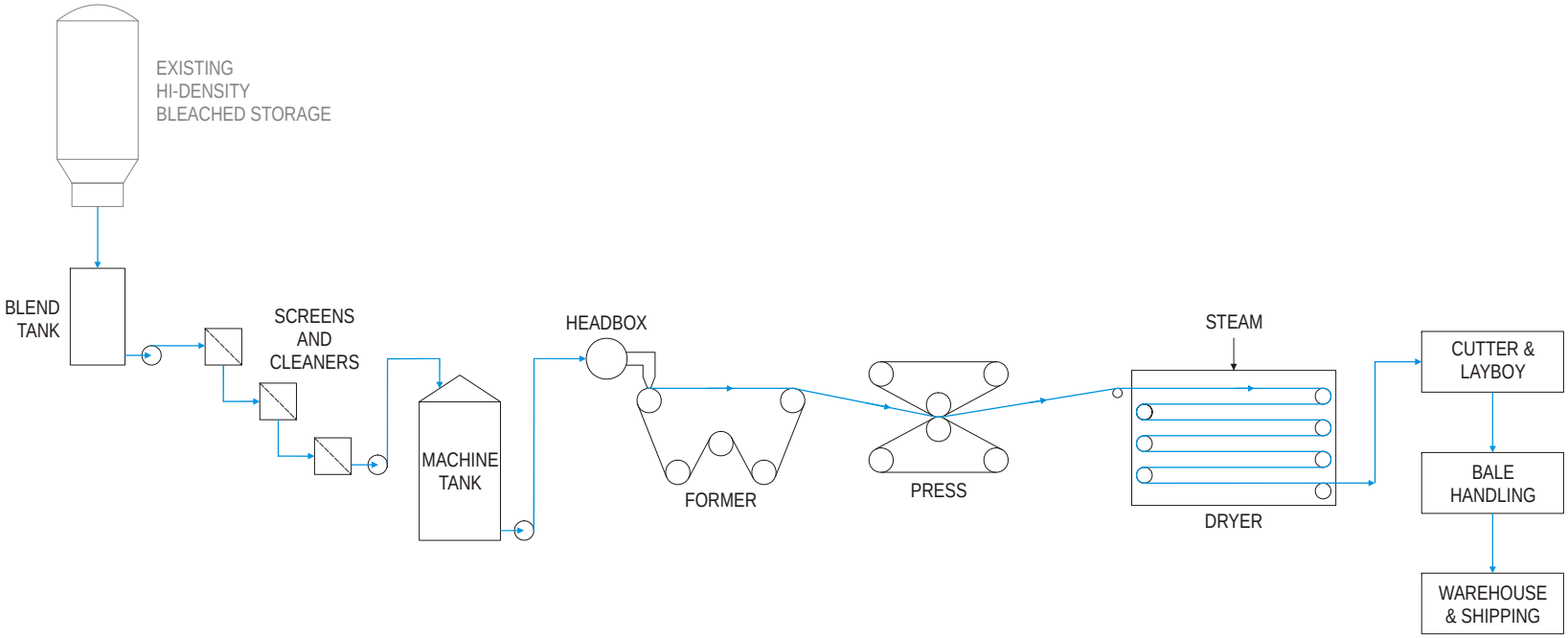


Figure 12. Schematic showing the proposed bleached stock screening system, pulp dryer, and pulp baling line at the Reversing Falls Mill in Saint John, New Brunswick.

Table 2. Input and outputs to the existing and future pulp drying process at the Reversing Falls Mill in Saint John, New Brunswick.

Parameter	Existing Dryers (3)	New Dryer (1)
INPUTS		
Air Flow ($m^3 \cdot s^{-1}$)	66	92
Steam ($kg \cdot hr^{-1}$)	45 000*	50 000†
OUTPUTS		
Sound emissions (vacuum pumps, exhaust fans, *etc.*)	85 dBA at 1 m from roof stack	85 dBA at 1 m from roof stack
Exhaust stacks	3	2
Exhaust stack diameter (m)	1.2	1.5
Exhaust stack tip elevation (m AMSL)	21.926	48.108
Exhaust stack tip elevation above ground surface (m)	~ 20.7	~ 31.5

NOTES:
*This is with the Phase II Mill Upgrades (*i.e.*, continuous cooking digester) complete with a daily pulp production of 970 ADMT; the steam input was 43 000 $kg \cdot hr^{-1}$ prior to the Phase II Mill Upgrades when the daily pulp production was 935 ADMT
†The additional 5 000 $kg \cdot hr^{-1}$ of steam will be obtained from vented steam currently available within the Mill; no additional energy input will be used to generate the additional steam for the new dryer

2.6.1 Bleached Stock Screening System

The bleached stock screening system will be housed in a new 1 020 m^2 storage building. That building will house the following key equipment:

- a 2 020 m^3 white water storage tower;
- a 2 020 m^3 broke storage tower;
- a 315 m^3 blend tank;
- a 315 m^3 machine tank;
- a 75 m^3 fibre collection tank (*i.e.*, for collecting stock spills and returning to process); and
- primary, secondary, and tertiary pulp screens.

Pulp, at the correct brightness for drying, will be pumped to a high-density storage tower as it exits from the bleach plant. From there, the pulp will enter a three stage screening system followed by two stages of centrifugal cleaners. The primary purpose of the bleached stock screening and cleaning system will be to remove contaminants (i.e., shives, bark, plastic specks, grit, sand, and fibre bundles) in the Kraft pulp that may cause operational issues, reduce the appearance and / or strength of the paper produced from the pulp and / or cause equipment damage.

The rejected material, from the last stage of the cleaner system, will be fed to a cleaners rejects tank. From there, that material will be pumped to the existing screw press feed system within the main Mill. Solids there are dewatered and are fed into the bark boiler where they are combusted (*i.e.*, they become part of the boiler fuel).

2.6.2 Pulp Dryer

A new 5 390 m^2 Machine Hall will house the new pulp dryer. Major equipment housed in the machine hall, which is collectively known as the “pulp dryer”, includes:

- a headbox;
- a former;
- a press, with three press nips;
- a dryer using airborne float technology;
- a pulp cutter / layboy; and
- an automated conveyor system that extends to the pulp baling line in the connected warehouse.

Included in the machine hall will be the following rooms:

- electrical;
- HVAC;
- control room;
- maintenance shop;
- laboratory;
- offices and conference rooms; and
- lunch room.

2.6.2.1 Wet End

Bleached pulp will be transferred to the wet end of the pulp dryer via a 61 cm diameter pipe. For a daily design production of 1 200 ADMT, the transfer rate will be about 20 100 L · min^{-1}.

2.6.2.1.1 Headbox

Pulp that has gone through the bleached stock screening system will enter the headbox (Figure 10). The pulp slurry entering the headbox will be about 99.5 % water and about 0.5 % pulp fibre. Because the wood fibres have a tendency to attract to one another, forming clumps or flocs, the headbox is a pressure chamber where turbulence will be applied to break up fibre clumps that may be contained within the pulp slurry and also prevents them from developing.

The headbox will also be used to deliver a consistent distribution of pulp slurry onto the wire / woven mesh fabric loop (*i.e.*, forming fabric) feeding the pulp sheet former. The slurry will exit a rectangular opening in the headbox called a slice as a pressurized stream onto the travelling wire. The wire on the Former will be moving at speeds of 120 to 160 m · min^{-1}.

2.6.2.1.2 Former and Sumps

The former (Figure 10), of which the original technology was named after the Fourdrinier Brothers who first developed the process, is essentially a table over which the wire that the pulp slurry will be pumped onto travels. As the wire moves over the table, water and shorter wood fibres will drain through the mesh and be captured from below. Vacuum boxes located under the table will aid in water drainage from the slurry. During travel over the table, wood fibres contained in the slurry will align themselves in the direction of the travelling wire. As the fibres align, they will become interlaced and form a pulp sheet.

In order to accommodate the new pulp dryer in the new Machine Hall, two internal sumps will be installed; one at the wet end (*i.e.*, at floor level below the former) of the machine and one at the dry end (*i.e.*, at floor level below the cutter / layboy). These sumps will be used to capture any fibre spills / overflows and return them to the fibre collection tank and then back into the process.

2.6.2.2 Dry End

2.6.2.2.1 Press

From the former, where most of the water is removed from the sheet, the formed pulp sheet, which at that point is about 22 % solids, will move on to the press section (Figure 10) where mechanical force is required to remove the next portion of moisture. The Press section has four individual press felt runs configured to give three nip points in which moisture is pressed or squeezed from the sheet due to compression between rotating rolls. The pressing will be aided by synthetic woven fabric press felts that will support the pulp sheet and absorb the pressed water. The press will be double felted, which means that both sides of the pulp sheet will contact a press felt. When the press felts leave contact with the pulp sheet (*i.e.*, as they continue their rotation through the press), they will pass over a vacuum box to remove moisture so that they can remove moisture from the pulp sheet on their next rotation. When the smooth, uniform thick sheet leaves the press section, the solids content will be about 46 % (*i.e.*, a moisture content of around 54 %).

Water from the press will be collected in the felt water tank. From that tank, the water will be pumped back to the wire water tank and back to the white water storage tank for reuse in the process.

2.6.2.2.2 Dryer

The pressed pulp sheet will enter the top of the dryer from the press (Figure 10) and exit the other end of the dryer at the bottom. Essentially, the dryer is a large chamber with a series of horizontal stages, allowing the pulp sheet to travel in a serpentine path where heated air is blown or impinged against both sides of the sheet, thereby both drying and supporting (*i.e.*, floating) the sheet between each of the entry and exit turning rolls. As the pulp sheet is carried through the dryer, it will move downwards through the stages by moving over turning rolls (*i.e.*, with a full width of about 0.5 m in diameter) at the ends of each stage. In total, there will be approximately 20 of these rolls located at the dryer inlet and outlet. Between the large rollers, heated air will support the pulp sheet from above and below. As the heated air exits the blow boxes, it moves across the pulp sheet. The air will transfer heat to the sheet and carry evaporated water vapour up through the chamber and out the vents from the dryer. When the sheet exits the dryer, the moisture content will be about 10 %.

Airborne dryers are typically designed to use about 4 kg of air per 1 kg of water evaporated. The exhaust air will typically have a dry bulb temperature of 130 °C and a dew point of 70 °C. This allows from the transfer of a substantial amount of heat to the incoming makeup air, without risk of condensation in the air-to-air heat exchanger. In order to transfer all of the heat required to evaporate most of the water in the pulp sheet, it is necessary to re-circulate and reheat the air about six times within the dryer. That is

because air, when compared to water, is not a particularly a good medium for transferring heat to the pulp sheet.

Steam, for heating the air in the dryers, will be obtained from the existing Mill operations. All of the condensed steam, from heating the Kraft sheet passing through the dryers, will be collected in a condensate receiver. From there it will be pumped through a white water silo heat exchanger to heat white water. The condensate will be collected again in another receiver and be pumped back to the recovery boiler. The water that is evaporated from the drying Kraft sheet passing through the dryers, will be sent to the dryer heat recovery system where most of the heat will be recovered before that air / water vapor stream gets vented to the atmosphere. Any fibre, heated spray shower water recovered from the heat recovery units will be returned to the wet end fibre sump and back into the process.

There will be several exhaust points located on the roof of the new dryer building. Figure 13 shows the location of those exhaust points and Table 3 provides details about the exhaust points.

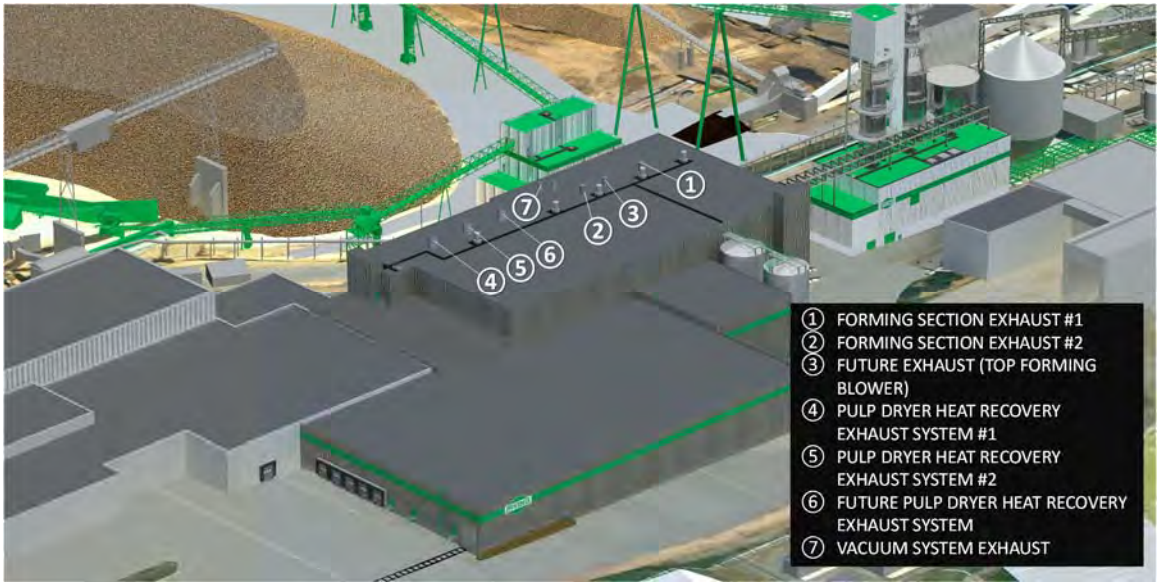


Figure 13. Three-dimensional model showing the exhaust points on the roof of the pulp dryer building proposed for the Reversing Falls Mill in Saint John, New Brunswick.

Table 3. Exhaust point details for the proposed pulp drying process at the Reversing Falls Mill in Saint John, New Brunswick.

Exhaust Point	Description	Diameter (m)	Airflow (kg · min^{-1})	Details
①	Forming section exhaust #1	0.5	1 050	Equipped with a silencer*
②	Forming section exhaust #2	0.5	1 400	Equipped with a silencer*
③	Future exhaust (top forming blower)			Will be equipped with a silencer*
④	Pulp dryer heat recovery exhaust system #1	3.9	1 800	Equipped with a silencer*
⑤	Pulp dryer hear recovery exhaust system #2	3.9	1 800	Equipped with a silencer*
⑥	Future pulp dryer heat recovery exhaust system			Will be equipped with a silencer*
⑦	Vacuum system exhaust	3.5	1 600	Equipped with a silencer*

NOTES:
*Silencers will be designed so that sound emissions at 1 m from the stack will be 85 dBA

2.6.2.2.3 Cutter / Layboy

A cutter will be used to trim the continuous pulp sheet exiting the dryer. As the pulp sheet is cut into uniform size sheets (*i.e.*, in both directions), they will be stacked on the layboy before being transferred to the baling line.

2.6.3 Pulp Baling Line

The warehouse, which did not require EIA approval or an Approval to Construct (*n.b.*, it is a standalone building without any process stacks / vents or outfalls), will house the new pulp baling line equipment (Figure 14). The warehouse will also be used to store pulp bales prior to shipping to market. The 5 880 m^2 building has approximate length and width dimensions of 100 m and 58.8 m. The height of the building is about 8.5 m.

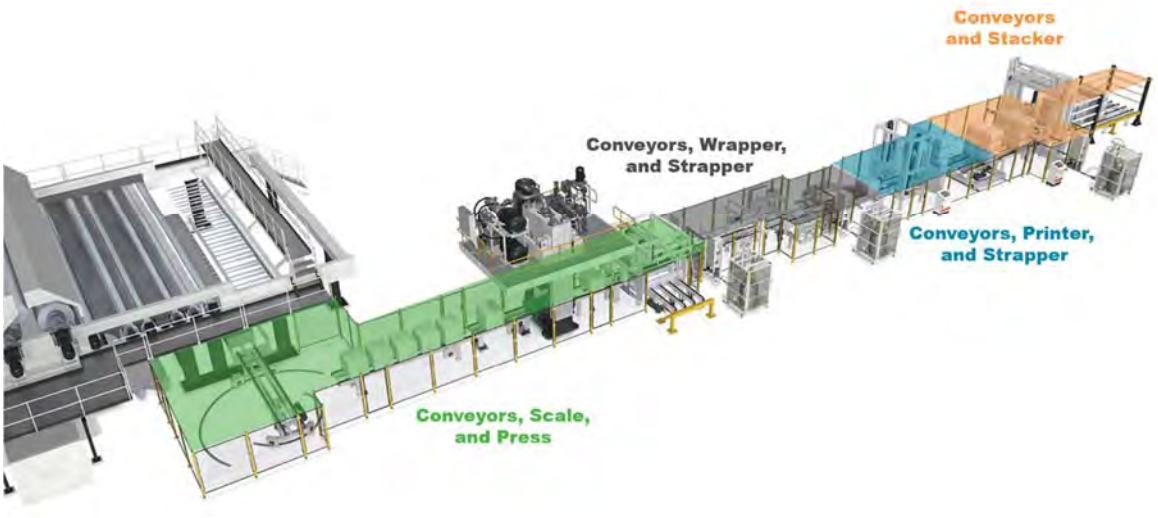


Figure 14. Generalized three-dimensional model of the baling line proposed for the Reversing Falls Mill in Saint John, New Brunswick.

The new pulp baling line equipment will comprise:

- an automated conveyor system;
- a bale scale;
- a bale press;
- a bale wrapper, printer, and strapper; and
- a bale stacker.

2.6.3.1 Automated Conveyor System

An automated conveyor system will be used to transfer cut and stacked pulp from the cutter / layboy in the machine hall to the pulp baling line in the warehouse (Figure 14). Conveyor types will include stationary, swing, turntable, transfer, and intersecting. Overall, about 185 m of conveyor lines will be installed in the warehouse.

2.6.3.2 Bale Scale

Bales from the cutter / layboy will be weighed on a scale to record bale weight (Figure 14). Pulp bales will typically weigh 250 kg. If bales are not within the desired upper and lower weight limits, they will be adjusted accordingly.

2.6.3.3 Bale Press

A hydraulic press, with a force of at least 1 000 tonnes, will be used to reduce the size of the pulp bales for easy handling (Figure 14). Bale dimensions are approximately 87 cm × 70 cm (*i.e.*, length and width) and 43.2 cm high. Once the pulp bales are compressed, they can be wrapped.

2.6.3.4 Bale Wrapper, Printer, and Strapper

Typically, pulp bales will be wrapped with larger sheets of the same grade of pulp. Two wrapper sheets will be used for each bale; one sheet for the top and one sheet for the bottom. On the automated wrapper (Figure 14), two sides of the wrapper sheets will be folded up and down and wire straps will be applied around the bale to hold the sheets in place. From there, the pulp bale will pass through a printer where information, such as the bale weight, pulp type, and the corporate logo will be applied to the wrapper. The pulp bale will then be turned 90 ° on a turntable and ends of the wrapper sheets will be folded up and down and tucked in (*i.e.*, will look like an envelope fold), and two more wire straps will be applied around the bale.

2.6.3.5 Bale Stacker

Wrapped bales will move along the conveyor to the bale stacker (Figure 14). Once there, the bales will be stacked and strapped together as a unit up to four bales high × two bales wide (*i.e.*, ~ 1.8 m tall; suitable for placement within a transport truck or railway box car). The unitized stack moves to the end of the conveyor system where a forklift will move the stack to temporary storage within the warehouse.

2.6.3.6 Bale Storage

Pulp bales will be stored within the warehouse prior to shipping to market by rail or truck. From the warehouse, the bales will be loaded by forklift on to railcars and trucks for shipping to customers. The warehouse will have an enclosed rail siding for up to five railcars and there will be five exterior truck bays.

The warehouse has the storage capacity for approximately 6 000 ADMT of pulp. Currently, once pulp is produced it is either shipped out to market, shunted to the on-site tissue mill, or moved to one of IPP's storage facilities in east Saint John. The addition of the warehouse, which is separate from this Project, will limit the amount of pulp double-handling that occurs today.

Unwrapped pulp bales will also be stored in the warehouse. Those unwrapped pulp bales will primarily be used within the on-site tissue mill and will negate the requirement to remove straps from the pulp bales.

2.6.3.6.1 Reducing Pulp Handling

Some of the pulp bales from the existing baling line are shunted to the on-site Tissue Mill for processing. When the Project is complete, the shunting of pulp bales will be eliminated because the end of the baling line will be directly connected to the Tissue Mill. Figure 15 shows the building where the three existing pulp dryers are located and where the new pulp dryer building will be located.

Pulp bales that are either not shipped directly to market or shunted to the Tissue Mill are transferred to IPP's warehouse on the east side of Saint John. This is because the existing Mill has no warehousing ability. Therefore, some of the pulp bales are double handled before being shipped to market.

The shunting of pulp bales and the transferring of pulp bales to the warehouse is done using semi-trailer trucks. This Project will reduce the handling of pulp produced at the Mill. As a result, there will be a reduction in GHG emissions from the operations. Table 4 summarizes the reduction in annual GHG emissions, which are anticipated to be 36.32 tonnes CO_{2eq}.

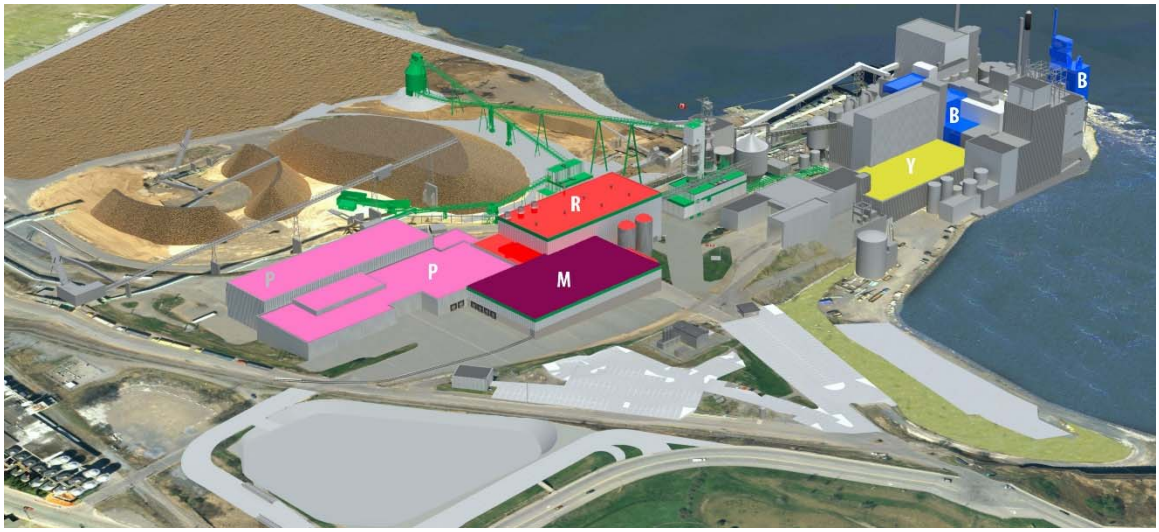


Figure 15. Three-dimensional model looking northwest of the Reversing Falls Mill in Saint John, New Brunswick. Shown in yellow is the location of the three existing pulp dryers. Pulp is currently shunted from the three existing pulp dryers (building shown with a yellow roof) to the Tissue Mill (building shown with a pink roof). Once the Phase III upgrades are complete (components shown in red) the pulp will be stored in the warehouse (building shown with a magenta roof) that connects the new pulp dryer to the Tissue Mill. NOTES: B = Blue (Phase I Mill Upgrades), M = Magenta, P = Pink, R = Red, and Y = Yellow.

Table 4. Estimated annual greenhouse gas reductions from reducing pulp handling (*i.e.*, shunting between buildings and transferring to local warehouses) at the Reversing Falls Mill in Saint John, New Brunswick.

Description	Number of Trips Per Year	Weight (MT)	Distance Travelled (km)	Total Distance Travelled (km · yr^{-1})	GHG Emissions (t CO_{2eq})
SHUNTING PULP FROM BALING LINE TO TISSUE MILL					
Trucks loaded with pulp bales	2 840	32	0.5	1 420	5.18
Tucks empty (return trip)	2 840	7	0.5	1 420	1.13
TRANSFERRING PULP FROM BALING LINE TO EAST- SAINT JOHN WAREHOUSES					
Trucks loaded with pulp bales	1 350	32	5	6 750	24.62
Trucks empty (return trip)	1 350	7	5	6 750	5.39
TOTAL					36.32

NOTES:
It is assumed that a semi-transport truck weighs 7 MT empty
An emission factor of 114 $CO_{2eq} \cdot t^{-1} \cdot km^{-1}$ was assumed

2.6.4 Ancillary Equipment

2.6.4.1 Power

Power for the Mill is purchased through NB Power. It is supplied via an NB Power transmission line that connect with the Mill. Existing power distribution to the Mill is suitable for supplying the new pulp dryer.

2.6.4.2 Lighting

For employee safety, new exterior lighting will be installed on the exterior of the buildings. The light fixtures will be installed every 9 m to 12 m along the exterior approximately 4.6 m above grade.

The design and selection of exterior lighting for this Project balances employee safety criteria with requirements to minimize the effect on the environment and neighbours. Awareness of light pollution (*i.e.*, sky glow), light trespass (*i.e.*, spill light), and veiling luminance (*i.e.*, glare) are all being considered in the lighting design. The lighting design will be such that light trespass will be minimized. As a result, occupants of neighbouring spaces will be minimally affected because of the lighting system's ability to contain light within its intended area. To minimize light trespass, luminaires will be tilted or aimed away from neighbouring spaces. Luminaries will also be selected to minimize glare and up-lighting, which can affect avians.

2.6.4.3 Water Supply

For all water supplies, final flows and sizes are subject to completion of detailed design engineering.

2.6.4.3.1 Raw Water

Raw water will be supplied to the tank storage building and the Machine Hall via a 25 cm pipe. The design flow rate to the buildings will be about 4 550 $L \cdot min^{-1}$.

2.6.4.3.2 Seal Water

Seal water will be supplied to the tank storage building and the Machine Hall from the existing Mill via a 7.6 cm diameter line. The design flow rate for seal water will be about 21 $L \cdot min^{-1}$.

2.6.4.3.3 Hot Water

Hot water will be supplied to the tank storage building and the Machine Hall from the Tissue Mill. The design flow rate will be about 6 810 $L \cdot min^{-1}$, which will be accommodated using a 31 cm diameter line.

2.6.4.3.4 Cooling Water

Cooling water for the various processes at the Mill is sourced from the Spruce Lake and Loch Lomond reservoirs. That water source will be the same for this Project. There will be no change in the flow of water from the municipal system to the Mill as a result of this Project.

2.6.4.4 White Water Collection

All of the white water (*i.e.*, approximately 15 235$L \cdot min^{-1}$ with 0.03 % solids content) will be collected and pass through a pressure screen. About 12 950 $L \cdot min^{-1}$ of white water will be sent from the Machine Hall to the Mill. Of that white water, about 35 % of it (*i.e.*,

4 550 L · min^{-1}) will be used in the Mill's bleach plant. The remainder of the white water will be sent to the Mill's bleach plant foam tank, which goes to the Mill's existing clean sewer.

2.6.4.5 Fire Prevention

New fire prevention equipment will be constructed in accordance with the National Fire Code and the National Fire Protection Association requirements. Automatic sprinkler systems will be included throughout the chip handling areas to provide the necessary level of fire protection. Fire protection system details for the Project are provided in Table 5.

Table 5. Sprinkler details for the fire prevention equipment proposed for the pulp dryer modernization project at the Reversing Falls Mill in Saint John, New Brunswick.

Area	Type	Sprinkler Details				
		Density (L · min^{-1} · m^{-2})	Surface Application (m^2)	Coverage per Sprinkler (m^2)	Hose Allowance (L · min^{-1})	Temperature Rating (°C)
PULP DRYER BUILDING – ELEVATION 16.8 M						
Process Area	Wet	8.1	4 000	12.1	1 890	140
Vacuum Pump Room	Wet	8.1	220	12.1	946	74
Hydraulic Room	Wet	8.1	60	9.3	1 890	140
Chiller Room	Wet	8.1	175	12.1	946	74
Maintenance Shop	Wet	8.1	280	12.1	946	74
Dryer	Steam	See Note 1	N/A	N/A	N/A	N/A
PULP DRYER BUILDING ROOF						
Process Area	Wet	8.1	4 580	12.1	1 890	140
PULP DRYER BUILDING MEZZANINES						
Electric cable trays (stacked 3 or more)	Wet	8.1	3 m spacing	9.3	946	140
Offices – Elev. 22.3 m	Wet	4.1	350	12.1	946	74
Laboratory / Lunch Room Elev.26.8 m	Wet	4.1	320	12.1	946	74
Control Room Elev. 32.9 m	Wet	4.1	350	12.1	946	74
Mezz. Elev. 22.3 m	Wet	8.1	190	12.1	1 890	140
Cable Room North	Wet	10.2	375	9.3	1 890	140
Cable Room South	Wet	10.2	190	9.3	1 890	140
HVAC Rm Elev. 26.8 m	Wet	8.1	80	12.1	946	74
Under Mezz Elev. 33.8 m - North	Wet	8.1	610	12.1	1 890	140
Under Mezz. Elev. 33.8 m - South	Wet	8.1	120	12.1	1 890	140
Under Mezz Elev. 36.6 m - North	Wet	8.1	400	12.1	1 890	140
WAREHOUSE						
Pulp Storage & Bale Lines	Wet	8.1	6 800	9.3	946	140
HVAC Rm. Elev. 30.5 m	Wet	8.1	580	12.1	946	74
Under Mezz. Elev. 30.5 m	Wet	8.1	330	12.1	1 890	140

NOTES:
1) Dryer steam suppression system sized for 36 000 kg · hr^{-1}

2.6.5 Design Standards

The Project will be designed, constructed, operated, maintained, and abandoned using accepted standards and methods that are in accordance to the applicable *Acts*, permits, authorizations, regulations, and guidelines. Those standards and methods will reflect current legislation (*i.e.*, abandonment will reflect those standards and methods at some future date).

All materials, equipment, and installation labour supplied for this Project will be in accordance with all of the requirements governing New Brunswick jurisdictional codes. In particular, all work performed will conform the most recent codes of the organizations listed in Table 6. All contractors working on the Project will possess the necessary permits, certifications, and / or licenses to undertake Project work. The primary codes of reference that contractors will focus on are also listed in Table 6.

Table 6. Jurisdictional organizations and contractor's codes of reference for the pulp dryer modernization project at the Reversing Falls Mill in Saint John, New Brunswick.

Acronym	Description	Project Applicable Component(s)
PROJECT JURISDICTIONAL ORGANIZATIONS		
ANSI	American National Standards Institute	
ASME	American Society of Mechanical Engineers	
ASTM	American Society for Testing and Materials	
CGSB	Canadian Government Standards Board	
CSA	Canadian Standards Association	
FM	Factory Mutual	
MSS	Manufacturers Standardization Society	
TEMA	Tubular Exchange Manufacturers' Association	
TIAC	Thermal Insulation Association of Canada	
ULC	Underwriter Laboratory of Canada	
*PROJECT CONTRACTOR'S CODES OF REFERENCE**		
ABMA	American Bearing Manufacturers' Association	Bearings
AGMA	American Gear Manufacturers' Association	Speed reducers
ANSI	American National Standards Institute	Piping and electrical equipment
API	American Petroleum Institute	Tanks
ASHRAE	American Society of Heating, Refrigeration, and Air Conditioning Engineers	Heating, ventilation, and air conditioning equipment
ASME	American Society of Mechanical Engineers	Boilers and pressure vessels
ASTM	American Society for Testing Materials	Materials specifications
AWWA	American Water Works Association	Underground piping and potable water
CEC	Canadian Electrical Code	All electrical equipment
CEMA	Conveyor Equipment Manufacturers' Association	Conveyors
CSA	Canadian Standards Association	Electrical equipment, concrete, and steel structures
CWB	Canadian Welding Bureau	Welding
EEMAC	Electrical and Electronic Manufacturers' Association of Canada	Electrical equipment
ICEA	Insulated Cable Engineers Association	Electrical cables
IEC	International Electric Commission	Electric motors and electric equipment
IEEE	Institute of Electrical and Electronic Engineers	Electrical equipment
ISA	Instrument Society of America	Instrumentation
NBC	National Building Code of Canada (2010)	Buildings and structures
NEMA	National Electrical Manufacturers' Association	Electrical enclosures

Acronym	Description	Project Applicable Component(s)
NFPA	National Fire Protection Association	Fire protection
OSHA	Occupational Safety and Health Administration	Safety regulations for NB
SCAN	Scandinavian Pulp, Paper, and Board Testing Committee	
SSPC	Structural Steel Painting Council	Painting
TAPPI	Technical Association of the Pulp and Paper Industry	Equipment
TEMA	Tubular Exchange Manufacturers' Association	Tubular exchangers
TIMA	Thermal Insulation Manufacturing Association	Insulation

NOTES:
*regarding Country of Origin, codes and standards are to be applicable to the manufacture of equipment / materials

2.7 PROJECT STAGES

The proposed Project will proceed in several Stages. Environmental permitting, monitoring, and compliance are a necessary component for all Stages of the proposed Undertaking. Each of the Stages is described below.

2.7.1 Stage I - Project Environmental Permitting, Monitoring, and Compliance

IPP is committed to environmental excellence. The Mill operates under an Environmental Management System (EMS), which is registered to the ISO 14001 standard. As part of the EMS, and in order to meet Provincial and Federal Regulations, IPP has established, implemented, and maintains an operational Emergency Response Plan and Environmental Contingency Plan (ERP&ECP) at the Mill. The ERP&ECP identify how personnel are required to respond to potential emergency situations and potential incidents promptly and to prevent or mitigate any associated adverse environmental impacts. Specific procedures within the ERP&ECP include, but are not limited to:

- environmental incident procedures;
- spill response;
- environmental incident reporting guidelines; and
- contingency procedures related to site specific tanks.

All employees and contractors working at the Mill are required to participate in a safety and environmental orientation program. IPP issues all participants of that program an environmental incident response procedure card that outlines the 3Cs that must be followed at the Mill in the event of an incident (*i.e.*, contain, contact, and clean-up). Project personnel will also be required to adhere to the Project-specific Environmental Protection Plan (EPP) that will be developed prior to completing any on-site construction works related to the Project.

Standard operating procedures, basic care procedures and contingency procedures will be developed for the new pulp drying process. Those procedures will be incorporated into IPP's existing EMS. On a go-forward basis, IPP will ensure all Project personnel implement, comply with, and follow those new procedures included in the EMS.

2.7.1.1 Existing Approvals

The Mill currently has Approvals To Operate (ATOs) as per the Air Quality Regulation **[97-133]** of the New Brunswick *Clean Air Act* (*i.e.*, ATO I-7850) and Water Quality Regulation

[82-126] of the New Brunswick *Clean Environment Act* (*i.e.*, ATO I-8660). Copies of those ATOs are included in Appendix II. Both ATOs are for reference production rates from the Mill up to 1 000 ADMT. Environmental monitoring at the Mill will continue to occur on a routine and a long-term basis as set out in the existing ATOs. Compliance will be ensured through the regular reporting, as outlined in the ATOs, to the regulatory authority.

2.7.2 Stage II - Project Construction

The Project will be confined to the boundaries of the existing active Mill site. Project construction will only occur after receiving approval from the NBDELG and any other applicable regulatory authorities. An approximate quantity summary of the main Project construction materials is provided in Table 7. Although not an exhaustive list, the heavy equipment that may be used during Project construction is summarized in Table 8. The various aspects of Project construction are described in the sections that follow.

Table 7. Summary of the main construction materials proposed for the pulp dryer modernization project at the Reversing Falls Mill in Saint John, New Brunswick.

Component	Approximate Quantity
Backfill* - granular material	18 500 m^3
Concrete (cast in place)	63 000 m^3
Structural steel	1 800 t
Siding	6 700 m^2
Roofing	6 000 m^2
Piping (above and below ground)	6 100 m
Electrical cable tray	2 500 m
Electrical cable	87 500 m

NOTES:
*Fill materials will come from Gulf Operators' Bald Mountain site, which operates under an NBDELG issued Approval To Operate (*i.e.*, I-7934)

Table 8. Typical list of heavy equipment anticipated for use during construction of the pulp dryer modernization project at the Reversing Falls Mill in Saint John, New Brunswick.

Equipment Use / Type	Typical Task
CONSTRUCTION TRAILER MOBILIZATION, SURVEYING, AND GENERAL LABOUR	
Semi-trailer truck	Moving trailers to site
Pick-up support truck or van	Transport of equipment and personnel
MATERIAL EXCAVATION, BACKFILLING, SPREADING AND SERVICES INSTALLATION	
Dump truck	Hauling excavated material and backfill
Semi-trailer truck and float	Floating equipment to and from the site
Compactor / roller	Fill compaction
Loader	Material movement
Bulldozer	Material movement
Tracked excavator	Material movement
STRUCTURAL FOUNDATIONS	
Carry deck (8 t to 22 t)	Movement of heavy equipment about the site
Semi-trailer truck and float	Floating equipment to and from the site
Welding truck	Base-stations for welding equipment
Forklift / loader	Movement of pre-cast members about the site and materials handling
Concrete truck	Hauling concrete to the site
Concrete pumper truck	Movement of concrete about the site
Concrete pumps and vibratory equipment	Placing and compacting of concrete
STEEL MEMBERS AND BUILDING ENVELOPES	
Semi-trailer truck and trailer	Transport of structural steel and building materials to the site
Semi-trailer truck and float	Floating equipment to and from the site
Crane (110 t to 650 t)	Movement and placement of structural steel members
Truck crane (40 t to 90 t)	Movement and placement of structural steel members
Hydraulic boom truck (10 t to 40 t)	Movement and placement of building materials
Welding truck	Base-stations for welding equipment
Self-propelled elevating work platforms	Safely positioning personnel in above-ground areas
Forklift / loader	Movement of pre-cast members about the site, materials unloading, and materials handling
PULP DRYER EQUIPMENT INSTALLATION	
Semi-trailer truck	Moving trailers and containers around the site
Container handler	Moving containers around the site
Semi-trailer truck and tilt bed trailer	Moving containers and equipment into the building
Semi-trailer truck and flatbed trailer	Moving equipment into the building
Rough terrain crane (130 t)	Installing fan and roll towers inside the building
Crawler crane (100 t)	Installing fan and roll towers inside the building
Transporter	Moving tower units into lifting position
Crane (50 t)	Setting fan tower on transporter
Rough terrain crane (150 t)	Setting pulper vats into place
Hydraulic crane (500 t)	Lifting utility rack into place
Warehouse forklift	Movement and storage of equipment in the warehouse
Self-propelled elevating work platforms	Safely positioning personnel in above-ground areas
Telehandler (2 250 kg capacity)	Safely positioning personnel in above-ground areas
GENERAL CONSTRUCTION EQUIPMENT	
Compressors	Operating pneumatic tools
Pumps	Pumping water from excavations
Generators	Supplying localized power
Heaters	Heating work areas
Lighting plants	Lighting work areas

2.7.2.1 Temporary Infrastructure and Supporting Facilities

Prior to Project construction, several contractor trailers will be brought on to the Mill site. Those trailers will serve as construction offices throughout Project development. Temporary services will be connected to those facilities. Locations proposed for contractor trailers are shown in Figure 16.

There are several surface parking lots on the Mill property. As shown in Figure 16, IPP has designated one parking lot area for this Project (*i.e.*, the former Simms Factory site). Contractors bringing their own vehicle to the site will be required to park their vehicle in that designated parking lot.

Materials being delivered to the Project site can enter using one of the three designated entrances (Figure 16). Laydown required for large Project will be confined to the existing chip handling areas of the Mill site. Those areas may also be used for storage of general construction materials.

Temporary washroom facilities may be brought on-site for the duration of Project construction. Any temporary washrooms will be maintained by licensed and approved third-party contractors who will be required to regularly service the facilities.

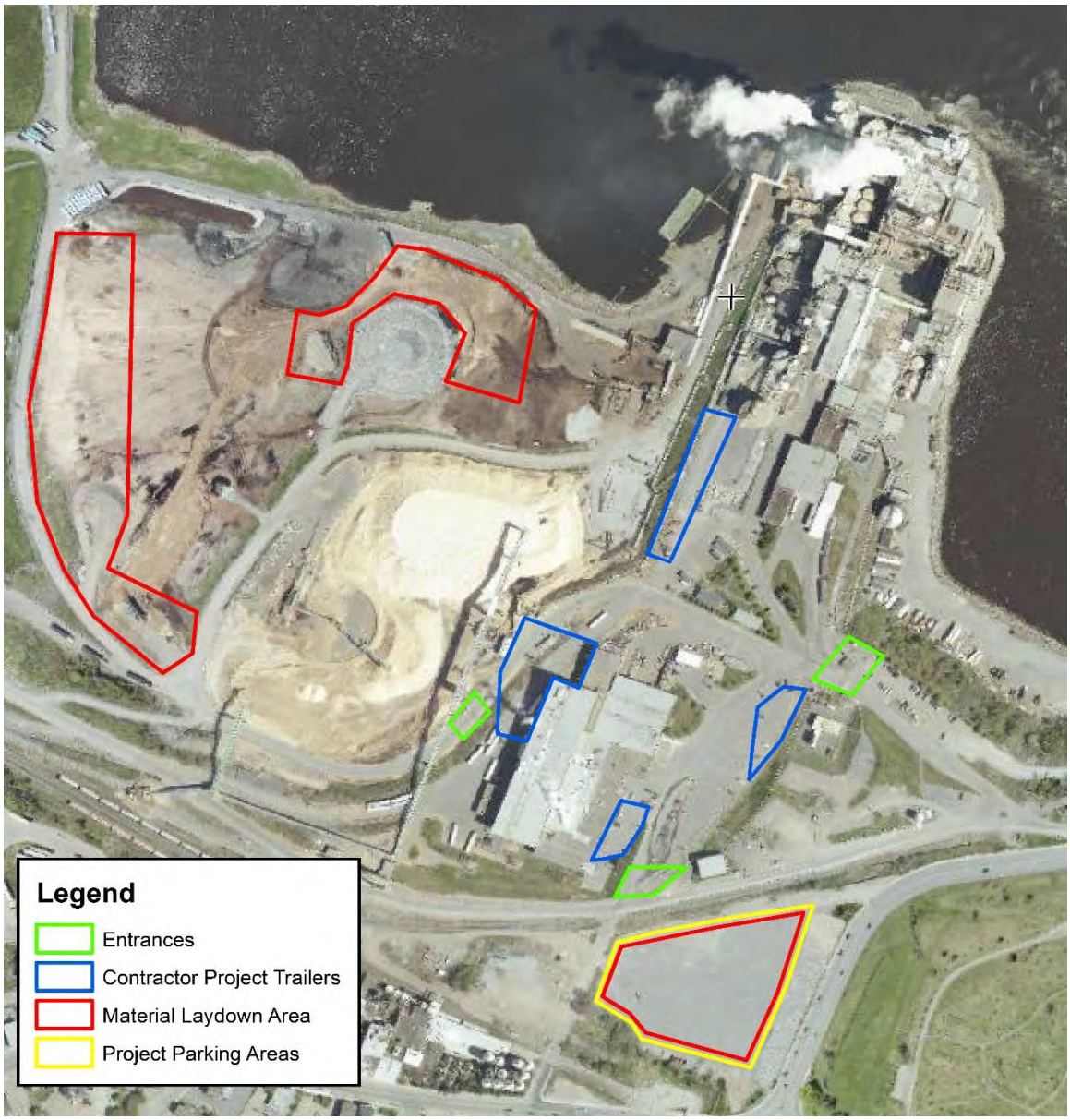


Figure 16. Aerial photograph of the Reversing Falls Mill in Saint John, New Brunswick showing the locations proposed for contractor project trailers, project parking areas, material laydown areas, and construction entrances for construction of the pulp dryer modernization project.

2.7.2.2 Services and Excavations

No green field areas are involved in this Project, which means no clearing or grubbing activities will be undertaken. Overall, minimal preparation is required for Project construction.

Site surveying was previously completed so that detailed Project engineering design could begin. Additional site surveying will be required throughout Project construction in order to precisely position equipment at the site.

Project preparation will include the excavation of building and equipment foundations to a depth below the frost line (*i.e.*, ~ 2 m below grade). It is expected that the excavation required for the pulp dryer building will be about 51 225 m^3. Excavated materials will likely include a mixture of native soils, wood chips, asphalt, and concrete. All excavated material will be reused where possible or disposed of at a registered / approved site (*e.g.*, Gulf Operators' Saint Rest facility, *etc.*).

2.7.2.3 Work Hours

Project construction is anticipated to occur over 30 months. During that period, on-site construction activities will be continuous. Loud work that has the potential to disturb neighbours will normally be done between the regular work hours of 7 AM to 7 PM Monday through Friday. Crews working outside of those regular work hours will be sensitive to neighbours and will, whenever practical, confine loud work to regular work hours. **No pile driving is currently anticipated.** Minimal requirements may be required subject to final detailed design engineering.

A reduced construction crew may be used when working on Saturdays, Sundays, and evenings. Tie-in work (*i.e.*, connecting the new units to the Mill), which requires Mill shutdowns, will be completed 24 hours · day^{-1}, seven days a week in order to limit shutdown duration.

2.7.2.4 Labour

It is estimated that approximately 450 person years of work will be generated through Project construction. A breakdown of the labour required to complete the Project construction is provided in Table 9.

Table 9. Estimated labour required to construct the pulp dryer modernization project at the Reversing Falls Mill in Saint John, New Brunswick.

Trade	Example	Hours*
Civil	Carpenters, masons, labourers, iron workers, *etc.*	175 000
Mechanical	Millwrights and boiler makers	125 000
HVAC	Sheet metal workers	35 000
Piping	Pipefitters	190 000
Electrical	Electricians	110 000
Instrumentation	Instrumentation technicians	20 000
Scaffolding	Carpenters and labourers	90 000
Yard work	Labourers, pipefitters, *etc.*	70 000
Management	Supervisors and support staff	75 000
Services	Testing, surveying, *etc.*	10 000
	TOTAL	900 000 (450 person years)†

NOTES:
*One person year equals ~ 2 000 hrs
†Not included in this total are the various company and external management, engineering, and staff responsibilities

2.7.2.5 Site Access

Access to the Mill for routine deliveries and shipping (*e.g.*, chemicals, wood chips, Kraft pulp, *etc.*) by road and rail will not be affected by Project construction. Operational and maintenance personnel for regular Mill processes will continue to access the site via the main gatehouse (Figure 16). Project construction equipment and personnel will enter and exit the site through two existing Mill access points.

2.7.2.6 Traffic

The Mill is constantly undergoing routine maintenance operations and planned upgrades. That work results in regular peaks and valleys in local area traffic. The existing all-weather road networks are designed to accommodate those fluctuations. It is not anticipated that there will be any issues with off-site traffic during Project construction.

During peak Project construction (*i.e.*, a 30 month period), truck traffic to and from the Mill will slightly increase as materials are delivered. Reasonable efforts will be made to ensure that increased traffic loads on local truck routes are confined to non-peak travel times (*i.e.*, not during morning or evening rush hour traffic). During the movement of over-sized and / or heavy loads, there may be a requirement to have traffic controls in place, such as flagging crews or police escorts.

2.7.2.7 Safety

Employee and contractor safety is a vital part of the culture at IPP. For example, one of IPP's goals is to provide a safe and healthy work environment for all employees, contractors, and visitors. As previously noted, all employees and contractors working at the Mill are required to take part in a safety and environmental orientation program. Participants are provided a safety and environmental booklet and environmental reporting procedure wallet card that explains the safety and environmental protocols in place at the Mill. Employees and contractors are required to adhere to the established safety practices, which include:

- lockout tagout for isolating equipment;
- confined space and special entry;
- barrier tapes; and
- Mill alarms and evacuation.

All Project personnel will be required to participate in the Mill safety and environmental orientation program in addition to any Project-specific orientation. They will also be required to use specific and appropriate safety policies. For example, contractors working inside any tanks or vessels must adhere to the confined space and special entry policy.

Safety concerns identified by Project personnel will be resolved as they arise; however, as per the New Brunswick *Occupational Health and Safety Act* (*OHSA*) the Mill operates with a Joint Occupational Health and Safety Committee (JOHSC). The JOHSC addresses safety concerns as necessary. Depending on the number of contractors on site and the duration of the Project construction stage, a contractor JOHSC may be formed to address safety concerns brought forward by contract employees. In addition to the safety practices

in place, all other safety standards and / or requirements under the *OHSA* will be followed and enforced.

2.7.2.8 Commissioning

All commissioning activities will follow a detailed schedule, which has not yet been established. Process experts from the pulp dryer vendor will be on-site to assist with the overall commissioning stage. No additional temporary infrastructure (*e.g.*, construction trailers, washroom facilities, parking, *etc.*) will be required for the commissioning process. During commissioning, any and all contaminated materials will be reclaimed.

Once the new pulp dryer is constructed and all field instrumentation, drives, mechanical checkouts, and interlocks are verified, the various pulp dryer systems will be brought online. Some of those systems include: compressed air; seal water; hot water; cooling water; and building ventilation. Also, the different pulp dryer sections (*i.e.*, headbox, former, press, dryer, cutter / layboy) will be energized and initially run in crawl speed mode with no stock involved. From there, they will be run up to operating speed, again with no stock on them. That will be done to verify that all systems are working fine both mechanically and electrically. Similarly, the baling line will initially be run with no pulp bales.

Following the mechanical and electrical verifications, a series of trials will be run in order to conduct live checkouts while the existing three pulp dryers maintain Mill production. While those dryers are running, some bleached pulp will be slowly transferred to the new pulp dryers' tank system to build inventory in the broke, blend, and machine tanks. When inventory is sufficient, pulp trials will be run to checkout. Those trials will likely comprise:

1) running a pulp sheet across the former to the pulper and back to broke storage;
2) running a pulp sheet across the former through the press to the pulper and back to broke storage;
3) running a pulp sheet through the former, press, and dryer to the pulper and back to broke storage; and
4) running a pulp sheet through the former, press, dryer, cutter / layboy to produce bales, which can be used to checkout the baling line.

Those types of checkouts will likely be run over several weeks until all the systems are checked out and any issues are resolved. This will all be done while trying to maintain full Mill production using the existing three pulp dryers. Once the checkouts are completed, the new pulp dryer will be run at a slow speed. When the new pulp dryer is being run at a slow speed, the total Mill production will be achieved by running one or two of the existing dryers. Once operating crews have been trained and are comfortable with operating the new dryer and all issues, if any, have been corrected full production will be run through the new dryer. Only after the new dryer is fully operational will the three existing dryers be fully shutdown.

During construction and commissioning, there will be no interference in getting baled pulp from the existing Mill to the Tissue Mill. Once the new pulp dryer is fully operational, the three existing pulp dryers will be redundant. Those older dryers will be shutdown and decommissioned, but will remain in place until such time in the future that it is determined that their footprints are needed for other upgrades or operations (*n.b.*, the existing dryers

are located in a completely separate part of the Mill property than that proposed for the new dryer).

If and when it is determined that the space the existing dryers occupy is required, the NBDELG and other applicable regulators, if there are any, will be contacted to identify any permitting processes required to move forward with equipment removal and any associated demolition.

2.7.3 Stage III - Project Operation and Maintenance

Once commissioned and approved, the new pulp dryer will operate continuously. Similar to other Mill operations, these processes will operate 24 hours per day, 7 days a week, and 365 days per year. The only exception to this will be during planned maintenance shutdowns. There will be no change in the current compliment of employees at the Mill as a result of this Project. Existing personnel will operate the new pulp dryer (*i.e.*, employees operating the three existing pulp dryers will be switched over to the new pulp dryer).

Planned shutdowns of the new pulp dryer will occur approximately every 90 to 100 days. Any press felt change-outs, forming fabric changes, roll changes, and any corrective maintenance tasks will be undertaken during those planned shutdowns. During those planned shutdowns, preventative maintenance tasks and equipment cleaning will also be completed to help ensure high pulp dryer reliability. More extensive inspections and overhauls, as required, will be conducted every 18 months during the main Mill shutdown.

Equipment noise silencers will be inspected and serviced every 12 months initially and then adjusted based on findings. Vacuum pumps will be inspected and serviced on a regular schedule, which will be determined based on failure mode analyses for the type of pump selected. Frequent (*i.e.*, monthly) predictive and preventative checks will be completed on the vacuum pumps and will include vibration analyses, process performance analyses, and lubrication. Vacuum pump overhauls, rebuilds, or replacement are typically not required when frequent predictive and preventative checks are undertaken; however, the vacuum pumps will be inspected in detail during the main Mill shutdown.

As with other Mill operations, best-management practices and modern environmental protection measures will be employed throughout the 50 year operational lifespan of the Project.

2.7.4 Stage IV - Project Decommissioning

The Project has a predicted lifespan of 50 years. Environmental protection measures are continually evolving and improving. Therefore, specific protection measures regarding the decommissioning / abandonment of the Project cannot adequately or appropriately be made at this time. The decommissioning / abandonment will be subject to future study for assessing the environmental impacts and how the activities can be done in an environmentally appropriate manner.

2.7.5 Stage V - Mishaps, Errors, and / or Unforeseen Events

With any Project, there is always the possibility of a mishap, errors, and / or unforeseen events. These instances may happen during this Project and the Proponent will mitigate

them by taking a systematic approach to safeguarding public and personnel health and safety by establishing a safe culture during Project implementation. The IPP Environmental Spill Response Plan will be used throughout the life of the Project. Under that plan, all spills are reported, immediately contained, and cleaned up as soon as they occur. Where required, Environmental Protection Plan procedures will be developed specifically for this Project and may include contingency measures in the event that mishap, errors, and / or unforeseen events occur.

2.8 PROJECT SCHEDULE

Project construction activities are expected to begin immediately following the granting of a successful EIA determination and issuance of all applicable construction permits. The Project Team is aiming for a construction start date in September 2017. Assuming a construction start of September 2017, the majority of Project construction activities at the Mill will be completed on or around the end of 2019 as shown in Figure 17. Depending on business conditions, the schedule presented could be shifted out by up to 12 months.

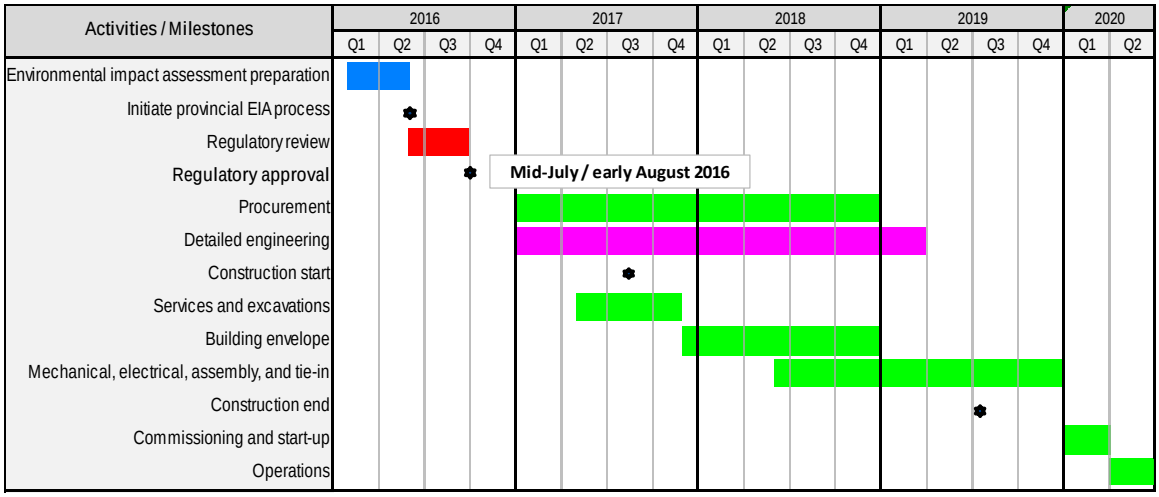


Figure 17. High-level project Gantt chart for the construction of the pulp dryer modernization project proposed for the Reversing Falls Mill in Saint John, New Brunswick.

3.0 DESCRIPTION OF THE EXISTING / BASELINE ENVIRONMENT

This section describes the existing environment, pre-Project, at and in the vicinity of the Reversing Falls Mill. The information contained in this section is considered to be baseline information for this Project and can be used for comparison to post-Project data to assess any potential impacts. Within this section, "regional" refers to the City of Saint John, which includes the rural, suburban, and urban centres around the Reversing Falls Mill. Those areas include, but are not limited to, the west side (*i.e.*, Carleton, Lancaster, and Fairville), the east side (*i.e.*, Simonds and Loch Lomond), the north end (*i.e.*, Indian Town, Millidgeville, Mount Pleasant, and Portland), and the south end (*i.e.*, central peninsula and Uptown). Where specifically defined, the term "local" refers to the Mill site proper and the area immediately surrounding the site (*i.e.*, a 500 m buffer with a particular focus on Milford).

3.1 PHYSIO-CHEMICAL ENVIRONMENT

3.1.1 Climate

Saint John exists within the Fundy Coast ecoregion of New Brunswick [*Hinds*, 2000]. According to the Köppen-Geiger climate classification, the region is characterized by a humid continental climate [*Peel et al.*, 2007]. The Bay of Fundy, which is a large heat sink that never fully freezes or warms (*i.e.*, temperatures average between 8 °C and 12 °C), influences the climate by generally providing cool summers and mild winters compared to inland locations.

Monthly climate data between 1947 and 2008 are available for the meteorological station at the Saint John Airport (YSJ). That station is part of the World Meteorological Organization (WMO) climate monitoring system (WMO ID 71609; 45.32 °N 65.89 °W, elevation 108.8 m). During that period, the mean annual temperature was 5.0 °C ± 0.73 °C (Figure 18) with a monthly daily minimum of - 7.8 °C ± 2.38 °C in January to a monthly daily maximum of 17.0 °C ± 0.84 °C in August [*Environment Canada*, 2014a]. The warmest and coolest years on record were 1953 and 1948, respectively, when the mean annual temperature was 6.9 °C and 3.8 °C. The extreme minimum mean daily temperature of - 36.7 °C was measured on 11 February 1948. In contrast, the extreme maximum mean daily temperature of 34.4 °C was measured on 22 August 1976.

Precipitation (*i.e.*, rain, drizzle, freezing drizzle, hail, snow, *etc.*) is generally well distributed throughout all months and the majority (> 80 %) falls in the form of rain. Mean annual precipitation between 1947 and 2008 (Figure 18) was 1 379 mm with a mean monthly low of 90 mm in August to a mean monthly high of 148 mm in December [*Environment Canada*, 2014a]. The driest year on record was 2001 when there was only 799 mm of precipitation. Conversely, the wettest year was 1979 when 1 975 mm of precipitation fell. The most extreme daily rainfall of 154.4 mm was measured on 13 November 1975. The greatest snowfall of 58.2 cm was recorded on 12 December 1960. Snow depth, during the seven months with snowfall, averages 8.6 cm and almost 158 days each year experience some form of precipitation.

Marine fog, which varies seasonally and is more common during the summer, averages 590 hours · year^{-1} in the region; however, visibility is normally good at > 9 km about 77 % of the time [*Environment Canada*, 2014a]. Annual sunshine is approximately 1 947 hours

ranging from 97 hours in November to 226 hours in July. The extreme amount of daily sunshine (*i.e.*, 15.2 hours) occurred on 26 June 1978.

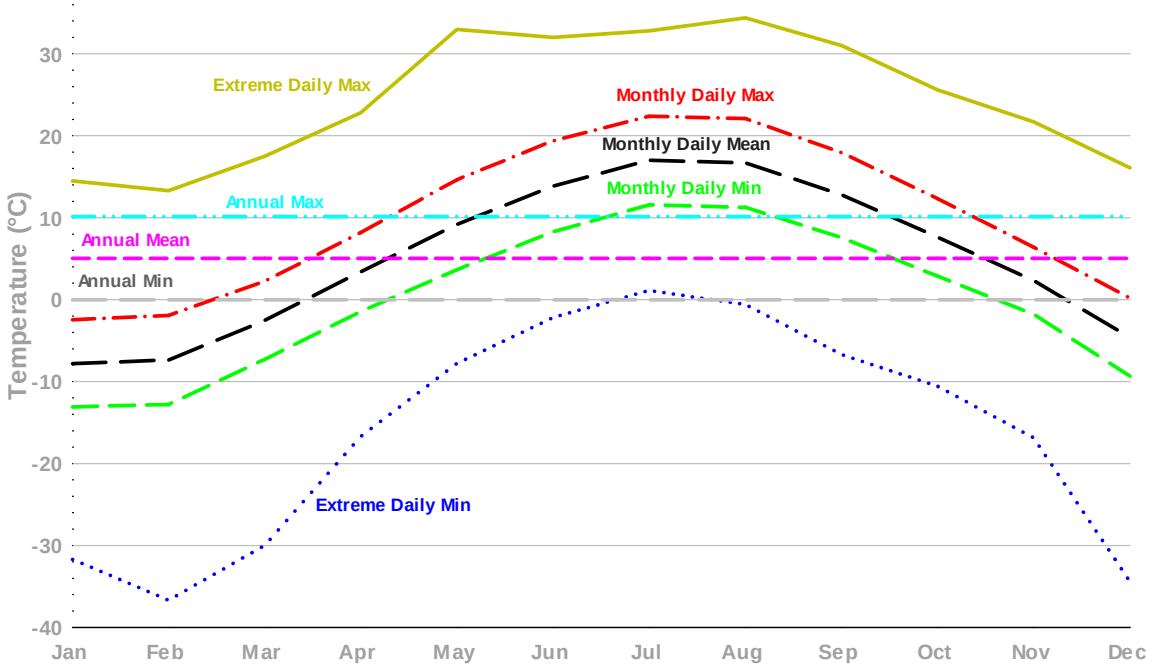


Figure 18. Compilation of mean daily temperatures measured at the YSJ meteorological station between 1947 and 2008.

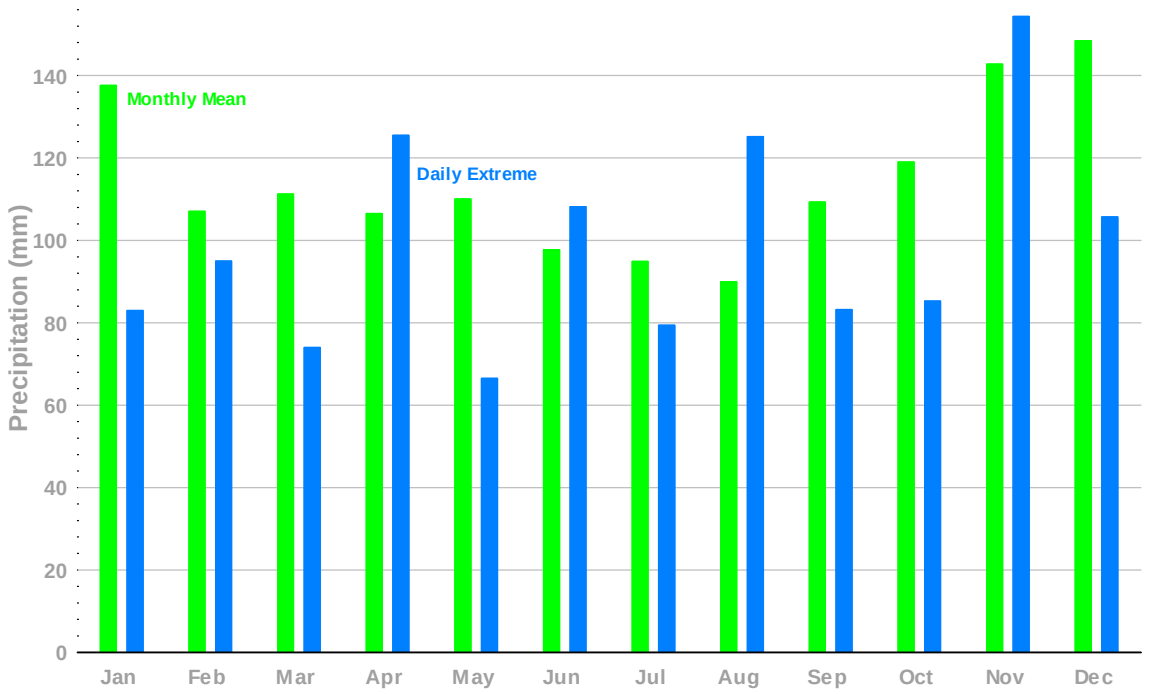


Figure 19. Compilation of mean daily precipitation measured at the YSJ meteorological station between 1947 and 2008.

Average wind speed measurements at YSJ are not available for the same period as the data previously discussed. Wind speed varies from 12.1 km · hour^{-1} in August to 18.6 km · hour^{-1} in March yielding an annual average of 16.1 km · hour^{-1} [*Environment Canada*, 2014a]. The winds predominantly blow from the south (*i.e.*, off the Bay of Fundy), but are also frequent from the northwest (*i.e.*, off the land towards the Bay of Fundy). Winds tend to be the strongest in the winter and weakest in the summer (Figure 20). The maximum hourly wind speed of 111 km · hour^{-1} was measured on 9 January 1978. The most extreme wind gusts of 146 km · hour^{-1} (south winds) were recorded on 2 February 1976 (*i.e.*, the *Groundhog Day Gale*).

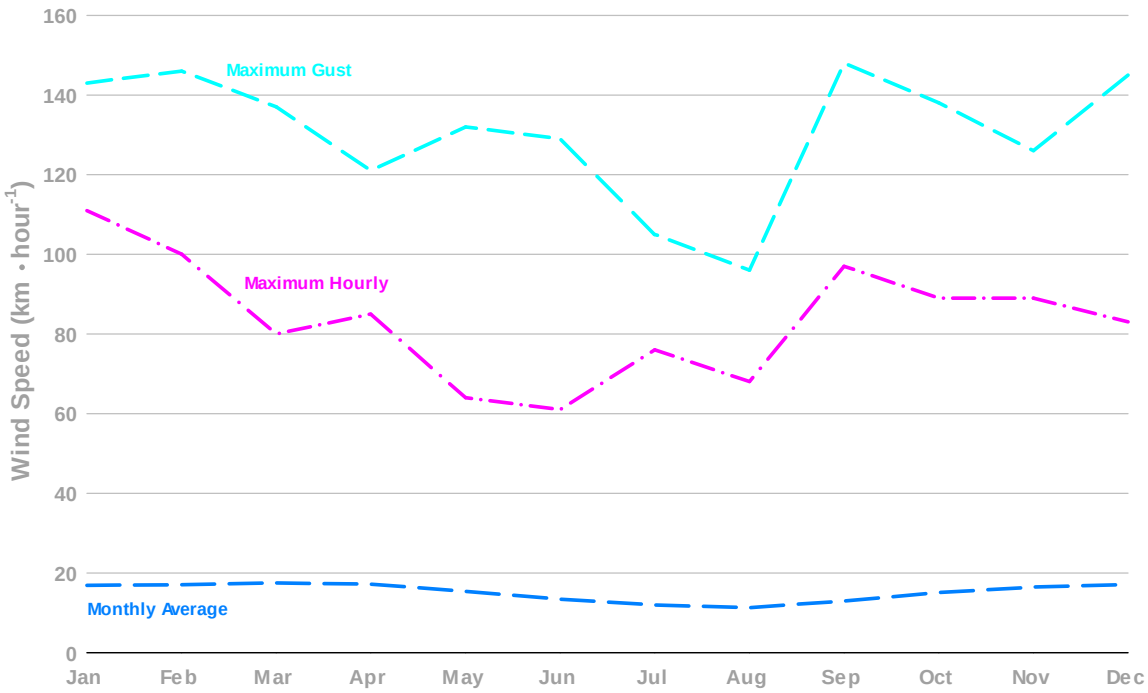


Figure 20. Compilation of wind speeds measured for the 30 year period between 1971 and 2000 at the Saint John Station A (*i.e.*, Saint John airport).

3.1.2 Air Quality

3.1.2.1 Objectives

The NBDELG recognizes several air quality objectives and standards; some are regulated while others are voluntary. Table 10 summarizes the air quality objectives as per the New Brunswick *Clean Air Act*. The air quality objective provided for ground-level ozone is the national objective because there is not a legally-binding limit in New Brunswick.

Table 10. New Brunswick ambient air quality objectives as per the New Brunswick *Clean Air Act*.

Pollutant	Averaging Period			
	1 hr	8 hr	24 hr	1 yr
CO (ppm)	30	13		
H_2S (ppb)	11		3.5	
NO_2 (ppb)	210		105	52
SO_2 (ppb)*	339 (169.5)		113 (56.5)	23 (11.5)
Total Suspended Particulates ($\mu g \cdot m^{-3}$)			120	70
O_3 (ppb)†	82		25	15

NOTES:
*Objectives are 50 % lower in Saint John, Charlotte, and Kings Counties (*i.e.*, shown in brackets)
†National ambient air quality objective (*i.e.*, acceptable level)

3.1.2.2 Monitoring

Air quality monitoring in Saint John began in the early 1970s. The air quality-monitoring program was established to assess the airshed with respect to various common industrial pollutants. In Saint John today, air quality is monitored at five NBDELG sites, four industry locations, and eight industrial monitoring sites as shown in Figure 21. Quality assured data from the NBDELG sites can be accessed from Environment Canada's National Air Pollution Surveillance (NAPS) Program website. Mean annual data for carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter ($PM_{2.5}$), and ozone (O_3) are available from the NAPS. Those data are plotted in Figure 22. Generally, there has been a continual improvement in Saint John's air quality over time.

Carbon monoxide data have only been monitored in Uptown Saint John (Figure 22). Those data (n = 27 years between 1980 and 2014) show that CO concentrations in the Saint John airshed have historically been 0.58 parts per million (ppm) ± 0.32 ppm. The mean annual CO concentrations have ranged from a maximum of 1.40 ppm (1983) to a minimum of 0.20 ppm (2007, 2013, and 2014). The overall trend for the 32 year period indicates that CO concentrations have been slowly declining. This is attributed to advances in air emissions technology and the subsequent decrease in CO emissions from industry and vehicles.

Similar to mean annual CO concentrations, mean annual concentrations of NO_2 have exhibited a downward trend in Saint John (Figure 22). The Uptown monitoring site has the largest number of datum points (n = 25). The mean annual concentration for that site between 1981 and 2014 was 10.4 ppb ± 3.81 ppb and ranged from a low of 3.0 ppb in 2009 to a high of 19.0 ppb in 1987. All mean annual concentrations are well below the 52 ppb air quality objective limit set by the NBDELG.

Sulfur dioxide concentrations have also exhibited a downward trend in Saint John. The site with the most complete set of data, the Uptown location, yielded a 33 year (*i.e.*, between 1977 and 2014) annual mean of 5.9 ppb ± 5.07 ppb (Figure 22). Mean annual concentrations at the Forest Hills site were slightly higher at 7.6 ppb ± 4.75 ppb (n = 26).

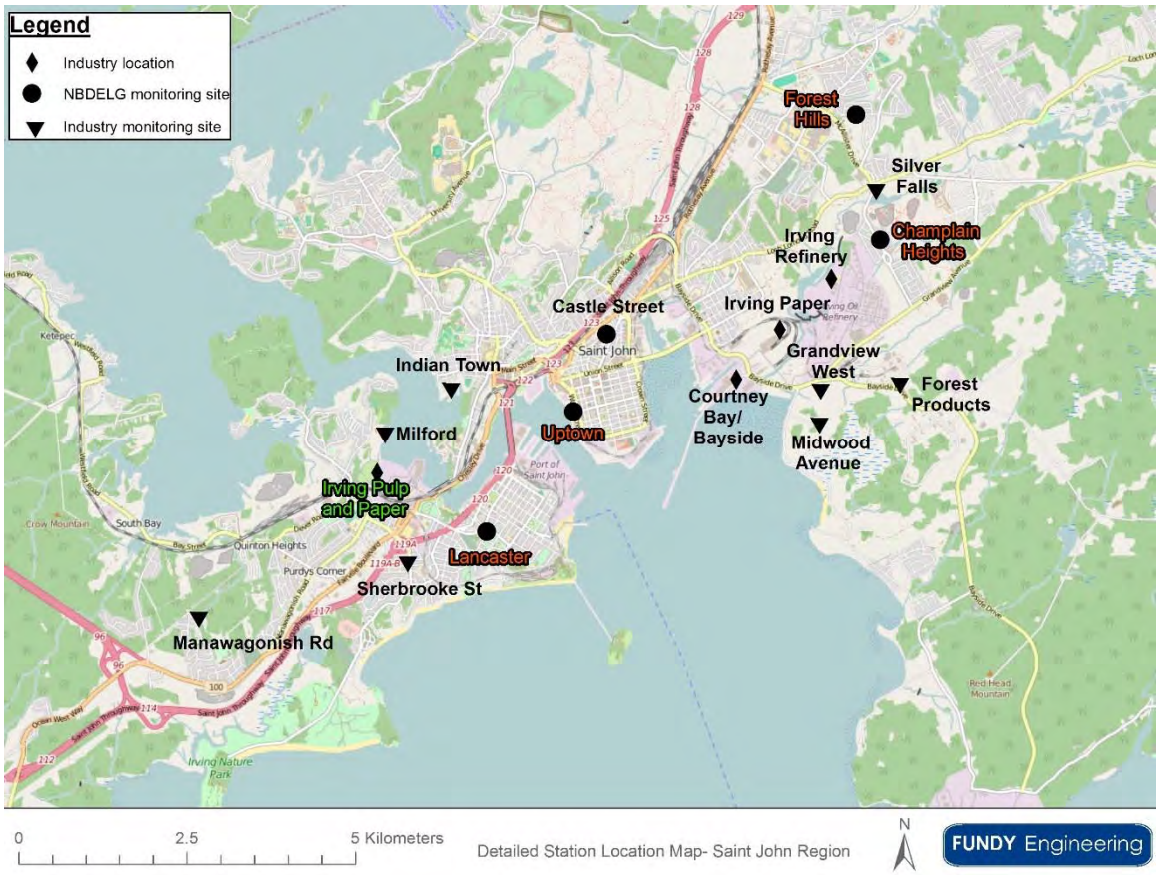


Figure 21. Map of Saint John showing the relative locations of the New Brunswick Department of the Environment and Local Government air quality-monitoring stations.

Particulate Matter in the 2.5 micron or less range (*i.e.*, $PM_{2.5}$) started being measured at the NBDELG monitoring sites in 1997 (Figure 22). The highest annual concentrations were measured in Champlain Heights with a mean of 7.2 $\mu g \cdot m^{-3} \pm 1.60 \mu g \cdot m^{-3}$ (n = 6). Mean annual concentrations at the Uptown, Lancaster, and Forest Hills site were, respectively, 6.8 $\mu g \cdot m^{-3} \pm 1.79 \mu g \cdot m^{-3}$ (n = 5), 5.9 $\mu g \cdot m^{-3} \pm 0.64 \mu g \cdot m^{-3}$ (n = 8), and 6.2 $\mu g \cdot m^{-3} \pm 1.37 \mu g \cdot m^{-3}$ (n = 14). Although the levels are fairly static, they are well below the annual air quality objective limit of 70 $\mu g \cdot m^{-3}$ set by the NBDELG.

Ozone data is available at the Uptown, Lancaster, and Forest Hills sites starting in 1980 for the Uptown and Forest Hills sites and in 1998 for the Lancaster site (Figure 22). There has been an overall upward trend at the Uptown site, but a slight downward trend at the Forest Hills and Lancaster sites; however, almost all annual values at all three sites have been above the NB air quality objective of 15 ppb. The mean annual concentration at the Uptown, Lancaster, and Forest Hills sites was calculated to be 23.0 ppb ± 3.96 ppb (n = 28), 26.8 ppb ± 1.70 ppb (n = 17), and 25.1 ppb ± 4.11 ppb (n = 34), respectively.

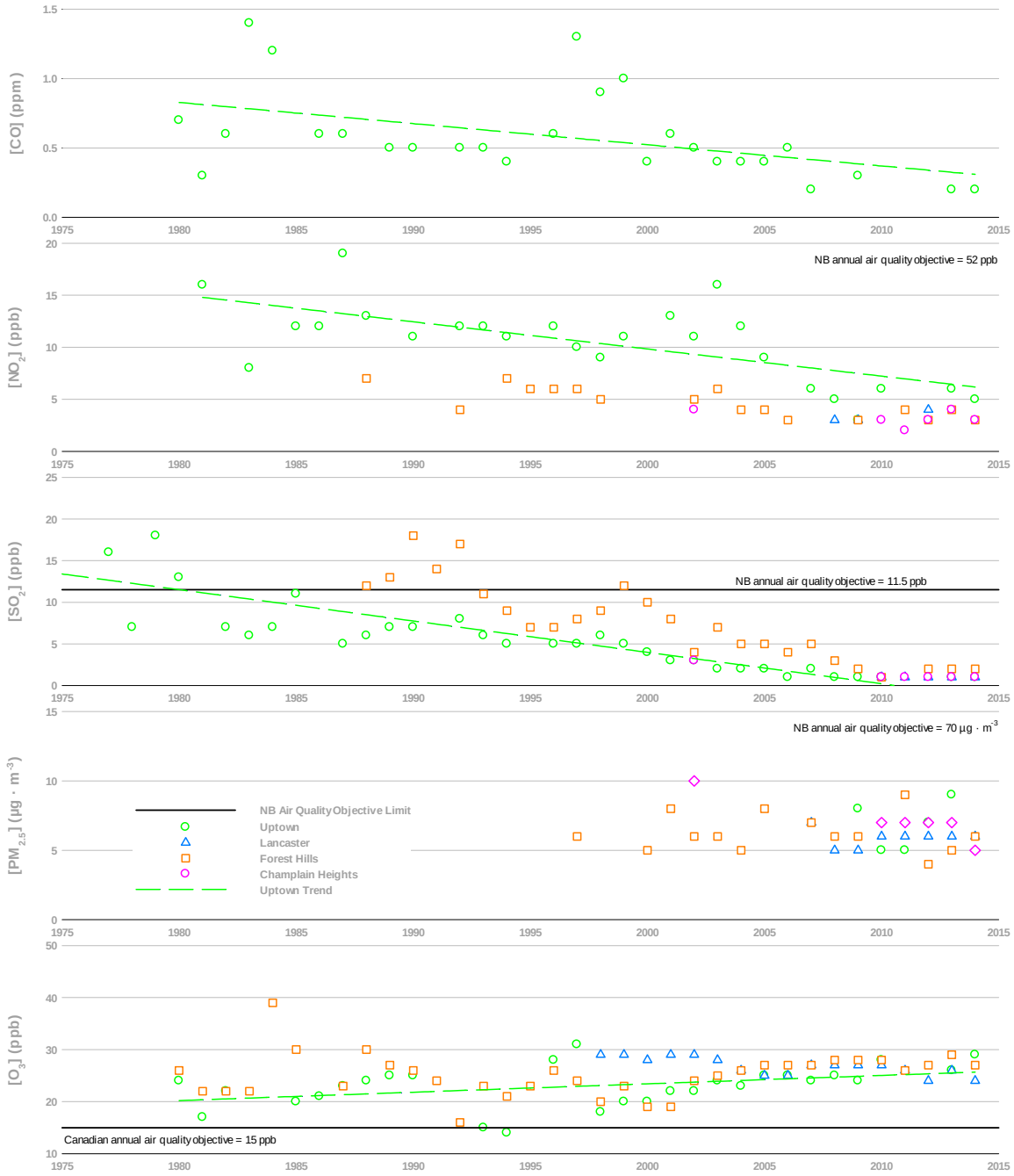


Figure 22. Mean annual air quality data as measured at NBDELG monitoring locations in Saint John, New Brunswick between 1976 and 2015.

3.1.2.3 National Pollutant Release Inventory Reporting

In addition to air quality monitoring sites, many industrial facilities are required, as per the *Canadian Environmental Protection Act, 1999*, to annually report their emissions to the National Pollutant Release Inventory (NPRI) administered by Environment Canada. The NPRI is Canada's legislated, publically accessible inventory of pollutant releases (*i.e.*, to air, water, and land), disposals, and transfers for recycling. In the Greater Saint John area, there are a dozen facilities (Figure 23) that are required, based on meeting

thresholds, to report their air emissions. Those numbers complement our understanding of the air quality for Greater Saint John. The most recent data available (*i.e.*, 2012 emissions data) for facilities in the Greater Saint John area are summarized in Table 11.

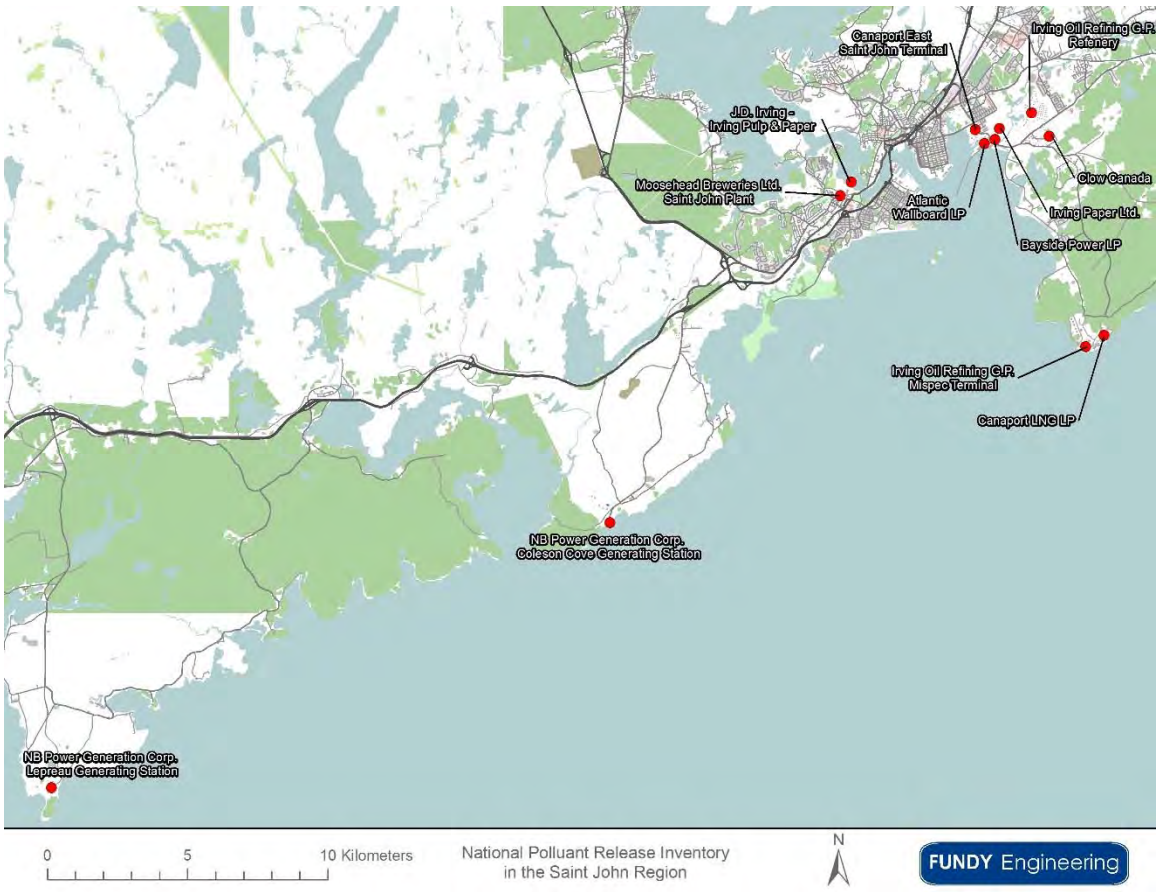


Figure 23. Facilities in the greater Saint John area that are required to annually report emissions to Environment Canada's National Pollutant Release Inventory tracking database.

Table 11. Air emissions data, circa 2012, for facilities in Greater Saint John that reported to Environment Canada's National Pollutant Release Inventory tracking database.

Reporting Facility	Air Emissions ($t \cdot yr^{-1}$)						
	CO	NO_2	PM	PM_{10}	$PM_{2.5}$	SO_2	VOC
Canaport™ LNG_{LP}		26.1					
Irving Oil Refining G.P. - Canaport Mispec Terminal							56.4
Clow Canada							17.5
Bayside Power L.P.	430.7	153.5	48.9			2.4	11
Irving Oil Refining G.P. - Refinery	1 691.8	2 858.9	352.6	283.4	214.2	1 330.3	401.1
Irving Paper Limited	63.4	102.3	5.2	11	8		35.7
Atlantic Wallboard L.P.	34.9	9.9	13.4				
Irving Oil Refining G.P. - Canaport East Saint John Terminal							155.8
JD Irving - Irving Pulp and Paper	2 085.1	935.3	55.6	40.2	27	409.1	240.5
Moosehead Breweries Ltd - Saint John Plant						26.6	
NB Power Generation Corp. - Coleson Cove Generating Station	52.8	323.3	3	3	2.9	309.2	0.2
NB Power Nuclear Corp - Point Lepreau Generating Station		22.8					

3.1.2.4 Greenhouse Gas Reporting

GreenHouse Gas (GHG) emissions (*i.e.*, carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, sulphur hexafluoride, and nitrogen trifluoride) are believed to be contributors to accelerated climate change. Greenhouse gas emissions summaries are available between 2005 and 2012 for all provinces and territories, Canada, and the World. The emissions summaries comprise total emissions from: energy activities (*i.e.*, stationary combustion sources, transportation, and fugitive sources); industrial processes (*e.g.*, mineral products, chemical industry, metal production, *etc.*); solvent and other product use; agriculture (*i.e.*, fermentation, manure management, soils management, and field burning); and waste activities (*i.e.*, wastewater handling, incineration, and landfills) [*Environment Canada*, 2014d]. The data are summarized in Table 12.

Table 12. Provincial and territorial, national, and global greenhouse gas emissions data for 2005 to 2012. Data from *Environment Canada* [2014d].

Region	Kilotonnes of Carbon Dioxide Equivalent Units (kt CO_{2eq})								Change*
	2005	2006	2007	2008	2009	2010	2011	2012	
AB	232 000	242 000	244 000	238 000	233 000	241 000	244 000	249 000	107 %
BC	62 300	61 000	62 600	62 900	59 800	59 700	60 100	60 100	96 %
MB	20 900	20 700	21 300	21 700	20 300	20 200	19 700	21 100	101 %
NB	20 100	19 800	19 800	18 600	18 300	18 300	18 500	16 400	82 %
NL	9 860	9 400	10 700	9 910	9 680	9 280	9 310	8 740	89 %
NS	23 100	20 900	23 300	20 800	20 200	19 900	20 600	19 000	82 %
NT	1 630	1 830	2 130	1 890	1 220	1 340	1 410	1 460	90 %
NU	344	417	540	549	433	422	229	210	61 %
ON	207 000	196 000	200 000	192 000	168 000	175 000	171 000	167 000	81 %
PE	2 150	2 120	2 070	1 990	1 980	2 020	2 070	1 940	90 %
QC	85 600	84 800	86 200	84 600	83 600	79 200	80 600	78 300	91 %
SK	71 100	69 400	71 500	73 600	73 100	73 100	72 700	74 800	105 %
YK	457	507	406	394	345	341	383	370	81 %
Canada	736 000	728 000	749 000	731 000	689 000	699 000	701 000	699 000	95 %
NB†	2.73 %	2.72 %	2.64 %	2.54 %	2.66 %	2.62 %	2.64 %	2.35 %	
World	38 696 545	39 728 428	40 851 919	41 221 150	40 956 547	42 669 718	43 816 734		113 %
Canada‡	1.90 %	1.83 %	1.83 %	1.77 %	1.68 %	1.64 %	1.60 %		

NOTES:
*Percentage change between 2005 emissions and 2012 emissions
†New Brunswick's emissions contribution to Canada's emissions
‡Canada's emissions contribution to the World's emissions

Since 2005, there has been an upward trend in GHG emissions globally (Table 12 and Figure 24). This is largely due to the increase in emissions from developing countries. Comparatively, Canada emissions have exhibited a general downward trend and is due in large part to increased awareness and the implementation of newer technologies to reduce GHG emission. All provinces, with the exception of Alberta, Manitoba, and Saskatchewan, large fossil fuel extracting provinces, have shown a decrease in GHG emissions. Between 2005 and 2012, New Brunswick's GHG emissions decreased by about 18 % while Canada's overall emissions have decreased by about 5 %.

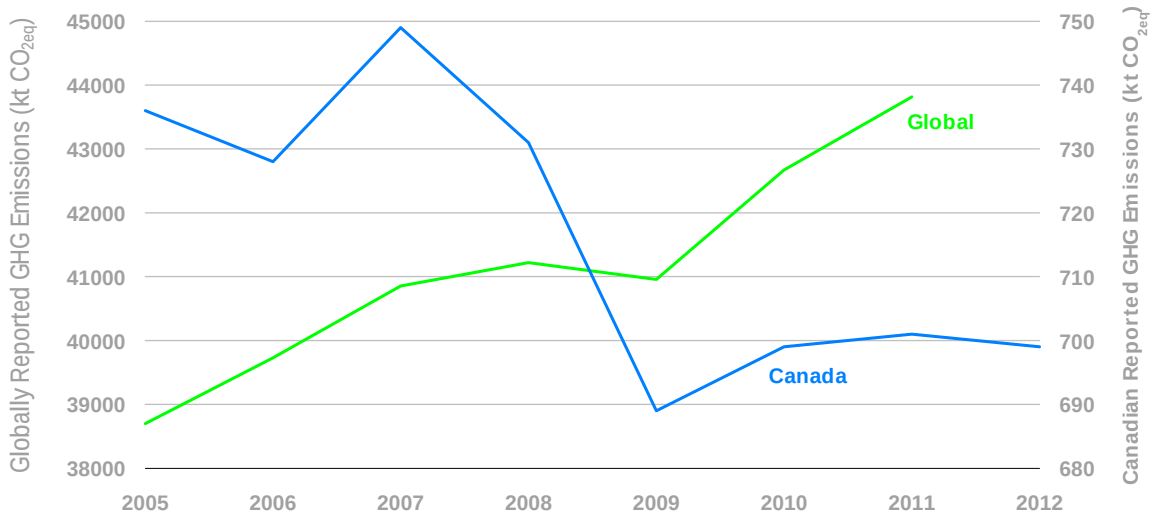


Figure 24. Annually reported greenhouse gas emissions, in kilotonnes (kt) of carbon dioxide equivalent units (CO_{2eq}), for the world and Canada.

In order to assess Canada's overall environmental performance and contribution to GHG emissions, the Canadian Government announced the introduction of the Greenhouse Gas Emissions Reporting Program (GHGRP) in March 2004. Through the GHGRP, all facilities that emit the equivalent of 50 000 tonnes or more of GHGs in carbon dioxide equivalent units (CO_{2eq}) per year from stationary combustion, industrial processes, venting, flaring, fugitives, and on-site transportation, waste, and wastewater sources are required to report. Facilities falling below the threshold are not obligated to report, but they may voluntarily do so.

Since 2004, 18 facilities in New Brunswick have reported to the GHGRP. During that time, greenhouse gas emissions reporting has decreased by 43 % from about 13 million tonnes · yr^{-1} CO_{2eq} to about 7.5 million tonnes · $year^{-1}$ CO_{2eq}. Reductions have resulted from the implementation of improved technology and the phasing out of coal-fired power generating stations (*i.e.*, Grand Lake Generating Station and Dalhousie Generating Station) [*Environment Canada*, 2014c].

For the three years between 2011 and 2013, the same dozen facilities in New Brunswick reported to the GHGRP and the total CO_{2eq} emissions are plotted in Figure 25. The three largest contributors to total carbon dioxide equivalent emissions, which represent > 80 % of the reported emissions, are Bayside Power, the Belledune Generating Station, and the Refinery.

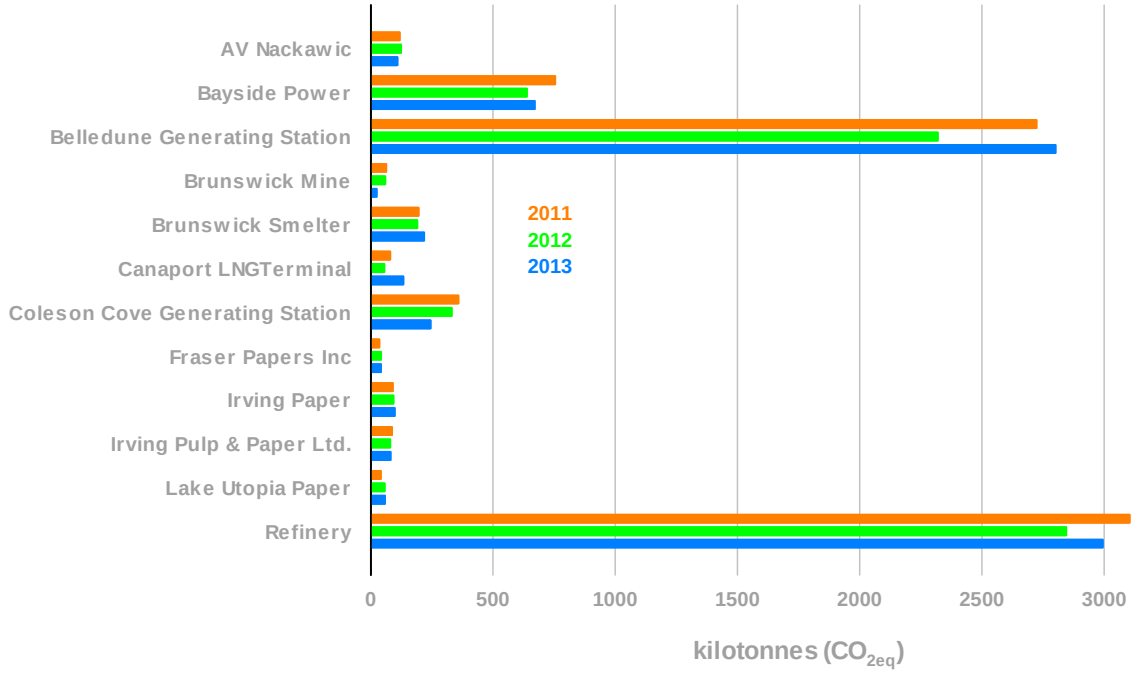


Figure 25. Reported total carbon dioxide equivalents (CO_{2eq}), in kilotonnes, for New Brunswick facilities that reported to the Greenhouse Gas Emissions Reporting Program between 2011 and 2013.

3.1.3 Sound Levels

Saint John has pockets of heavy industrialized areas (*e.g.*, the Irving Oil Refinery, the East Saint John Terminals, Saint John Harbour, the IPP Mill, *etc.*). Dense urban residential neighbourhoods are found within the older parts of the City that surround the industrialized areas (*i.e.*, people wanted to be close to their place of work). The Mill is surrounded by various types of public and private infrastructure, such as major highways and thoroughfares and railways. Collectively, these activities and uses result in ambient sound levels typical of an industrial and urban setting.

3.1.4 Topography

Saint John is located in the south-central portion of New Brunswick along the north shore of the Bay of Fundy at the mouth of the Saint John River. The Mill is located on the western bank of a narrow steep-sided gorge (*i.e.*, ~ 120 m wide with 20 m high rock banks) where the River enters Saint John Harbour. Strong tides within the Bay cause the water flow within the Saint John River to reverse direction twice a day, which gives the gorge its name of Reversing Falls / Rapids.

Regional topography is hilly. Two coastal mountain ranges, the St. Croix Highlands from the west and the Caledonia Highlands to the east, converge as they run along the Bay of Fundy (*i.e.*, the two ranges are divided by the Saint John River). Locally, Milford is fairly rugged ridge and valley topography (Figure 26). Elevations there range from ~ 0 m (*i.e.*, at the lower end of the Reversing Falls) to ~ 45 m (*i.e.*, at the Milford Memorial Community Centre). Generally, slopes range from about 2 % to 15 %, but can be considerably greater

along the banks of the Saint John River. Bedrock outcroppings and bedrock bluffs are regionally prominent.

Figure 26. Aerial photograph, circa 2014, showing the general topography at the Reversing Falls Mill at the mouth of the Saint John River in Saint John, New Brunswick.

The Mill exists in a topographically low area on the banks of the Saint John River. Elevations on the Mill site range from about 0 m to 30 m (Figure 26). The Project site exists at ground elevations around 10 m and is bordered by existing access roads to the south and west. To the east, the Project site is bordered by existing Mill buildings and the Irving Tissue plant. To the north, the Project site is bounded by the NB Southern Railway Line at an elevation of about 30 m.

3.1.5 Hydrology

The City of Saint John is located within the 55 000 km^2 Saint John River watershed. The Mill is located on the western bank of the Saint John River at Reversing Falls. Review of the watercourse and wetland mapping from the NBDELG's GeoNB online GIS tool shows that there are no mapped streams or wetlands on the Mill site (Figure 27). Ground-truthing by Fundy Engineering in October 2013 confirmed that there are no on-site watercourses or wetlands. Although much of the Saint John River valley experiences some flooding during the spring freshet, the Mill site is not prone to flooding. Site drainage is northeast towards the Saint John River.

Figure 27. Aerial photograph, circa 2014, showing mapped watercourses and wetlands in the vicinity of the Reversing Falls Mill at the mouth of the Saint John River in Saint John, New Brunswick.

3.1.6 Geology

3.1.6.1 Bedrock

The Reversing Falls Mill lies within the Caledonia Highland physiographic region of New Brunswick [*Rampton et al.*, 1984]. The Caledonia Zone is underlain by a Middle Proterozoic quartzite-carbonate sequence and a succession of Late Proterozoic volcanic and associated intrusive rocks. A Cambrian to Early Ordovician platformal sequence containing a distinctive Acado-Baltic trilobite fauna unconformably overlies Precambrian rocks. The Caledonia Zone is generally considered to represent a crustal fragment rifted from the margin of Gondwana during opening of the Early Paleozoic Iapetus Ocean.

Bedrock geology of the local area is described in Table 13 and shown in Figure 28. Underlying the majority of the Mill site are metamorphic and igneous rocks from the following four formations: Ashburn; Brookville Gneiss; Fairville Granite; and an unnamed formation of deformed granitoid rocks [*Johnson et al.*, 2005]. Rocks of the formations are typically Cambrian (*i.e.*, 505 mya to 545 mya) and Neoproterozoic in age (*i.e.*, 545 mya to 1 000 mya). Bedrock exposure in the vicinity of the Mill is predominant.

Table 13. Descriptions of the bedrock geology in the vicinity of the Reversing Falls Mill at the mouth of the Saint John River in Saint John, New Brunswick.

Code	Age	Group	Formation	Description
ZASmb	Middle Neoproterozoic	Green Head	Ashburn	White to grey and light green, generally banded and locally stromatolitic marble; black to brown pelite; massive spotted hornfels; white to grey fine-grained quartzite; minor marble-pebble conglomerate and mica schist
ZBKgn	Middle Neoproterozoic	New River Plutonic Suite	Brookville Gneiss	Dark grey to pinkish grey fine- to medium-grained, banded, and locally magmatitic paragneiss with minor calc-silicate, marble, or quartzite layers; grey medium-grained granodioritic to tonalitic orthogneiss with locally abundant biotite schlieren and amphibolite; the gneisses are locally intruded granodiorite, pegmatite, and diabase
ZFfl	Neoproterozoic / Cambrian	Golden Grove Plutonic Suite	Fairville Granite	Pink to orange coarse-grained granite gradational to granodiorite; commonly feldspar megacrystic and elongate enclaves of fine-grained dioritic rocks
Z€Tlvs	Neoproterozoic / Cambrian	Lorneville	Taylors Island	Epidotized and hematized basaltic breccia; red and minor green sandstone, siltstone, and conglomerate; minor red felsic lithic tuff and quartzite
Z€ii	Neoproterozoic / Cambrian	Golden Grove Plutonic Suite	Deformed Granitoid Rocks	Grey strongly deformed monzogranite to granodiorite with augen of feldspar and quartz
€Imi	Neoproterozoic / Cambrian	Golden Grove Plutonic Suite	Indiantown Gabbro	Green to grey medium- to coarse-grained gabbro
€OSJc	Cambrian to early Ordovician	Saint John	Ratcliffe Brook, Glen Falls, Hanford Brook, Forest Hills, Kings Square, Silver Falls, Reversing Falls	Red beds; white quartzite and black sandstone; grey sandstone and shale; grey to black shale and impure limestone; grey fine-grained sandstone and micaceous shale and siltstone; black shale and fine-grained sandstone; black carbonaceous shale
€RPii	Neoproterozoic / Cambrian	Golden Grove Plutonic Suite	Rockwood Park Granodiorite	Grey medium-grained granodiorite gradational to tonalite; abundant ellipsoidal dioritic enclaves

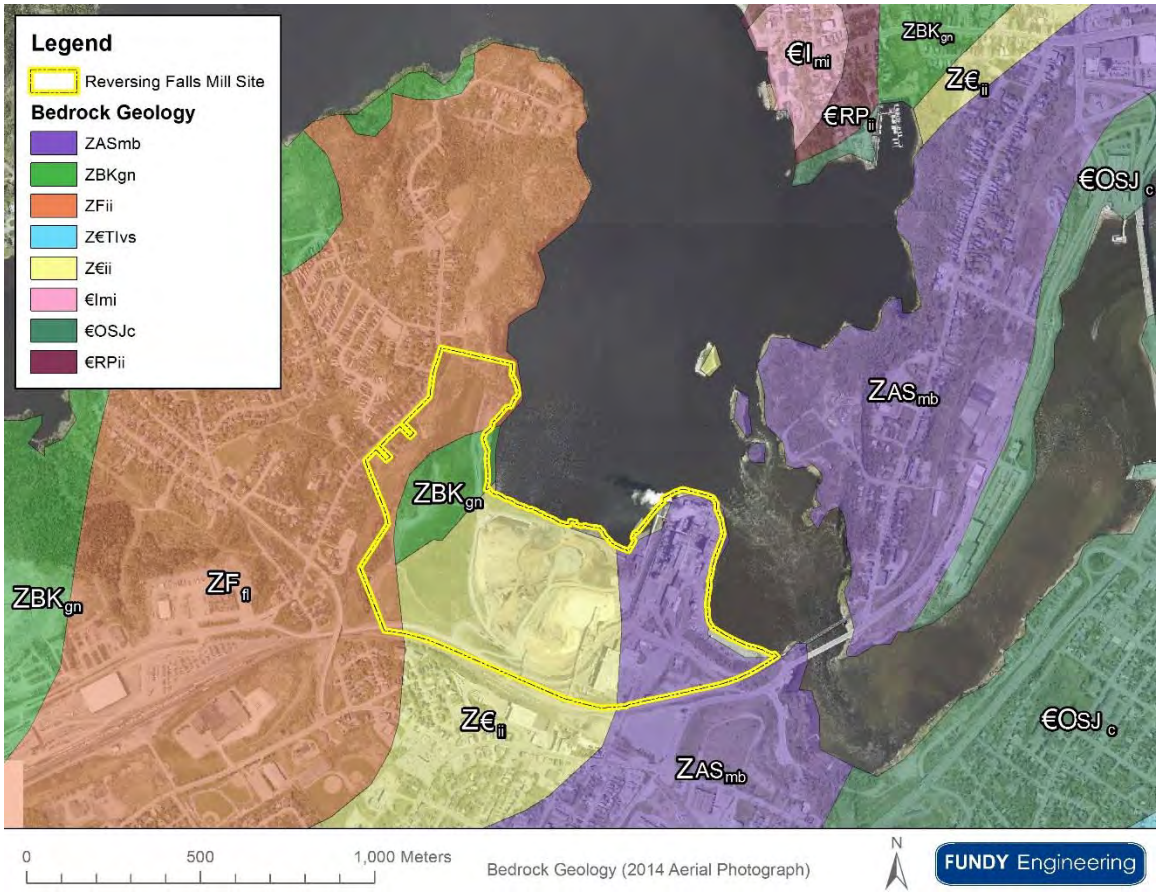


Figure 28. Bedrock geology map overlaying an aerial photograph, circa 2014, in the vicinity of the Reversing Falls Mill at the mouth of the Saint John River in Saint John, New Brunswick. See text for bedrock geology descriptions.

3.1.6.2 Surficial

Surficial geology of the local area is described in Table 14 and shown in Figure 29. The Milford area is generally overlain by Late Wisconsinan and / or early Holocene sediments [*Rampton*, 1984]. Those blankets and veneers of marine sediments are typically 0.5 m to 3 m thick and are generally comprised of sand, silt, and some gravel and clay. The materials were deposited in shallow marine water, locally deep, which submerged coastal areas and sections of many valleys during and following Late Wisconsinan deglaciation.

Table 14. Descriptions of the surficial geology in the vicinity of the Reversing Falls Mill at the mouth of the Saint John River in Saint John, New Brunswick.

Code	Age	Description
aMb3	Late Wisconsinan	Morainal blankets generally 0.5 m to 3 m thick that are comprised typically of loamy lodgement till, minor ablation till, silt, sand, gravel, and rubble; the till is mainly stony with more than 35 % of clasts pebble-sized and larger; the sediments were deposited directly by Late Wisconsinan ice or with minor reworking by water
aMv3	Late Wisconsinan	Morainal veneer is discontinuous over rock that is < 0.5 m thick and comprised typically of loamy lodgement till, minor ablation till, silt, sand, gravel, and rubble; the till is mainly stony with more than 35 % of clasts pebble-sized and larger; the sediments were deposited directly by Late Wisconsinan ice or with minor reworking by water
R	Pre-Quartenary	Rock of various lithologies and all ages; generally weathered and partially disintegrated, glacially moulded surfaces; few localities show glacially scoured and polished surfaces
Wb	Late Wisconsinan and / or Early Holocene	Marine sediments of sand, silt, gravel, and clay; deposited in shallow marine water, locally deep, which submerged coastal areas and sections of many valleys during and following Late Wisconsinan deglaciation; blankets and plains of sand, silt, some gravel and clay are generally 0.5 m to 3 m thick

Figure 29. Surficial geology map overlaying an aerial photograph, circa 2014, in the vicinity of the Reversing Falls Mill at the mouth of the Saint John River in Saint John, New Brunswick. See text for surficial geology descriptions.

3.1.7 Hydrogeology

Approximately 64 % of New Brunswick's population is reliant on groundwater for supplying domestic freshwater [*Natural Resources Canada*, 2005]. Individual water well owners in the province depend on small aquifers, typically composed of thin glacial sand and gravel deposits, to supply their potable water. Regional groundwater availability maps exist for most of Canada and are generalizations of large quantities of data collected for a region [*Natural Resources Canada*, 2005]. In Saint John, aquifers are typically able to supply a flow rate < 24 L · min^{-1} (Figure 30); however, localized groundwater availability can only be determined through on-site investigations.

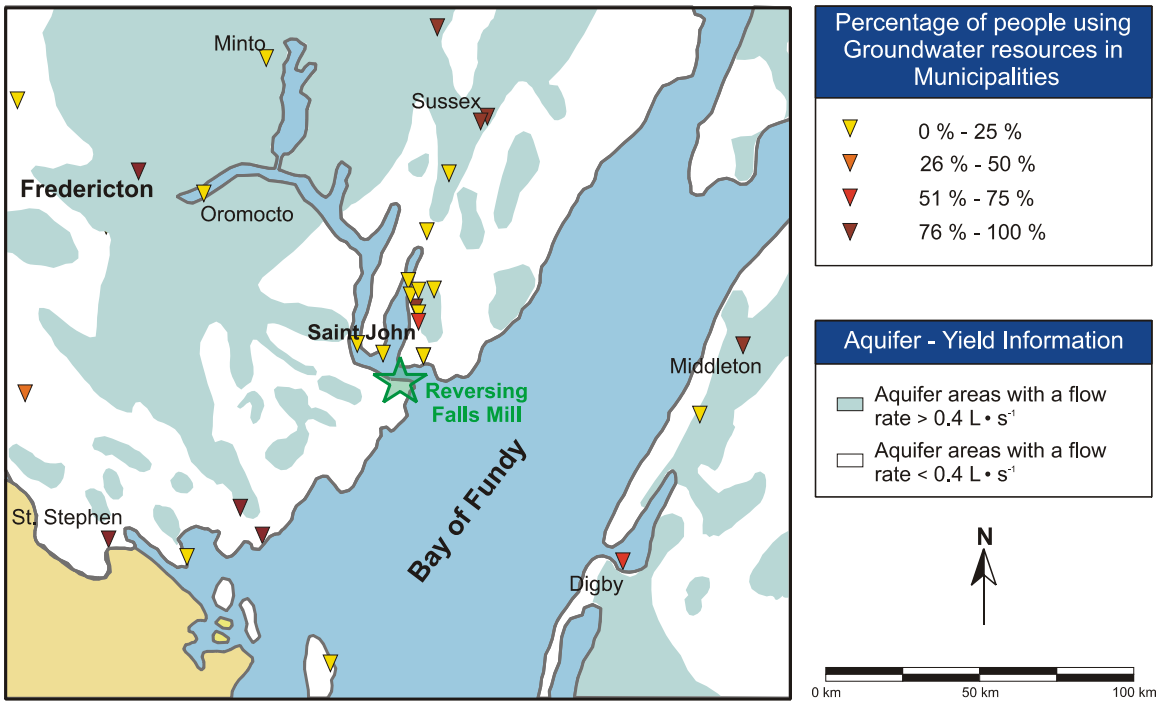


Figure 30. Groundwater availability map for Saint John, New Brunswick and the surrounding area.

Residential, commercial, and industrial properties in Milford and surrounding areas are reliant entirely on municipal water for supplying potable water and / or process water. Municipal water is derived from surface water sources; Spruce Lake and Loch Lomond on the east- and west-side of Saint John, respectively. There are no known groundwater users in Milford and the Mill obtains potable and process water from municipal services.

3.2 BIOLOGICAL ENVIRONMENT

3.2.1 Federal Species At Risk

Federally listed species at risk that exist in New Brunswick and could potentially be impacted by the Project are noted in Table 15. Those terrestrial and aquatic species identified under the federal *Species At Risk Act* (f*SARA*) and by the Committee On Status of Endangered Wildlife In Canada (COSEWIC) as being at risk in New Brunswick are listed. Listing of a species in Table 15 does not indicate that it is either present or absent

at the Project site. Presence and absence information is provided below. The order of risk level under the f*SARA* and by the COSEWIC is as follows: special concern; threatened; endangered; extirpated; and extinct.

Table 15. Terrestrial and aquatic flora and fauna listed as being species at risk under the f*SARA* and by the COSEWIC that could potentially be affected by the proposed Project at the Reversing Falls Mill in Saint John, New Brunswick.

Common Name	Scientific Name	f*SARA* Status	COSEWIC Status
Vascular Plants, Mosses, and Lichens			
Boreal felt lichen	*Eridoerma pedicellatum*	Endangered	Endangered
Vole ears lichen	*Erioderma mollissimum*	Endangered	Endangered
Prototype quillwort	*Isoetes prototypus*	Special concern	Special concern
Butternut	*Juglans cinerea*	Endangered	Endangered
Beach pinweed	*Lechea maritime*	Special concern	Special concern
Furbish's lousewort	*Pedicularis furishiae*	Endangered	Endangered
Anticosti aster	*Symphyotrichum anticostense*	Threatened	Threatened
Gulf of St. Lawrence aster	*Symphyotrichum laurentianum*	Threatened	Threatened
Bathurst aster	*Symphyotrichum subulatum*	Special concern	Special concern
Molluscs			
Dwarf wedgemussel	*Alasmidonta heterodon*	Extirpated	Extirpated
Brook floater	*Alasmidonta varicosa*	Special concern	Special concern
Yellow lampmussel	*Lampsilis cariosa*	Special concern	Special concern
Reptiles			
Snapping turtle	*Chelydra serpentina*	Special concern	Special concern
Wood turtle	*Glyptemys insculpta*	Threatened	Threatened
Birds			
Short-eared owl	*Asio flammeus*	Special concern	Special concern
Barrow's goldeneye	*Bucephala islandica*	Special concern	Special concern
Red knot *rufa* subspecies	*Calidris canutus rufa*	Endangered	Endangered
Eastern whip-poor-will	*Caprimulgus vociferus*	Threatened	Threatened
Canada warbler	*Cardellina*	Threatened	Threatened
Bicknell's thrush	*Catharus bicknelli*	Threatened	Threatened
Chimney swift	*Chaetura pelagica*	Threatened	Threatened
Piping plover *melodus* subspecies	*Charadrius melodus melodus*	Endangered	Endangered
Common nighthawk	*Chordeiles minor*	Threatened	Threatened
Olive-sided flycatcher	*Contopus cooperi*	Threatened	Threatened
Yellow rail	*Coturnicops noveboracensis*	Special concern	Special concern
Rusty blackbird	*Euphagus carolinus*	Special concern	Special concern
Peregrine falcon	*Falco peregrinus anatum / tundrius*	Special concern	Special concern
Harlequin duck	*Histrionicus histrionicus*	Special concern	Special concern
Least bittern	*Ixobrychus exilis*	Threatened	Threatened
Eskimo curlew	*Numenius borealis*	Endangered	Endangered
Roseate tern	*Sterna dougallii*	Endangered	Endangered

Common Name	Scientific Name	f*SARA* Status	COSEWIC Status
Arthropods			
Cobblestone tiger beetle	*Cicindela marginipennis*	Endangered	Endangered
Maritime ringlet	*Coenonympha nipisiquit*	Endangered	Endangered
Monarch butterfly	*Danaus plexippus*	Special concern	Special concern
Pygmy snaketail	*Ophiogomphus howei*	Special concern	Special concern
Fishes			
Shortnose sturgeon	*Acipenser brevirostrum*	Special concern	Special concern
Rainbow smelt (Lake Utopia)	*Osmerus mordax*	Threatened	Threatened
Atlantic salmon (IBOF pop.)	*Salmo salar*	Endangered	Endangered
Terrestrial Mammals			
Little brown bat	*Myotis lucifugus*	Endangered	Endangered
Northern bat	*Myotis septentrionalis*	Endangered	Endangered
Tri-colored bat	*Perimyotis subflavus*	Endangered	Endangered

The Atlantic Canada Conservation Data Centre (ACCDC) databases were queried for known observation data of federally protected species within a 5 km radius of the Project site (*i.e.*, refer to Appendix III). According to the ACCDC data, 13 species listed under the f*SARA* and by the COSEWIC have been observed (Figure 31).

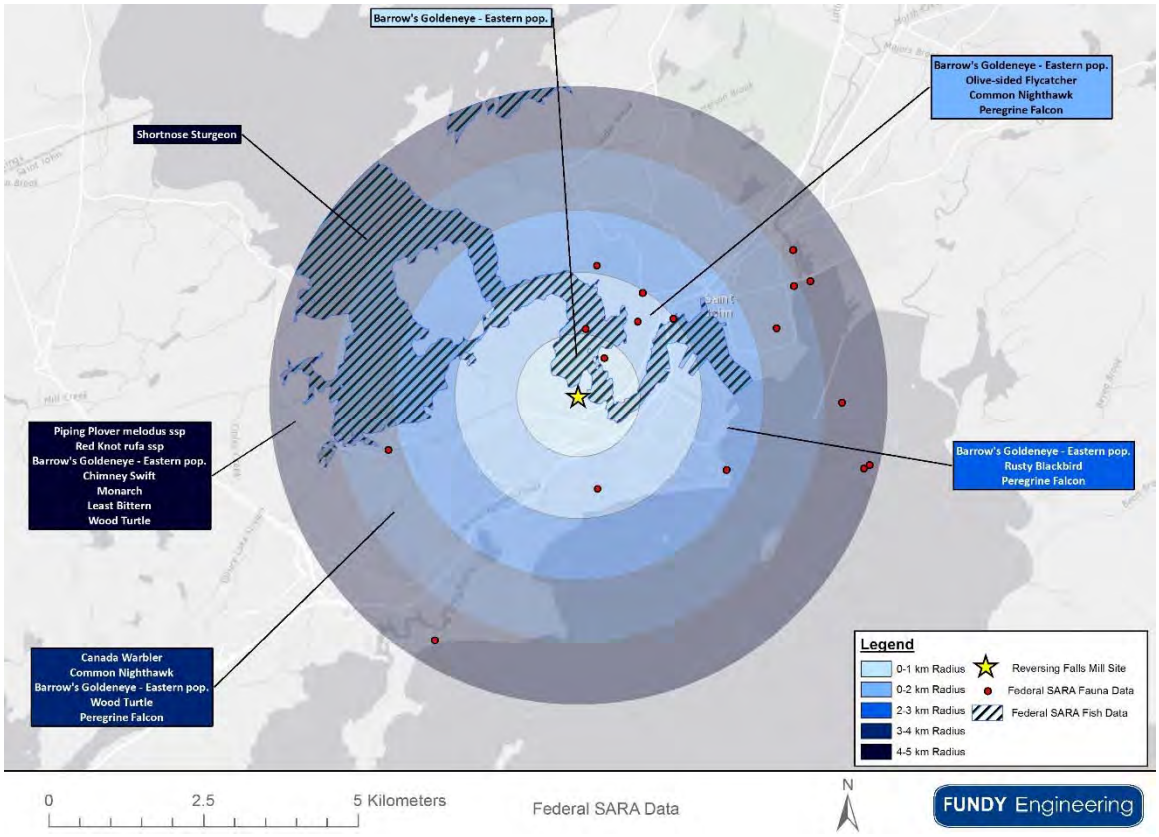


Figure 31. Map showing the recorded observations of species listed under the f*SARA* and by the COSWEIC within a 5 km radius of the Reversing Falls Mill in Saint John, New Brunswick. Data obtained from the ACCDC.

3.2.1.1 Snapshots of Federal Species At Risk Locally Present

Detailed information provided below on the protected species was obtained from the species profiles on the f*SARA* [*SARA*, 2016] and COSWEIC [*COSEWIC*, 2016] websites.

The wood turtle (Figure 32) inhabits a broad range of habitats. They prefer to be near areas of moderately flowing water (*e.g.*, streams, creeks, and rivers), and they favour riparian areas with open canopy. During the summer, the wood turtle prefers to be on the ground in forested areas. In spring and fall they prefer to be near water and they overwinter in the water. Wood turtles appear to select habitats, rather than randomly using areas. The damming of watercourses, loss and degradation of riparian habitat, road mortality, and the pet trade all threaten the wood turtle population. They are considered sensitive to pollution as evidenced by their disappearance from low-quality watercourses. Pesticides and insecticides also threaten the population. No New Brunswick population is known to exceed 100 individuals. Although evidence suggests that populations are common and stable, the wood turtle is ranked as a threatened species under the f*SARA* and by the COSEWIC (Table 15).

Barrow's Goldeneye (Figure 32) is ranked as a species of special concern under the f*SARA* and by the COSEWIC (Table 15). It is a medium-sized monogamous diving duck that breeds and winters primarily in Canada. About 400 of these birds over-winter in Atlantic Canada. They breed in tree cavities and rock crevices and their nests are usually placed within 1 km to 2 km from water and between 2 m and 15 m above the ground. During the breeding season it feeds on aquatic insects and crustaceans of inland waters. During winter, they are partial to coastal waters where they feed on molluscs and crustaceans.

The red knot *rufa* subspecies is a medium-sized shorebird (*i.e.*, 25 cm long) with a long straight bill, small head, long legs, and long tapered wings. They have an extreme migration route from the central Canadian Arctic to the southern tip of South America. One of the most important areas for these migrants is the north shore of the St. Lawrence. The primary reason for their precipitous decline is the overfishing of horseshoe crabs in Delaware Bay, which they feed upon prior to their final push into the Canadian Arctic. Migratory stopovers include vast coastal zone sand flats and mudflats. Under the f*SARA* and the COSEWIC, the red knot (Figure 32) is ranked as an endangered species (Table 15).

The Canada warbler (Figure 32) is a small (12 cm to 15 cm), brightly coloured songbird. Their numbers have plummeted in the majority of their nesting areas. Although most abundant in wet, mixed deciduous-coniferous forest with a well-developed shrub layer, it is found in a variety of forest types. It also prefers riparian shrub forests on slopes and in ravines and in old-growth forests with canopy openings and a high density of shrubs, as well as in regenerating forest stands. Because their habitat is being lost and degraded, their numbers continue to be vulnerable to decline and hence the reasoning for their threatened ranking under the f*SARA* and by the COSEWIC (Table 15).

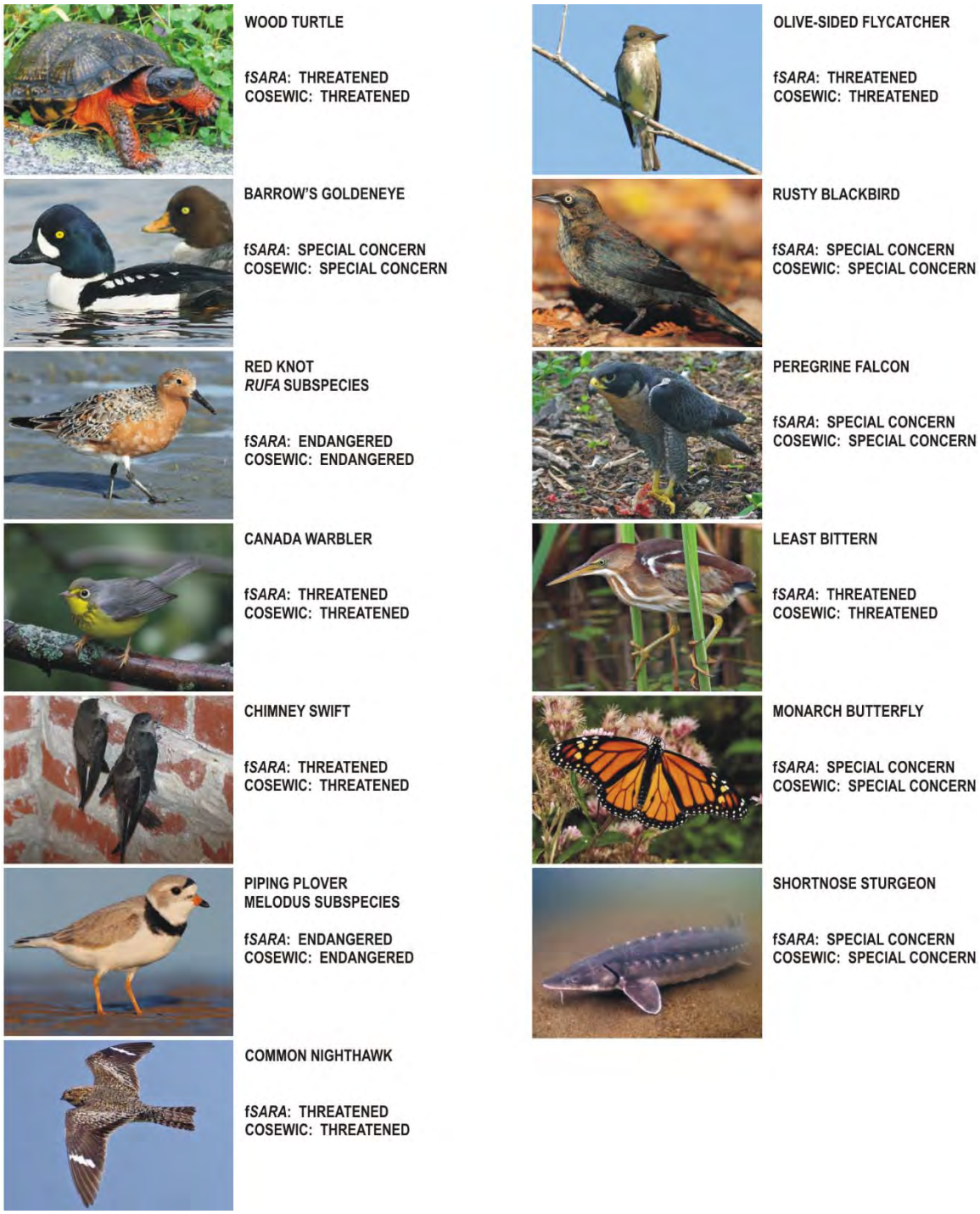


Figure 32. Photographs of species listed under the f*SARA* and by the COSEWIC that have been observed within a 5 km radius of the Reversing Falls Mill in Saint John, New Brunswick.

The chimney swift is a medium-sized (*i.e.*, 12 cm to 15 cm), sooty gray bird with very long, slender wings and very short legs. There are no subspecies of the chimney swift, but like all swifts, it is incapable of perching and can only cling vertically to surfaces (Figure 32). They build nests of twigs stuck together with salvia, in chimneys and other vertical surfaces

in dim, enclosed areas including air vents, wells, hollow trees, and caves. They forage overall urban and suburban areas, rivers, lakes, forest, and fields in search of flying insects. Although the global population of chimney swifts is relatively healthy, they have been impacted in Atlantic Canada due to severe storm events and the reduction in nesting habitat (*i.e.*, chimneys are not as prevalent as they once were). This has caused them to be listed as threatened under the f*SARA* and by the COSEWIC (Table 15).

Endangered species is the rank given to the piping plover *melodus* subspecies (Figure 32) under the f*SARA* and by the COSEWIC (Table 15). It is a small shorebird that is known to breed along the shores of New Brunswick. They nest above the normal high water mark on exposed sand or gravel beaches. Their nests are most often associated with small cobble and other small beach debris on ocean beaches, sand spits, and barrier beaches. They arrive on the breeding grounds in late April or early May. In 2001, there were 230 pair and 43 individuals in the Atlantic region.

The common nighthawk (Figure 32), a medium-sized bird with long, narrow, pointed wings and a slightly notched long tail, is ranked as a threatened species under the f*SARA* and by the COSEWIC (Table 15). While in flight, their distinguishing feature is a wide white stripe across the long feathers at the edge of their wings. They nest in a wide variety of open, vegetation-free habitats, including dunes, beaches, recently harvested forests, burnt-over areas, logged areas, rocky outcrops, rocky barrens, grasslands, pastures, peat bogs, marshes, lakeshores, and river banks. They are also known to inhabit mixed and coniferous forests. Causes of population decline are unknown, but it may be partly attributed to the decline of their main food source (*i.e.*, insects).

The olive-sided flycatcher (Figure 32) is a small (*i.e.*, 18 cm to 20 cm long), but stout songbird ranked as a threatened species under the f*SARA* and by the COSEWIC (Table 15). They breed in scattered locations throughout most coniferous and mixed forests of Canada. Considerable declines in population have occurred due to habitat loss and alteration. These birds are most often found in open areas containing tall live trees or snags for perching. Those vantage points are required to suit their foraging habits. Open areas used comprise forest clearings, forest edges located near natural openings, such as rivers and swamps, logged areas, burned forest, or open areas within old-growth forests.

The rusty blackbird (Figure 32) is a thrush-sized passerine with narrow and pointed wings, and a slightly rounded tail that is almost as long as the wings. *Euphagus carolinus* has pale yellow eyes and a slightly curved black bill. They nest in the forest and favour the shores of wet areas, such as slow-moving streams, peat bogs, marshes, swamps, beaver ponds, and pasture edges. In Canada, the rusty blackbird occurs in all provinces and territories, and is believed to have declined by approximately 85 % since the mid-1960s due to habitat alteration. As a result, they are listed as a species of special concern under the f*SARA* and by the COSEWIC (Table 15).

The *anatum* subspecies of the peregrine falcon (Figure 32) is a high-speed bird of prey slightly smaller and more streamlined than a hawk. Great declines in peregrine populations were observed following the introduction of the pesticide Dichloro-Diphenyl-Trichloroethane (DDT); however, their populations began a comeback following DDT restrictions that were established in 1970. It is estimated that there are 500 pair in Canada and because of this low number, they are listed as a threatened species under the *SARA* and by the COSEWIC (Table 15). Peregrine nests are usually scrapes made on cliff

ledges near wetlands. Their nesting territory is about a 1 km radius around the nest and their home range extends to a radius of about 27 km. They prefer open habitats such as wetlands, but they are known to hunt over open forest.

The least bittern is a small member of the heron and bittern family (Figure 32). It is ranked as a threatened species under the f*SARA* and by the COSEWIC (Table 15). The Canadian population is estimated at 1 000 pair. This species nests in freshwater marshes where dense tall aquatic vegetation (*i.e.*, cattails) is interspersed with clumps of woody vegetation and open water. In New Brunswick, nesting occurs in the extreme south and they are more common in marshes that exceed 5 ha.

The monarch butterfly is considered a species of special concern under the f*SARA* and by the COSEWIC (Table 15). The caterpillars are striped yellow, black, and white, the chrysalis is gold-green, and the butterfly is bright orange with heavy black veins (Figure 32). The eastern population, found throughout Atlantic Canada, is the largest of the populations (*i.e.*, outnumbering the western and central groups). The population is estimated in the tens of millions; however, the population can have drastic ups and downs each year depending on the climate. This species tends to be present wherever milkweed (*Asclepius sp.*) and wildflowers, such as goldenrod (*Solidago sp*.), asters (*Aster sp*.), and purple loosestrife (*Lythrum salicaria*), exist.

Found in 19 large river and estuary systems along the Atlantic seaboard from New Brunswick to Florida, the shortnose sturgeon (Figure 32) is listed under the *SARA* and the COSEWIC as a species of special concern (Table 15). Populations of this small anadromous species of sturgeon are disconnected because of their large geographical range but use of a small number of river systems; the only Canadian river system they are found within is the Saint John. These armoured fish are bottom feeders and primarily eat insects and small crustaceans. In cool rivers like the Saint John, these fish reach sexual maturity between about 10 years to 14 years for males and 13 years to 17 years for females. They can be long-lived (*i.e.*, up to 30 years for males and in excess of 60 years for females) and can grow to lengths over 1 m. Their decline since the 1960s is attributed to the construction of hydroelectric facilities, by-catch in commercial fisheries, and poaching.

3.2.1.2 Snapshots of Bats

Although the ACCDC reports did not yield any bat observations, little brown bats, northern bats, and tri-colored bats (*i.e.*, Figure 33) are known to have been seen in the Saint John area. All three are small-bodied bats typical of the plain-nosed bats.

These insectivores live in three different roosting sites: day roosts; night roosts; and hibernation roosts. Hibernation roosting populations have been decimated in recent years. It is estimated that about 6.5 million bats of several species, but primarily the little brown bat, have died in eastern Canada and the northeastern US as a result of white-nose syndrome. Populations in some hibernacula have fallen by more than 75 %. Species modelling has shown that this species could be extirpated by 2030 if declines continue. Their precipitous declines have resulted in their ranking under the f*SARA* as endangered. Unaffected, these bats often live well beyond 10 years of age.

Figure 33. Photographs of three bat species listed under the f*SARA* and by the COSEWIC as being endangered and are known to have been observed within a 5 km radius of the Reversing Falls Mill in Saint John, New Brunswick.

These bats generally range from 6 cm to 10 cm long, weigh less than 10 g, and have an average wingspan under 30 cm. The little brown bats distinguishing feature is a short and blunt tragus (*i.e.*, the inner side of the external ear). The northern bat has a long, slender, and pointed tragus and ears that extend beyond the nose when pressed forward. The tri-colored bat is distinguished by their distinctive tri-colored hairs.

3.2.2 Provincial Species At Risk

Provincially listed species at risk that exist in New Brunswick and could potentially be impacted by the Project are noted in Table 16. Those terrestrial and aquatic species identified under the provincial *Species At Risk Act* (f*SARA*) as being at risk in New Brunswick are listed. Listing of a species in Table 16 does not indicate that it is either present or absent at the Project site. Presence and absence information is provided below. The order of risk level under the p*SARA* is as follows: special concern; threatened; endangered; and extirpated.

Table 16. Terrestrial and aquatic flora and fauna listed as being at risk in New Brunswick under the p*SARA*.

Common Name	Scientific Name	p*SARA* Status
Vascular Plants, Mosses, and Lichens		
Blue felt lichen	*Degelia plumbea*	Species of special concern
Parker's pipewort	*Eriocaulon parkeri*	Endangered
Vole ears lichen	*Erioderma mollissimum*	Endangered
Boreal felt lichen Atlantic population	*Erioderma pedicellatta*	Endangered
Prototype quillwort	*Isoetes prototypus*	Endangered
Butternut	*Juglans cinerea*	Endangered
Beach pinweed	*Lechea maritima*	Species of special concern
Southern twayblade	*Listera australis*	Endangered
Furbish's lousewort	*Pedicularis furbishiae*	Endangered

Common Name	Scientific Name	p*SARA* Status
Van Brunt's Jacob's-ladder	*Polemonium vanbruntiae*	Threatened
Pinedrops	*Pterospora andromedea*	Endangered
Anticosti aster	*Symphyotrichum anticostense*	Endangered
Gulf of St. Lawrence aster	*Symphyotrichum laurentianum*	Endangered
Bathurst aster Bathurst population	*Symphyotrichum subulatum*	Endangered
Molluscs		
Dwarf wedgemussel	*Alasmidonta heterodon*	Extirpated
Brook floater	*Alasmidonta varicosa*	Species of special concern
Yellow lampmussel	*Lampsilis cariosa*	Species of special concern
Reptiles		
Loggerhead sea turtle	*Caretta caretta*	Endangered
Snapping turtle	*Chelydra serpentina*	Species of special concern
Leatherback sea turtle Atlantic population	*Dermochelys coriacea*	Endangered
Wood turtle	*Glyptemys insculpta*	Threatened
Birds		
Short-eared owl	*Asio flammeus*	Species of special concern
Barrow's goldeneye Eastern population	*Bucephala islandica*	Species of special concern
Red knot *rufa* subspecies	*Calidris canutus rufa*	Endangered
Whip-poor-will	*Caprimulgus vociferus*	Threatened
Bicknell's thrush	*Catharus bicknelli*	Threatened
Chimney swift	*Chaetura pelagica*	Threatened
Piping Plover *melodus subspecies*	*Charadrius melodus melodus*	Endangered
Common nighthawk	*Chordeiles minor*	Threatened
Olive-sided flycatcher	*Contopus cooperi*	Threatened
Eastern wood-pewee	*Contopus virens*	Species of special concern
Yellow rail	*Coturnicops noveboracensis*	Species of special concern
Bobolink	*Dolichonyx oryzivorus*	Threatened
Rusty blackbird	*Euphagus carolinus*	Species of special concern
Peregrine falcon *anatum / tundrius*	*Falco peregrinus anatum/tundrius*	Endangered
Bald eagle	*Haliaeetus leucocephalus*	Endangered
Barn swallow	*Hirundo rustica*	Threatened
Harlequin duck Eastern population	*Histrionicus histrionicus*	Endangered
Wood thrush	*Hylocichla mustelina*	Threatened
Least bittern	*Ixobrychus exilis*	Threatened
Eskimo curlew	*Numenius borealis*	Endangered
Horned grebe Western population	*Podiceps auritus*	Species of special concern
Roseate tern	*Sterna dougallii*	Endangered
Eastern meadowlark	*Sturnella magna*	Threatened
Canada warbler	*Wilsonia canadensis*	Threatened
Arthropods		
Cobblestone tiger beetle	*Cicindela marginipennis*	Endangered

Common Name	Scientific Name	p*SARA* Status
Maritime ringlet	*Coenonympha nipisiquit*	Endangered
Monarch	*Danaus plexippus*	Species of special concern
Skillet clubtail	*Gomphus ventricosus*	Endangered
Pygmy snaketail	*Omphiogomphus howei*	Species of special concern
Fishes		
Shortnose sturgeon	*Acipenser brevirostrum*	Species of special concern
Atlantic sturgeon Maritimes populations	*Acipenser oxyrinchus*	Threatened
Thorny skate	*Amblyraja radiata*	Species of special concern
Atlantic wolffish	*Anarhichas lupus*	Species of special concern
American eel	*Anguilla rostrata*	Threatened
Cusk	*Brosme brosme*	Endangered
White shark Atlantic population	*Carcharodon carcharias*	Endangered
Atlantic cod Laurentian south population	*Gadus morhua*	Endangered
Atlantic cod southern population	*Gadus morhua*	Endangered
American plaice Maritime population	*Hippoglossoides platessoides*	Threatened
Mako shortfin Atlantic population	*Isurus oxyrinchus*	Threatened
Porbeagle	*Lamna nasus*	Endangered
Winter skate southern Gulf of St. Lawrence population	*Leucoraja ocellata*	Endangered
Winter skate Georges Bank-Western Scotian Shelf-pop.	*Leucoraja ocellata*	Species of special concern
Smooth skate Laurentian-Scotian population	*Malacoraja senta*	Species of special concern
Striped bass Bay of Fundy population	*Morone saxitilis*	Endangered
Striped bass southern Gulf of St. Lawrence population	*Morone saxitilis*	Species of special concern
Rainbow smelt Lake Utopia large-bodied population	*Osmerus mordax*	Threatened
Rainbow smelt Lake Utopia small-bodied population	*Osmerus mordax*	Threatened
Blue shark Atlantic population	*Prionace glauca*	Species of special concern
Atlantic salmon Inner Bay of Fundy population	*Salmo salar*	Endangered
Atlantic salmon Outer Bay of Fundy population	*Salmo salar*	Endangered
Atlantic salmon Gaspe-S. Gulf of St. Lawrence pop.	*Salmo salar*	Species of special concern
Acadian redfish Atlantic population	*Sebastes fasciatus*	Threatened
Spiny dogfish Atlantic population	*Squalus acanthias*	Species of special concern
Atlantic bluefin tuna	*Thunnus thynnus*	Endangered
Mammals		
Blue whale - Atlantic population	*Balaenoptera musculus*	Endangered
Fin whale Atlantic population	*Balaenoptera physalus*	Species of special concern
Gray wolf	*Canis lupus*	Extirpated
North Atlantic right whale	*Eubalaena glacialis*	Endangered
Wolverine	*Gulo gulo*	Extirpated
Canada lynx	*Lynx canadensis*	Endangered
Little brown *Myotis*	*Myotis lucifugus*	Endangered
Northern *Myotis*	*Myotis septentrionalis*	Endangered
Atlantic walrus	*Odobenus rosmarus rosmarus*	Extirpated
Tri-colored bat	*Perimyotis subflavus*	Endangered

Common Name	Scientific Name	p*SARA* Status
Harbour porpoise Northwest Atlantic population	*Phocoena phocoena*	Species of special concern
Woodland caribou	*Rangifer tarandus caribou*	Extirpated

The ACCDC databases were queried for known observation data of provincially protected species within a 5 km radius of the Project site (*i.e.*, refer to Appendix III). According to the ACCDC data, 21 species listed under the p*SARA* have been observed (Figure 36).

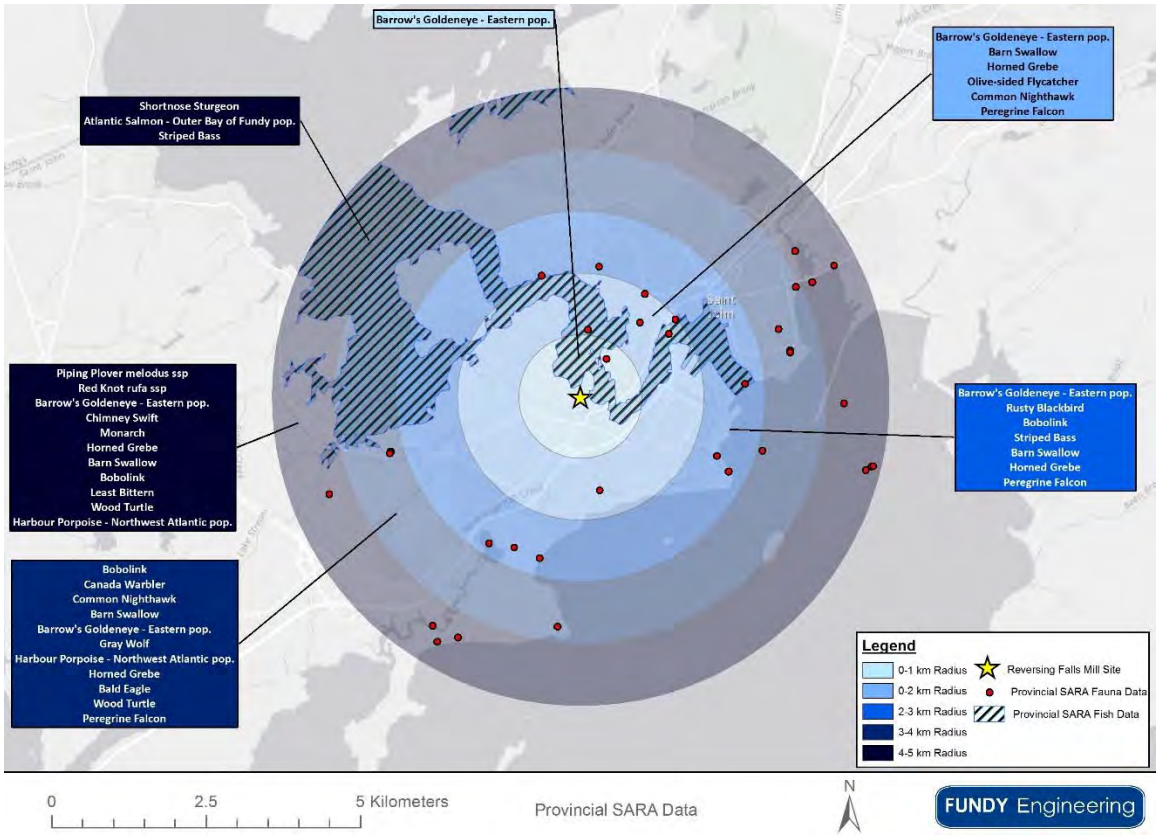


Figure 34. Map showing the recorded observations of species listed under the p*SARA* within a 5 km radius of the Reversing Falls Mill in Saint John, New Brunswick. Data obtained from the ACCDC.

3.2.2.1 Snapshots of Provincial Species at Risk Locally Present

Those 21 species listed under the p*SARA* that have been observed within 5 km of the Reversing Falls Mill in Saint John, New Brunswick are shown in Figure 35. Descriptions of those species are also provided if not previously described in Section 3.2.1.1. One of the species previously described, the peregrine falcon, is listed provincially as being endangered while federally it is only listed as being of special concern. All other listings are the same as above. Detailed information provided below on the protected species was obtained from the species profiles on the f*SARA* [*SARA*, 2016], COSWEIC [*COSEWIC*, 2016], and regulatory agency websites.

The bobolink (Figure 35) is a small bird that averages 18 cm long, has a wingspan of about 29 cm, and weighs approximately 40 g. Male bobolinks have a distinctive plumage during

the breeding season, which includes a black and white rump and a black and yellow nape. Their winter plumage, yellow and brown, is similar to that of the female. Bobolinks feed mainly on insects during the summer and switch to grains during migration periods. They are ground nesters. Since the mid-1900s, bobolinks have experienced an average annual decline of 3.8 %. The loss of these birds is primarily caused by changes in land-use, but it is suspected that some decline is attributed to winter kill. Under the p*SARA*, the bobolink is listed as being a threatened species (Table 16).

The bald eagle (Figure 35) is a large bird of prey with a distribution across North America and generally found near large bodies of open water that are near an abundant food supply and old-growth trees for nesting. Between the 1940s and 1970s, their numbers considerably declined due to intense hunting, unintentional poisonings (*e.g.*, DDT and lead shot), and habitat destruction. Juveniles are dark brown with white streaking throughout, while adults support the white head and tail. At maturity, the bald eagle has a wingspan between 1.8 m and 2.3 m and can weigh up to 6 kg. Although the number of bald eagles has drastically increased over the past few decades to the point where they are no longer a species listed under the f*SARA*, they are still listed as being endangered under the p*SARA* (Table 16).

The barn swallow (Figure 35) is the most widespread swallow species in the world. The population of over 190 million individuals globally is considered stable [*BirdLife*, 2014]. Because there have been considerable declines in the presence for the past several decades, the barn swallow is species is listed as threatened under the p*SARA* (Table 16). It is a distinctive passerine that has blue upperparts, a long, deeply forked tail that is curved, and pointed wings. This 17 cm to 19 cm long bird is commonly found in open areas with low vegetation, such as pasture, meadows, and farmland. They build a cup nest from mud pellets in barns or other similar structures and feeds on insects caught while in flight.

The horned grebe (Figure 35) is listed under the p*SARA* as being of Special Concern (Table 16). It is a small (*i.e.*, 31 cm to 38 cm long) duck-like waterbird that is not commonly observed in New Brunswick. Horned grebes generally nest in freshwater and occasionally in brackish water on small permanent or semi-permanent ponds, but it also uses marshes and shallow bays on lake borders. They generally winter in marine habitats, mainly estuaries and bays. The horned grebes' diet consists primarily of aquatic insects and fish in the summer and fish, crustaceans, and marine worms in the winter. It is particularly vulnerable to changes in water quality near its breeding sites.

The Atlantic striped bass (Figure 35) is an anadromous species that is known to inhabit areas along the Atlantic coast from northern Florida to the St. Lawrence estuary. Striped bass are omnivorous, feeding on a variety of invertebrates and fish species. Spawning occurs in the migratory stocks between the months of April and June as they migrate into fresh or brackish water to lay their eggs. After spawning, most large females leave the estuaries and participate in coastal migrations. Males also leave the spawning grounds but may remain within the estuaries throughout the year. Striped bass can grow to lengths exceeding 1.5 m and masses in excess of 30 kg. Table 16 notes that the striped bass is listed under the p*SARA* as being endangered.

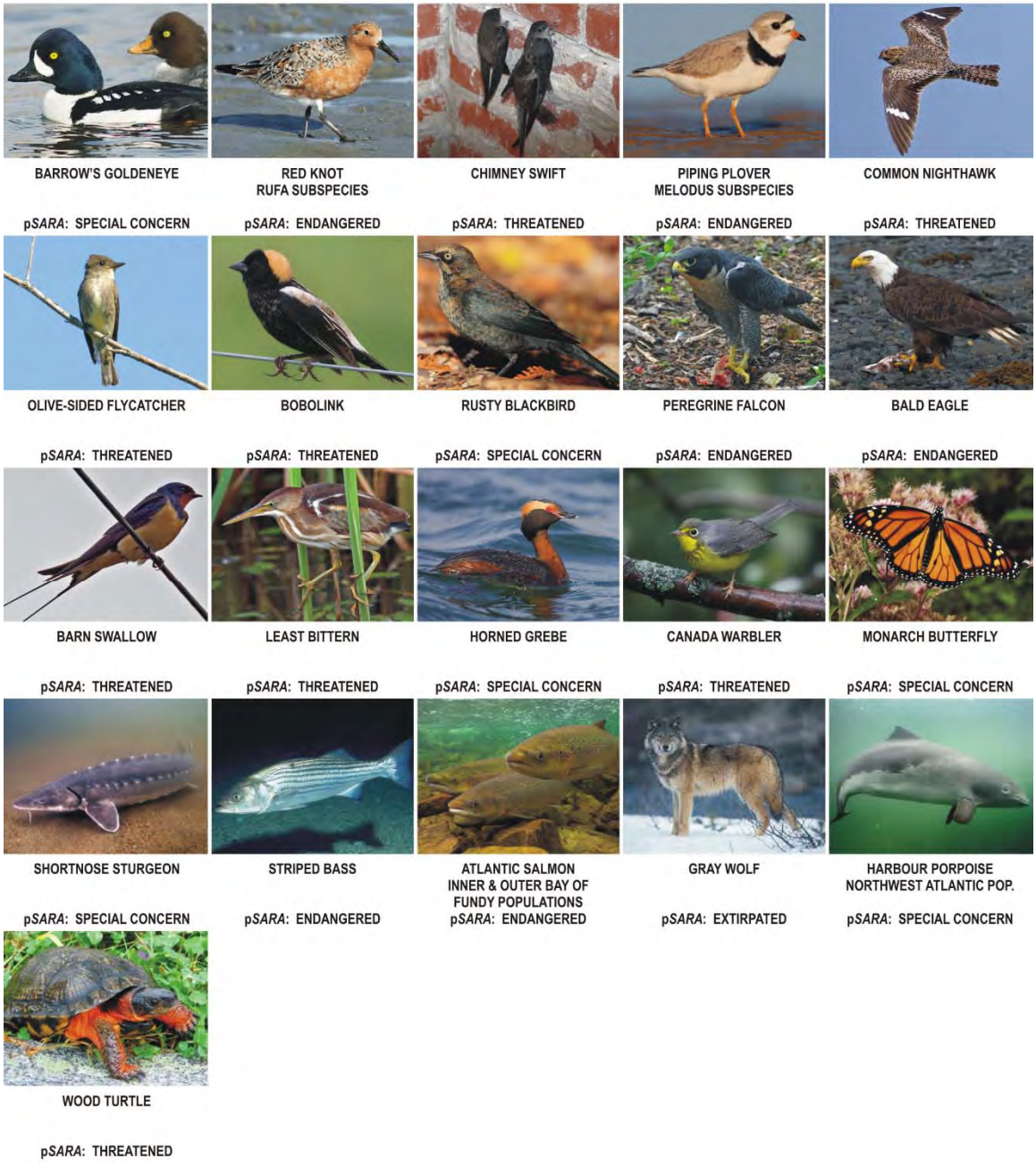


Figure 35. Photographs of species listed under the p*SARA* that have been observed within a 5 km radius of the Reversing Falls Mill in Saint John, New Brunswick.

Atlantic salmon (Table 16) is a prized anadromous sport fish. The Outer Bay Of Fundy (OBOF) salmon spawns in rivers of Nova Scotia and New Brunswick that drain into the Minas Basin and Chignecto Bay, as far south as the Black River in New Brunswick. They are particularly sensitive to environmental stressors and require clean, cool, flowing water free from chemical or organic pollution. The OBOF species prefers natural stream channels with rapids and pools, a gravel bottom, and water temperatures between 15 °C and 25 °C in summer. Migration to sea occurs in May or June and spawning occurs in October to December. Their numbers have drastically declined (~ 90 %) to where the population was estimated at 250 individuals in 1999. Decline appears to be linked to poor

survival at sea due in part to tidal barriers and commercial salmon farms. Because of their precipitous decline, they are ranked as endangered under the p*SARA* (Figure 35).

The gray wolf (Figure 35) is native to the wilderness and remote areas of North America. Mortality caused by human activity, such as hunting and trapping, road-kills, industrial, agricultural, and residential developments, and the abundance of prey have all affected the gray wolf's numbers and geographic range. In New Brunswick, the gray wolf is listed under the p*SARA* as being extirpated (Table 16). Gray wolves are territorial and wolf packs fiercely defend their turf. They feed on a wide-variety of animals and birds. Because they have been eliminated in many areas of their original geographic range, many of those populations that remain are heavily protected. They are an often feared and maligned species that has a characteristic howl.

The harbour porpoise (Figure 35) is one of the smallest and shortest-lived whales; they generally do not exceed 1.7 m long a weight of 65 kg or in excess of 20 years. These mottled greyish-white porpoises are widely distributed over the continental shelves of the temperature northern hemisphere. Estimates peg the population of harbour porpoises in eastern Canada to be about 50 000. These relatively shy and solitary animals do not respond well to intensive human activities in coastal waters. The primary threat to the harbour porpoise in eastern Canada is bycatch in bottom-set gill nets used by groundfishers. Other threats include habitat degradation, loss of habitat, and environmental contamination. The harbour porpoise is listed as a species of special concern under the p*SARA* (Table 16).

3.2.3 Other Locally Observed Species

ACCDC databases were also queried for known observation data of provincially ranked flora and fauna within a 5 km radius of the Project site. Those species identified in the sections above are not included here. Because there are many wildlife enthusiasts in the region, the listing of flora (n = 59 unique species) and fauna (n = 47 unique species) is fairly extensive. The full list of the flora and fauna within 5 km of the site is provided in Table 16 and the ACCDC report can be found in Appendix III. Interpretation of the ACCDC S-rank system is provided in Table 18.

A visual representation of the 59 observed flora species is provided in Figure 36. Similarly, a visual representation of the 47 observed fauna species is provided in Figure 37 and Figure 39.

Table 17. List of provincially ranked flora and fauna identified by the ACCDC as being observed within 5 km of the Reversing Falls Mill in Saint John, New Brunswick.

Common Name	Scientific Name	S-rank	NB GS Rank
Flora			
Hooked agrimony	*Agrimonia gryposepala*	S3	Secure
a moss	*Anomodon viticulosus*	S1	May be at risk
Pussy-toes	*Antennaria howellii ssp. petaloidea*	S1	May be at risk
Drummond's rockcress	*Arabis drummondii*	S2	Sensitive
Western hairy rockcress	*Arabis hirsuta var. pycnocarpa*	S3	Secure
Maidenhair spleenwort	*Asplenium trichomanes*	S2	Sensitive
Green spleenwort	*Asplenium trichomanes-ramosum*	S3	Secure
Cut-leaved Moonwort	*Botrychium dissectum*	S3	Secure

Common Name	Scientific Name	S-rank	NB GS Rank
Lance-leaf grape-fern	*Botrychium lanceolatum var. angustisegmentum*	S3	Sensitive
Pale bryum moss	*Bryum pallescens*	S1S2	Undetermined
Common large wetland moss	*Calliergonella cuspidata*	S2S3	Sensitive
Scabrous black sedge	*Carex atratiformis*	S3	Secure
Hairlike sedge	*Carex capillaris*	S3	Secure
Livid sedge	*Carex livida var. radicaulis*	S2	Sensitive
Michaux's sedge	*Carex michauxiana*	S3	Secure
Saltmarsh sedge	*Carex salina*	S2	Sensitive
Russet sedge	*Carex saxatilis*	S1	May be at risk
Strawberry-blite	*Chenopodium capitatum*	S1	May be at risk
Red pigweed	*Chenopodium rubrum*	S2	Sensitive
Spotted coralroot	*Corallorhiza maculata*	S3S4	Sensitive
Broom crowberry	*Corema conradii*	S1	May be at risk
Sieve-toothed moss	*Coscinodon cribrosus*	S1	May be at risk
Quebec hawthorn	*Crataegus submollis*	S3?	Sensitive
Buttonbush dodder	*Cuscuta cephalanthi*	S1?	May be at risk
Small yellow lady's-slipper	*Cypripedium parviflorum var. makasin*	S2	May be at risk
Purple-veined willowherb	*Epilobium coloratum*	S2?	Sensitive
Downy willowherb	*Epilobium strictum*	S3	Secure
Northern gentian	*Gentianella amarella ssp. acuta*	S3	Secure
Herb robert	*Geranium robertianum*	S2S3	Secure
Toothless grimmia moss	*Grimmia anodon*	SH	Undetermined
American false pennyroyal	*Hedeoma pulegioides*	S2	Secure
Water stargrass	*Heteranthera dubia*	S3	Secure
Appalachian fir-clubmoss	*Huperzia appalachiana*	S3	Sensitive
Loesel's twayblade	*Liparis loeselii*	S3	Secure
Auricled twayblade	*Listera auriculata*	S2S3	Sensitive
Brook lobelia	*Lobelia kalmii*	S3S4	Secure
Small yellow pond-lily	*Nuphar lutea ssp. pumila*	S3	Secure
Northern adder's-tongue	*Ophioglossum pusillum*	S2S3	Sensitive
Glaucous blue grass	*Poa glauca*	S3	Secure
Appalachian polypody	*Polypodium appalachianum*	S3	Secure
White-stemmed pondweed	*Potamogeton praelongus*	S2S3	Secure
Richardson's pondweed	*Potamogeton richardsonii*	S2	Sensitive
Glaucous rattlesnakeroot	*Prenanthes racemosa*	S3	Secure
Macoun's cudweed	*Pseudognaphalium macounii*	S2	Sensitive
Cursed buttercup	*Ranunculus sceleratus*	S1	May be at risk
Roseroot	*Rhodiola rosea*	S3	Secure
Swamp rose	*Rosa palustris*	S3	Secure
Hooked scorpion moss	*Scorpidium scorpioides*	S2	Sensitive
Low spikemoss	*Selaginella selaginoides*	S2	Sensitive
Narrow-leaved blue-eyed-grass	*Sisyrinchium angustifolium*	S1	May be at risk
Blue-stemmed goldenrod	*Solidago caesia*	SX	Extirpated
Long-leaved starwort	*Stellaria longifolia*	S2	Sensitive
Thread-leaved pondweed	*Stuckenia filiformis ssp. alpina*	S2	Sensitive
Sago pondweed	*Stuckenia pectinata*	S3S4	Secure
New York aster	*Symphyotrichum novi-belgii var. crenifolium*	S2?	Undetermined
Mucronate screw moss	*Tortula mucronifolia*	S1S2	Sensitive
Gaspé arrowgrass	*Triglochin gaspensis*	S3	Secure
Northern bog violet	*Viola nephrophylla*	S3	Secure
Northern yellow-eyed-grass	*Xyris montana*	S3	Secure

Fauna

Common Name	Scientific Name	S-rank	NB GS Rank
Mottled darner	*Aeshna clepsydra*	S2	Sensitive
Northern pintail	*Anas acuta*	S3B	Sensitive
American wigeon	*Anas americana*	S3B	Secure
Northern shoveler	*Anas clypeata*	S2B	Secure
Gadwall	*Anas strepera*	S2B	Secure
Long-eared owl	*Asio otus*	S2S3	Undetermined
Greater scaup	*Aythya marila*	S1B,S2N	Secure
Brant	*Branta bernicla*	S2S3M,S2S3N	Secure
Bufflehead	*Bucephala albeola*	S3N	Sensitive
Green heron	*Butorides virescens*	S1S2B	Sensitive
Purple sandpiper	*Calidris maritima*	S3M,S3N	Secure
Hoary elfin	*Callophrys polios*	S3	Secure
Turkey vulture	*Cathartes aura*	S3B	Secure
Black guillemot	*Cepphus grylle*	S3	Secure
Killdeer	*Charadrius vociferus*	S3B	Sensitive
Black-headed gull	*Chroicocephalus ridibundus*	S2M,S1N	Sensitive
Marsh wren	*Cistothorus palustris*	S2B	Sensitive
Transverse lady beetle	*Coccinella transversoguttata richardsoni*	S1S2	May be at risk
Evening grosbeak	*Coccothraustes vespertinus*	S3S4B,S4S5N	Sensitive
Willow flycatcher	*Empidonax traillii*	S1S2B	Sensitive
Horned lark	*Eremophila alpestris*	S2B	May be at risk
Gyrfalcon	*Falco rusticolus*	S1N	Undetermined
Ring-billed gull	*Larus delawarensis*	S3B	Secure
Red crossbill	*Loxia curvirostra*	S3	Secure
Black scoter	*Melanitta nigra*	S3M,S2S3N	Sensitive
Red-breasted merganser	*Mergus serrator*	S3B,S4S5N	Secure
Northern mockingbird	*Mimus polyglottos*	S3B	Sensitive
Brown-headed cowbird	*Molothrus ater*	S3B	May be at risk
Great Crested flycatcher	*Myiarchus crinitus*	S3B	Sensitive
Black-crowned night-heron	*Nycticorax nycticorax*	S1S2B	Sensitive
Compton tortoiseshell	*Nymphalis l-album*	S3	Secure
Ruddy duck	*Oxyura jamaicensis*	S1B,S4N	Secure
Cliff swallow	*Petrochelidon pyrrhonota*	S3S4B	Sensitive
Red-necked phalarope	*Phalaropus lobatus*	S3M	Sensitive
Wilson's phalarope	*Phalaropus tricolor*	S1B	Sensitive
American golden-plover	*Pluvialis dominica*	S3M	Sensitive
Red-necked grebe	*Podiceps grisegena*	S3M,S2N	Sensitive
Prothonotary warbler	*Protonotaria citrea*	SNA	Accidental
Bank swallow	*Riparia riparia*	S3B	Sensitive
Acadian hairstreak	*Satyrium acadica*	S3	Secure
Aphrodite fritillary	*Speyeria aphrodite*	S3	Secure
Common tern	*Sterna hirundo*	S3B	Sensitive
Brown thrasher	*Toxostoma rufum*	S2B	Sensitive
Willet	*Tringa semipalmata*	S2S3B	Sensitive
Solitary sandpiper	*Tringa solitaria*	S2B,S5M	Secure
House wren	*Troglodytes aedon*	S1B	Undetermined
Buff-breasted sandpiper	*Tryngites subruficollis*	SNA	Accidental

Table 18. The Atlantic Canada Conservation Data Centre's Sub-national (*i.e.*, provincial) rarity rank (S-rank) of species and S-rank definitions.

ACCDC S-rank	Definition
S1	Extremely rare: may be especially vulnerable to extirpation; typically five or fewer occurrences or very few remaining individuals.
S2	Rare: may be vulnerable to extirpation due to rarity or other factors; six to 20 occurrences or few remaining individuals.
S3	Uncommon: found only in a restricted range, even if abundant at some locations; 21 to 100 occurrences.
S4	Usually widespread, fairly common: apparently secure with many occurrences, but of longer-term concern (*e.g.*, watch list); 100 + occurrences).
S5	Abundant: widespread and secure under present conditions.
S#S#	Numeric range rank: a range between two consecutive ranks for a species / community; denotes uncertainty about the exact rarity (*e.g.*, S1S2).
SH	Historical: previously occurred in the province but may have been overlooked during the past 20 years to 70 years; presence is suspected and will likely be rediscovered.
SU	Unrankable: possibly in peril, but status is uncertain; need more information.
SX	Extinct / Extirpated: believed to be extirpated from its former range.
S?	Unranked: not yet ranked.
SA	Accidental: accidental or casual, infrequent and far outside usual range; includes species (usually birds or butterflies) recorded once or twice or only at very great intervals, hundreds, or even thousands of miles outside their usual range.
SE	Exotic: an exotic established in the province (*e.g.*, Purple Loosestrife or Coltsfoot); may be native in nearby regions.
SE#	Exotic numeric: an established exotic that has been assigned a rank.
SP	Potential: potentially occurs, but no occurrences have been reported.
SR	Reported: no persuasive documentation (*e.g.*, misidentified specimen).
SRF	Reported falsely: erroneously reported and the error has persisted in the literature.
SZ	Zero: not of practical conservation concern because there are no definable occurrences, although the species is native and appears regularly; an SZ rank is generally used for occasional long distance migrants.

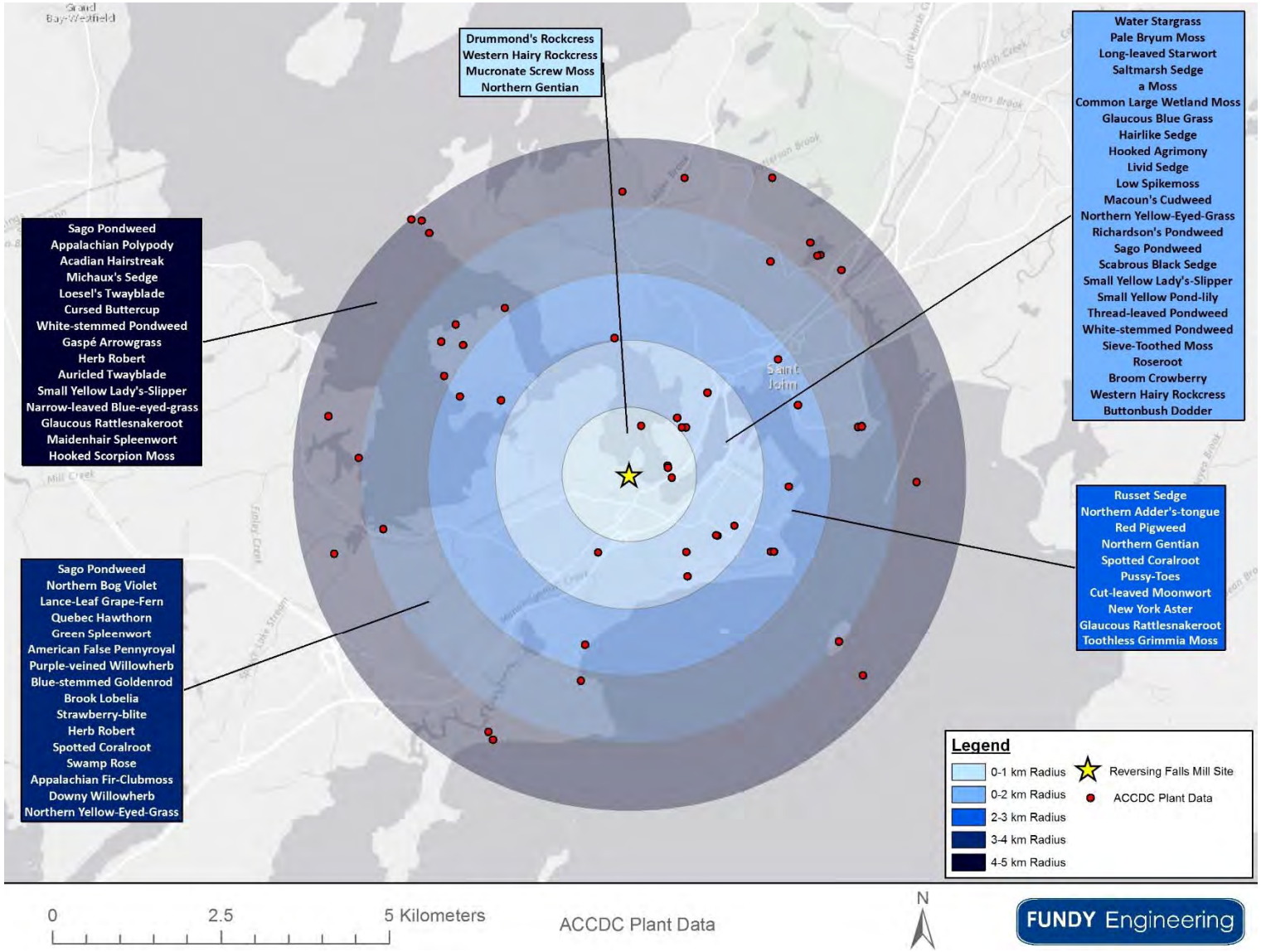


Figure 36. Map showing the observed flora species within a 5 km radius of the Reversing Falls Mill in Saint John, New Brunswick. Data obtained from the ACCDC.

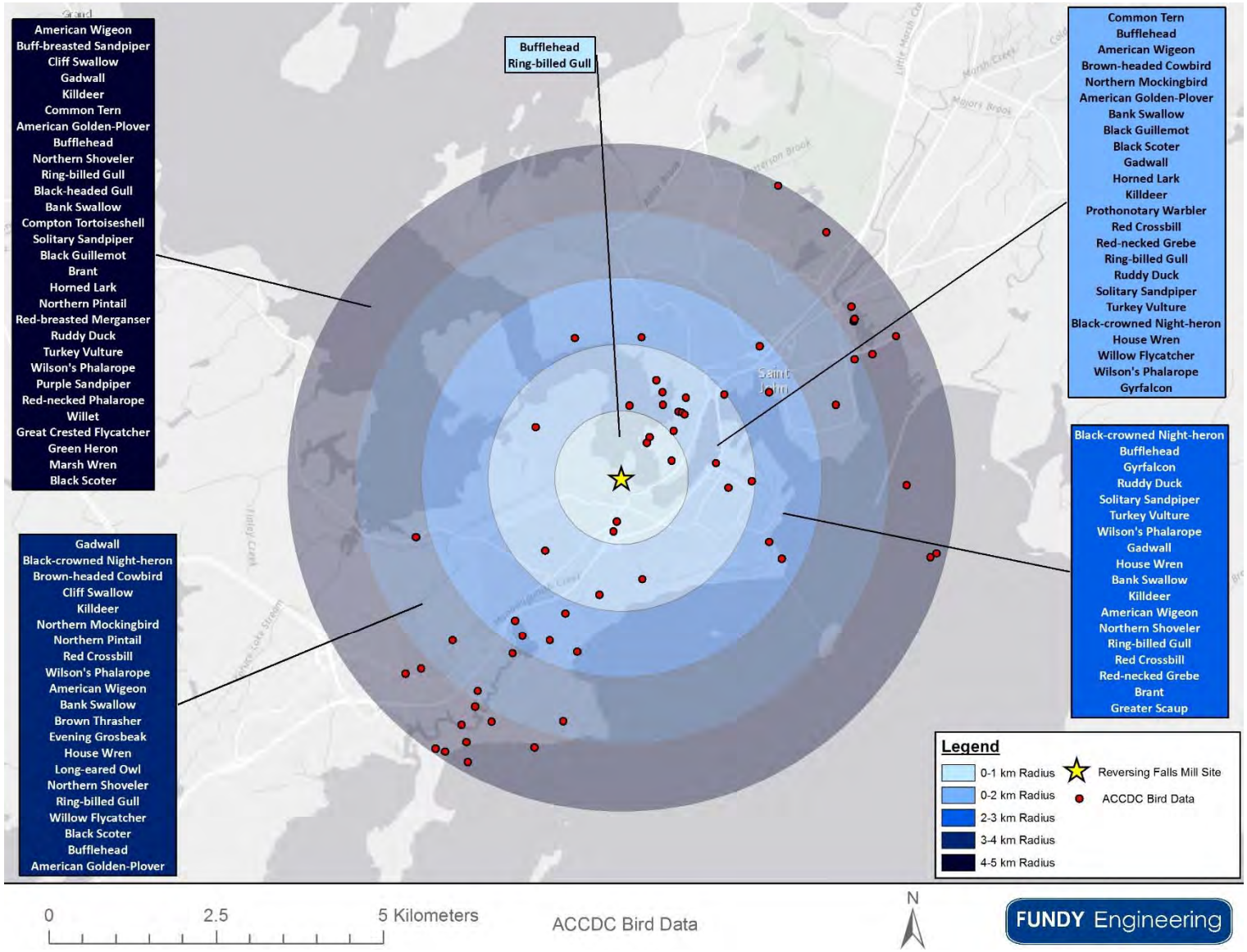


Figure 37. Map showing the observed birds within a 5 km radius of the Reversing Falls Mill in Saint John, New Brunswick. Data obtained from the ACCDC.

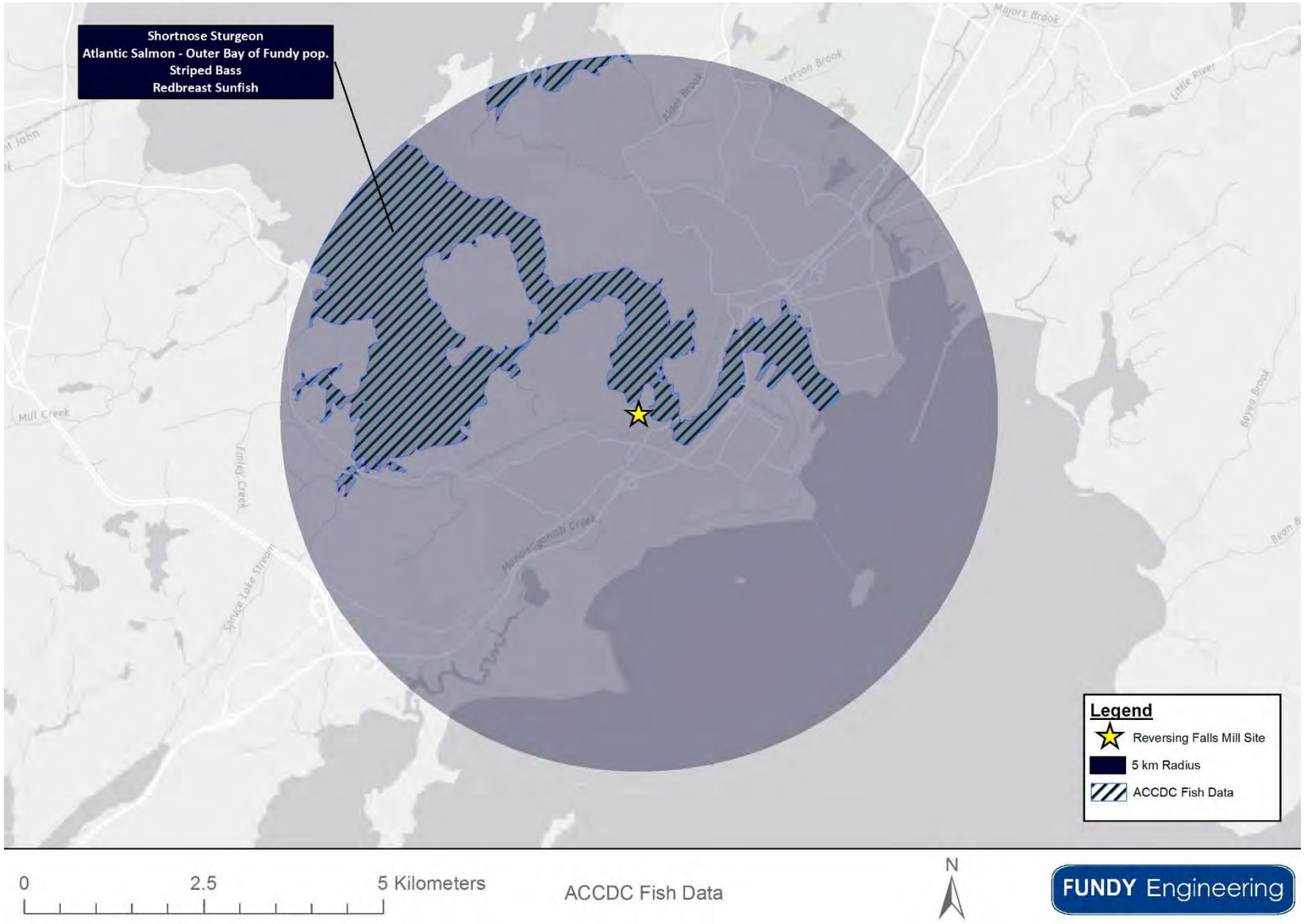


Figure 38. Map showing observed fishes within a 5 km radius of the Reversing Falls Mill in Saint John, New Brunswick. Data obtained from the ACCDC.

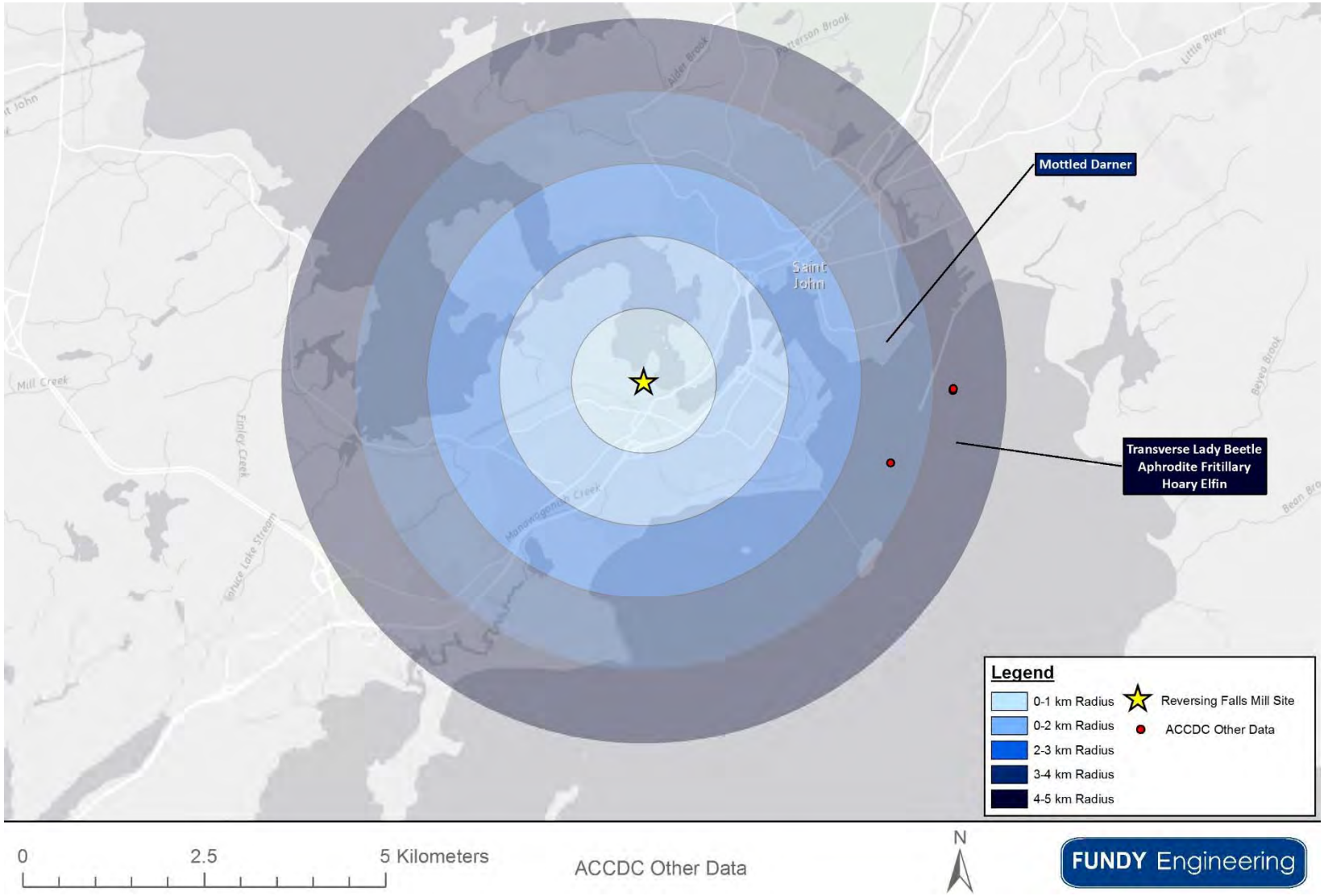


Figure 39. Map showing observed fauna other than birds within a 5 km radius of the Reversing Falls Mill in Saint John, New Brunswick. Data obtained from the ACCDC.

During the site visits, no flora and fauna species of special concern were noted. None of the areas where proposed equipment will be constructed and operated are virgin lands (*i.e.*, the areas for siting new equipment are not vegetated). It is possible that species listed above either live in adjacent areas or may migrate through the area on occasion.

3.2.4 Environmentally Significant and Managed Areas

The ACCDC query yielded eight Environmentally Significant Areas (ESAs) and five managed areas and within 5 km of the Reversing Falls Mill (Figure 40), including:

- Manawagonish Island Important Bird Area (IBA);
- Saint's Rest Marsh and Beach ESA;
- Greenhead Cave ESA;
- Reversing Falls and Outcrop Islands ESA;
- Saint John Cambrian-Precambrian Border ESA;
- Harbell's Cave ESA;
- Howe's Cave ESA; and
- Courtenay Forebay ESA.

Manawagonish Island is a 40 ha island about 1 km long × 500 m wide (Figure 40). The partially wooded island has rocky shores, coastal cliffs, and many small inlets. About 2 % to 3 % of the Atlantic Coast population of double-crested cormorants (*Phalacrocorax auritus*) inhabits the Island. This colony of *auritus* is among the three largest in the Maritimes. Herring gulls (*Larus sp.*), great black-backed gulls (*L. marinus*), and glossy ibis (*Plegadis falcinellus*) also nest on the Island. This is the only known Canadian breeding spot for *falcinellus*.

Saint's Rest Marsh and Beach ESA (Figure 40) is an internationally renowned bird-staging area. Glossy ibis from Manawagonish Island are sometimes sighted there. Due to efforts of the Nature Trust of New Brunswick who erected several nesting platforms on the Island, the great blue heron (*Ardea herodias*) population has been on the rise within the Marsh. A small peat bog is also found within this ESA.

Greenhead Cave is a cave located midway up a massive shoreline cliff on Green Head Island (Figure 40). A survey of the cave in 1978 reported a length of 64 m and a depth of 26.7 m. The majority of the Island is owned by the City of Saint John and has been labeled as an ESA as the Cave is used by bats as a hibernaculum. In the 1800s, the Island was the site of a lime quarry. Kiln foundations, wharf timbers, and foundation walls of homes still exist on the City-owned lands.

Three small bedrock islands, Goat Island (0.4 ha), Middle Island (0.5 ha), and Crow Island (0.3 ha), comprise the Reversing Falls and Outcrop Islands ESA (Figure 40). These Islands are owned by the Crown and are uninhabited. They exist at Reversing Falls / Rapids where the Saint John River flows through a narrow gorge before emptying into the Bay of Fundy (Figure 1). The rocks here form the contact of two ancient geologic terranes, Brookville and Caledonia, which are separated by the Caledonia Fault. This ESA and the Saint John Cambrian-Precambrian Border ESA are among the top 12 geosites within the Stonehammer Geopark. The majority of Uptown Saint John is built atop the contact between Cambrian and Precambrian age rocks. Outcrops are common throughout the Uptown.

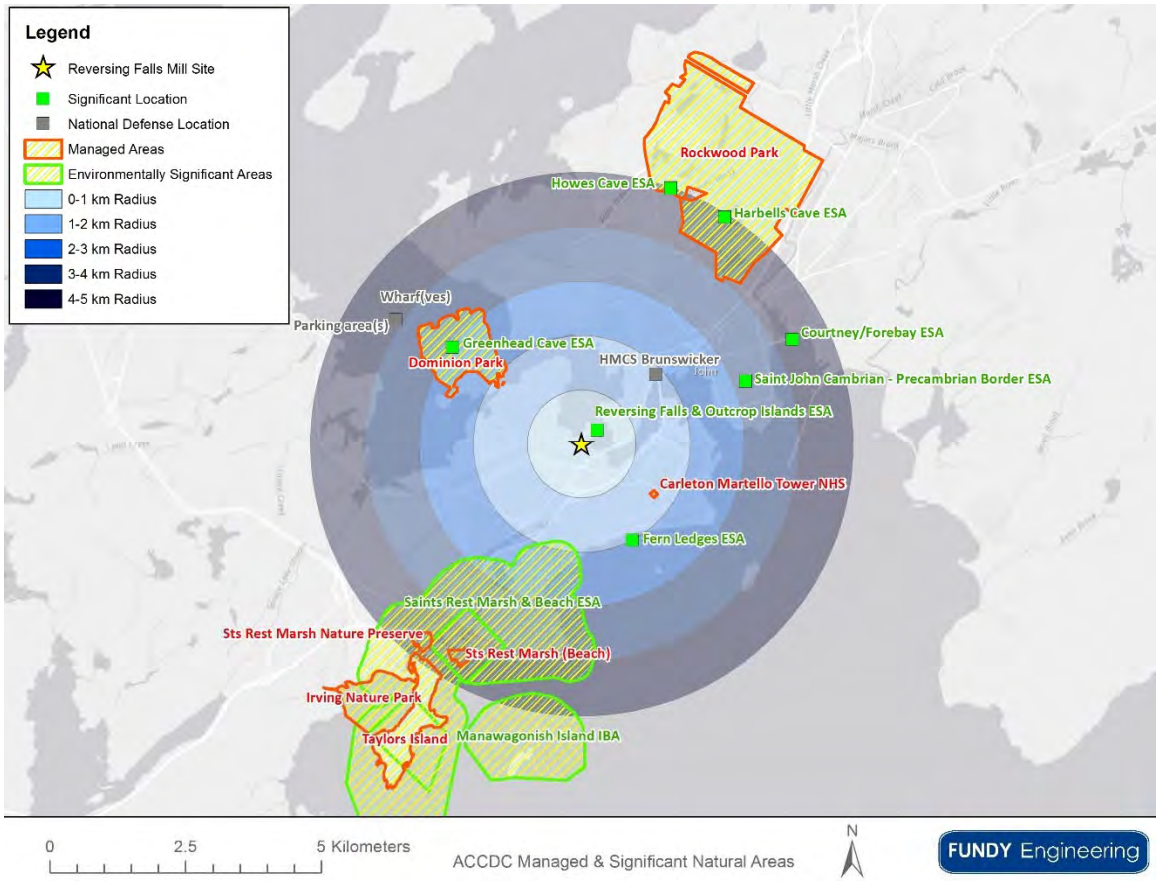


Figure 40. Map showing the environmentally significant and managed areas within a 5 km radius of the Reversing Falls Mill in Saint John, New Brunswick. Data obtained from the ACCDC.

The Harbell's Cave ESA and Howe's Cave ESA are both located within Rockwood Park (Figure 40). Both limestone caves are used by bats in the winter as hibernaculum. Harbell's Cave is about 74 m long and has a stream with several waterfalls flowing through it and Howe's Cave is about 120 m long. Both caves are frequented by naturalists because of their ease of access of being within the Park.

The Courtenay Forebay ESA (Figure 40) is a significant area for waterfowl in Saint John. Bald eagles have also been observed preying on waterfowl within the Forebay. It is a unique 43 ha urban wetland that is frequented by birders. The Saint John chapter of the Atlantic Coastal Action Program has been a strong advocate for cleanup efforts related to the Forebay and Marsh Creek, which flows into the wetland.

The managed areas within 5 km of the Reversing Falls Mill include:

- Rockwood Park;
- Dominion Park;
- Saint's Rest Nature Preserve and Beach (also an ESA); and
- Irving Nature Park / Taylors Island.

Rockwood Park (Figure 40) is located entirely within Saint John and at 890 ha is one of Canada's largest urban parks. The park has an extensive network of trails that wind their way through the upland Acadian forest, over many hills, and around several freshwater lakes. Rockwood Park Golf Course and the Cherry Brook Zoo are also located within the Park.

Dominion Park is located on Green Head Island (Figure 40). This Park is home to an urban, freshwater, sandy swimming beach. Because of the historic use of the area as a limestone quarry following the Great Fire of 1877, the area is part of the larger Stonehammer Geopark. It gives homage to one of the last historic lime kiln operations in southern New Brunswick.

The 243 ha Irving Nature Park (Figure 40) was created by JDI in 1992 to help protect an environmentally important area of southern New Brunswick. It is a peninsula of volcanic rock that has a long sandy beach along the Bay of Fundy side and a salt-marsh on the inland side. The area is a traditional staging area for birds migrating between the Arctic and South America. More than 250 species of birds have been observed during a single migration season. Eight walking trails on the island (*i.e.*, Taylor's Island) allow visitors to experience the area's fragile ecosystems. Upkeep, educational programs, and beautification of the Park are fully funded by JDI.

3.3 SOCIO-ECONOMIC ENVIRONMENT

3.3.1 Demographics and Labour

In 2006, the population of the Saint John Census Metropolitan Area (CMA) was 122 389 [*Statscan*, 2013]. Between 2006 and 2011, the population within the CMA increased by 4.4 % to 127 761. As is common in most Canadian jurisdictions, the baby boomer generation (*i.e.*, 45 to 65 years old) is the dominant demographic (*i.e.*, n = 39 245; Figure 41). Women represent a greater proportion of the population 25 years+ while men are the dominant group for those < 25 years old.

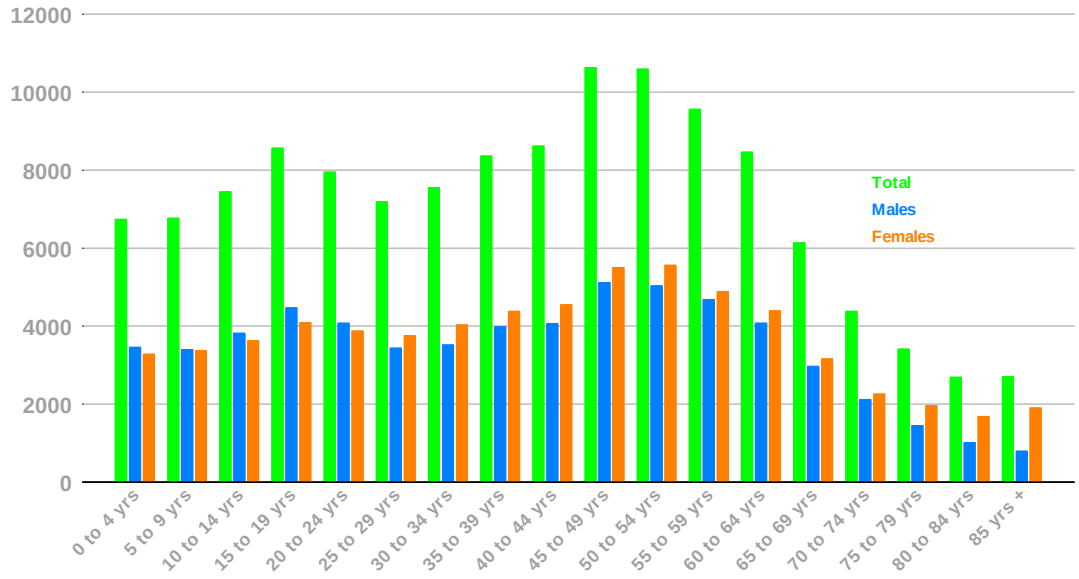


Figure 41. 2011 Demographics of the Saint John census metropolitan area.

At 3 363 km^2, the Saint John CMA represents about 4.7 % of New Brunswick's landmass. In 2011, the total number of private dwellings within the CMA was 56 775 and the average number of persons occupying each household was 2.4. Although there are urban, suburban, and rural areas of the CMA, residential development is considered scatterized [*Urban Strategies*, 2011]. The population density was 38 persons · km^{-2} in 2011.

New Brunswick's quarterly employment and unemployment rate is shown in Figure 42 for 2007 through to the second quarter of 2015. Employment was its greatest during the fourth quarter of 2008 when approximately 360 600 people were employed [*HRDC*, 2013]. Since then, about 9 600 jobs have been shed in the Province. The greatest impact has been to full-time employment. The unemployment rate reached a peak during the fourth quarter of 2012 when it was 11.2 %. In August 2013, New Brunswick tied with Newfoundland for the highest unemployment rate in Canada of 10.7 %. There has been some improvement, but the unemployment rate in NB still sits at 10.2 %.

The most recent labour force survey data available for Saint John are from 2006 [*StatsCan*, 2006]. A summary of the labour force by employment sectors is provided in Table 19. In 2006, the top five industries that employed people were: health care and social assistance; retail trade; manufacturing; administrative support and waste management; and accommodation and food services. IPP employees would largely be considered part of the manufacturing sector (*i.e.*, some would be part of administrative support and management), which is the third greatest employment sector in Saint John.

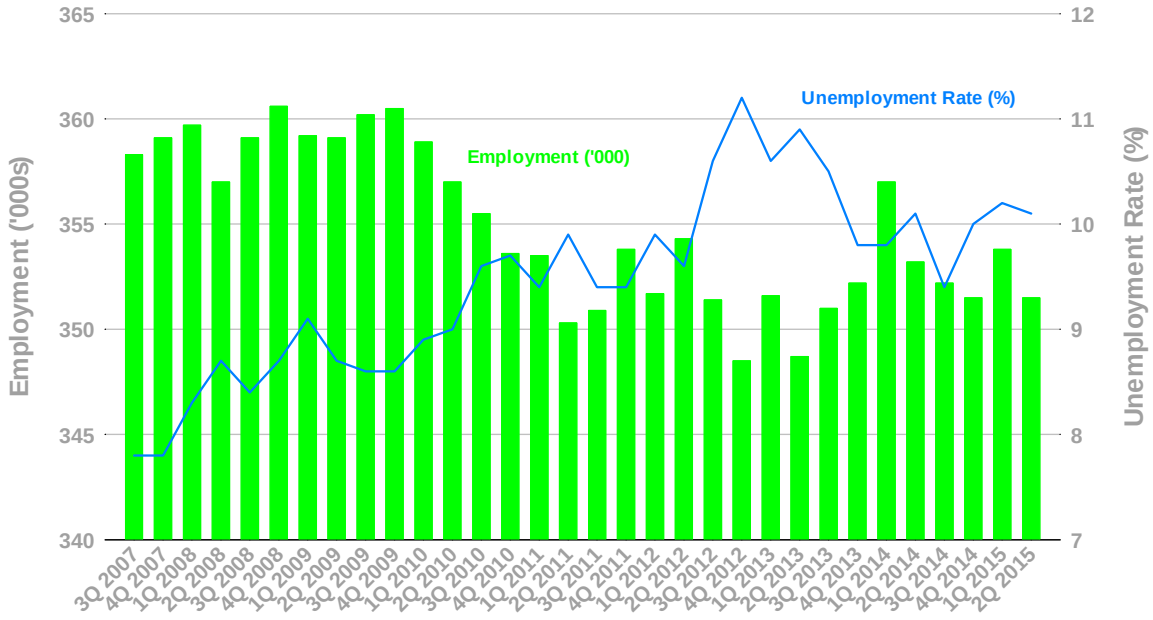


Figure 42. New Brunswick quarterly employment and unemployment rate between 2007 and 2015.

Table 19. Saint John 2006 labour force employment by sector.

Industry Sector	Number of Employees	Percentage of Total Employees
Health care and social assistance	7 515	13.9
Retail trade	6 940	12.8
Manufacturing	4 890	9.0
Administrative support and waste management	4 330	8.0
Accommodation and food services	3 480	6.4
Educational services	3 450	6.4
Transportation and warehousing	3 250	6.0
Construction	3 225	6.0
Public administration	3 195	5.9
Other services (except public administration)	3 080	5.7
Professional, scientific, and technical services	2 770	5.1
Wholesale trade	2 350	4.3
Finance and insurance	1 745	3.2
Utilities	1 010	1.9
Arts, entertainment, and recreation	980	1.8
Agriculture, forestry, fishing, and hunting	855	1.6
Real estate, rental, and leasing	840	1.6
Mining and oil and gas extraction	140	0.3
Management of companies	20	0.0
TOTAL	54 065	100

The median total income for Saint John families (*i.e.*, couple families with or without children and lone-parent families) increased 32 % between 2000 and 2011 jumping from $47 800 to $70 610; however, > 15 % of the population are still considered low-income earners.

3.3.2 Archaeological and Cultural Features

During EIA review for the Phase 2 mill upgrades (*i.e.*, the Chip Handling and Continuous Cooking Digester Plant Renewal EIA, NBDELG File #1380), the New Brunswick Department of Tourism, Heritage, and Culture (NBDTHC) requested that archaeological predictive modelling be included. As a result, an archaeological Resources Supplement [*Fundy Engineering*, 2014] was submitted prior to EIA approval.

Archaeological predictive modelling obtained from the NBDTHC is presented in Figure 43. The information shows that a First Nations archaeological site (*i.e.*, BhDm-3) is located within 250 m of the Project site. The modelling also suggests that there is a high potential to encounter First Nations material adjacent to the Saint John River and remnants of historic settlement.

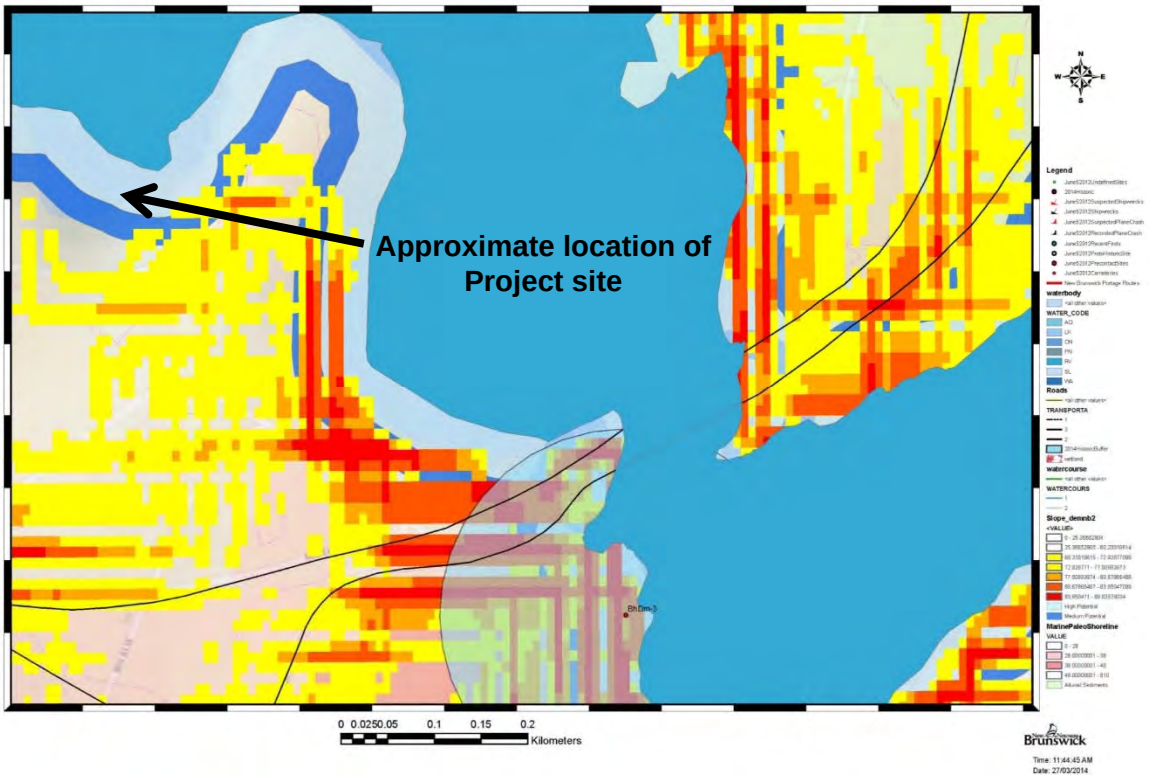


Figure 43. Archaeological predictive modelling in the vicinity of the Reversing Falls Mill Project site in Saint John, New Brunswick. Source: New Brunswick Department of Tourism, Heritage, and Culture.

As shown through the archaeological resources supplemental report, the Project lands were previously occupied by Mill infrastructure Project since development began at Union Point beginning around 1836 when the St. John Mills and Canal Company constructed and operated the Cunnabells Sawmill.

Due to the historical industrial use of this land, the potential for significant archaeological and / or cultural resources to be present at the Project site is considered to be very low. However, because there is a remote possibility that a find could be made, the Project-specific EPP will explicitly identify the processes that must be followed by Project personnel in the event of a find.

3.3.3 Traditional Uses by Aboriginals and First Nations

Little is known regarding the traditional use of the Mill site by Aboriginals and First Nations. It is believed that the Saint John River valley was inhabited by the Maliseet several thousand years prior to colonization by the French in the early 1600s [*Webster*, 1930]. The Passamaquoddy people occupied the coastal regions along the Bay of Fundy and the Gulf of Maine and the shores of the St. Croix River and its tributaries while the Wolastoqiyik occupied more northern and inland areas (Figure 44). Since both cultures lacked a written history, not much is known prior to the arrival of Europeans. The Passamaquoddy people were forced off their lands repeatedly by the Europeans during the sixteenth century and were eventually confined to the Indian Township Reservation in Maine. It is believed the Maliseet were pushed north towards Fredericton. According to

New Brunswick census statistics, there were only 1 116 natives identified as residing in the Province in 1851 [*Webster*, 1930].

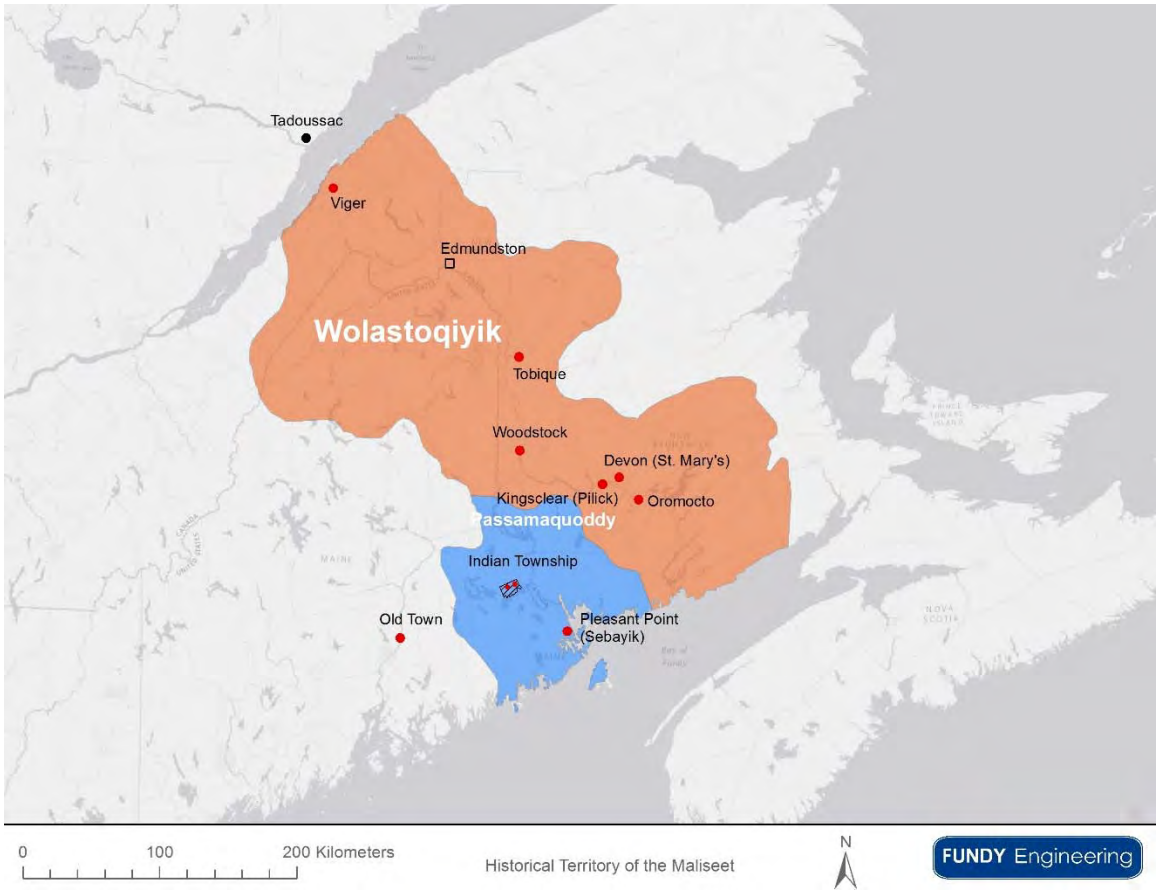


Figure 44. Historical territory of the Maliseet (*i.e.*, the Passamaquoddy people and the Wolastoqiyik) in New Brunswick, Quebec, and Maine.

It is unknown if the Maliseet used the lands the Mill occupies. Other areas surrounding the site were likely avoided due to the rugged (*i.e.*, rocky), steep (*i.e.*, > 45 %) and tall (*i.e.*, up to 25 m) bedrock cliffs. Furthermore, the proximity to Reversing Falls would have likely prohibited the safe transit or use of the waterway by small unpowered craft.

On the opposite side of Saint John River and to the northeast of Marble Cove (Figure 45), is a neighbourhood of Saint John known locally as Indian Town. Based on the name alone it is suspected that this area may have once been used by First Nations peoples; however, this area has been fully developed with multi-unit residential dwellings since the early 1800s and today it is not inhabited by First Nations peoples. The nearest designated First Nations lands are two small islands (*i.e.*, Goat Island and Indian Island) located approximately 5 km to the North of the project site in the Kennebecasis River.

Figure 45. Aerial photograph, circa 2012, showing the location of Indian Town, Goat Island, and Indian Island within the Kennebecasis River and their relation to the Reversing Falls Mill in Saint John, New Brunswick.

3.3.4 Historical Land-Use

The point of land the Mill sits atop was known historically as Union Point, which is located within Lancaster Parish of St. John County. Since the mid- to late 1800s, the site has been home to heavy industrial activities related to pulp and paper making. The Provincial Archives of New Brunswick does note that in 1866, Union Point had 55 families. It is inferred that those families were present for the operation of the local mill. The settlement of Union Point Road, located nearby, had six resident families at that time. Information on Union Point is scant; however, what information could be compiled from historical references is provided below and summarized in Table 20. What is clear is that Union Point has been the site of industrial activity for > 175 years. Previous mills have burned down and endured financial hardships. At 70 years, IPP has been present at the site the longest.

Table 20. Historical timeline of the use of the Union Point lands, now known as the Irving Pulp & Paper, Limited Reversing Falls Mill in Saint John, New Brunswick.

Year	Description
Cunnabells Sawmill	
1836 / 1837	• St. John Mills and Canal Company constructed and operated the Cunnabells Sawmill at Cunnabelle Point (Union Point)
1850	• Colonel John E. Goddard (1811-1870) purchased the Cunnabells sawmill and operated it with his son Charles W. (1844-?)
Andre Cushing and Company Mill	
1852	• Brothers Theophilus (1802-1881) and Andre Cushing (1820-1891) purchased the Cunnabells sawmill and renamed it the Andre Cushing and Company Mill, a steam sawmill with four grates for manufacturing pine lumber for US markets
1855	• Fire destroyed the sawmill • The sawmill was rebuilt • Started manufacturing sugar box shooks and cheaper qualities of lumber for the West India market
1857	• Theophilus's son George Byron Cushing (1831-1888) became a partner in the firm
1861	• Theophilus retired and transferred his interest in the firm to his son George
1869	• Fire destroyed the sawmill • The sawmill was rebuilt
10 April 1895	• Fire completely destroyed the sawmill that employed about 250
Andre Cushing and Company Mill and Cushing Sulphite Fibre Company	
1896	• The sawmill was rebuilt and the Cushing Sulphite Fibre Company was co-located at the site to process waste from the mill • Together, the two companies employed approximately 550 people
Saint John Pulp & Paper Company	
Circa 1900s	• Saint John Pulp & Paper Company, with operations at Mispec Point, purchased the mills at Union Point
Partington Pulp & Paper	
1911	• English Industrialist Edward Partington (1836-1925), the first Baron of Doverdale, purchased the Saint John Pulp & Paper Company and rebranded as the Partington Pulp & Paper
1913	• Machinery (two small digesters, a pulp drying machine, screens, *etc.*) was moved from the pulp and paper operations at Mispec Point to the Union Point mill
Nashwaak Pulp and Paper Company	
1916	• Bryant Paper Company and the Oxford Paper Company purchased the Edward Partington Pulp and Paper Company and operated as Nashwaak Pulp and Paper Company • Daily sulphite production capacity was 120 tons
1930	• The Nashwaak Pulp and Paper Company was shuttered
Port Royal Pulp & Paper Co. Ltd.	
1932	• Brothers Edward Lacroix (1889-1963) and Charles Lacroix of Quebec purchased the shuttered Mill
1933	• The Mill reopened under the name Port Royal Pulp & Paper Co. Ltd.
Saint John Sulphite Ltd.	
1946	• K.C. Irving (1899-1992) purchased Port Royal Pulp & Paper Co. Ltd. when it fell into financial troubles and initially operated as Saint John Sulphite Ltd.
Irving Pulp & Paper, Limited	
1951	• Saint John Sulphite Ltd. renamed Irving Pulp & Paper, Limited (IPP) • IPP has continuously operated the Reversing Falls Mill since 1946 • Present production is 935 Air Dry Metric Tonnes per day of pulp and employees number ~ 350

Since its purchase by IPP, the Mill has undergone many upgrades and expansions to remain globally competitive. A 1953 aerial photograph of the site shows the existence of some residences on the swath of land between the railroad tracks and the Mill where the Tissue Plant currently exists (Figure 46). The Mill underwent expansion following the purchase by IPP. Lands were acquired for the expansion, which included residential lots.

Figure 46. Aerial photograph, circa 1953, of the Reversing Falls Mill in Saint John, New Brunswick.

Aerial photographs of the Mill since being taken over and operated by IPP are shown in Figure 47 through Figure 50. The photographs show progressive expansion of the Mill site, primarily through development of previous residential and vacant lands towards the railway tracks and through infilling at Lee Cove.

Figure 47. Aerial photograph, circa 1960, of the Reversing Falls Mill in Saint John, New Brunswick.

Figure 48. Aerial photograph, circa 1962, of the Reversing Falls Mill in Saint John, New Brunswick.

Figure 49. Aerial photograph, circa 1976, of the Reversing Falls Mill in Saint John, New Brunswick.

Figure 50. Aerial photograph, circa 1984, of the Reversing Falls Mill in Saint John, New Brunswick.

Figure 51. Aerial photograph, circa 1994, of the Reversing Falls Mill in Saint John, New Brunswick.

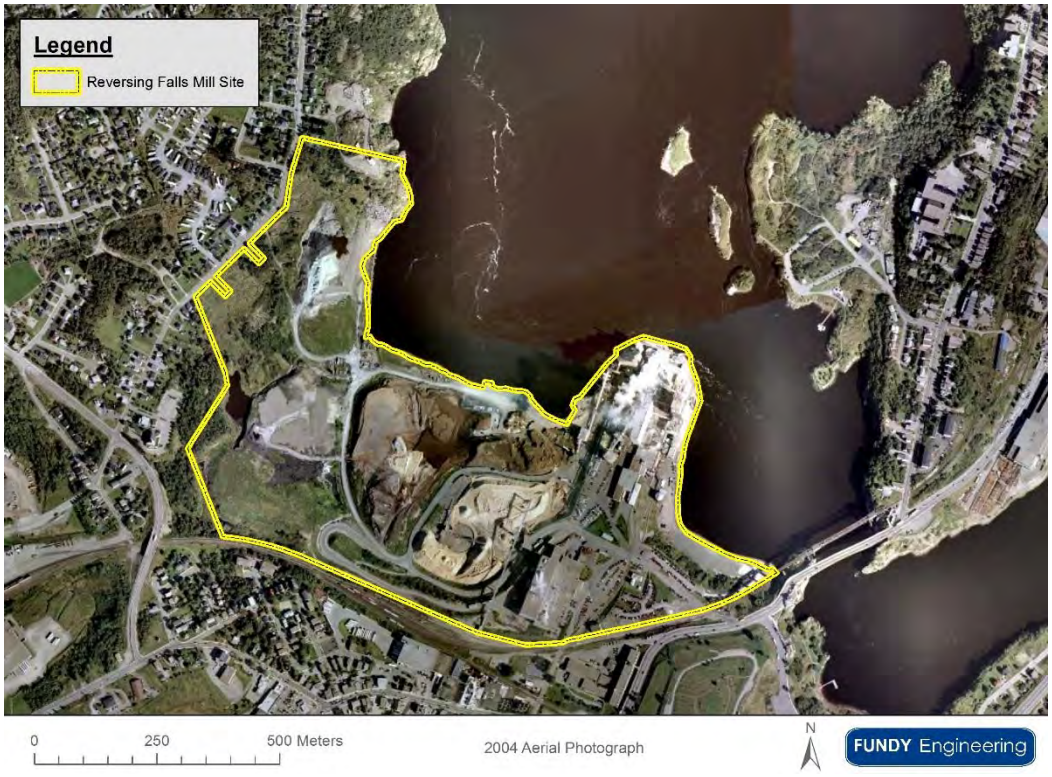


Figure 52. Aerial photograph, circa 2004, of the Reversing Falls Mill in Saint John, New Brunswick.

3.3.5 Health and Safety

The Reversing Falls Mill is a heavy industrial site (*i.e.*, Figure 2). Approximately 350 people are employed at the Mill for routine operations (*n.b.*, many more people are employed during regular operation and maintenance programs). As described in Section 2.7.2.7, a detailed and site-specific health and safety program is in place at the Mill.

3.3.6 Transportation

Saint John has an intricate web of roadways. A network of provincial and municipal roads provides access to the Mill site. The Saint John Throughway (*i.e.*, NB Route 1) is a four-lane divided highway that is maintained by Transfield Dexter Gateway Services Ltd. Municipal roads, such as Bridge Road and Chesley Drive (*i.e.*, together forming NB Route 100) are two-lane asphalt roads that are maintained by the City of Saint John. Within the Mill site, there is a series of private roads, which are maintained by IPP, for accessing specific areas (*i.e.*, Mill Street, Mill Cove Road, and Woodyard Road). All of the roadways described above are designed for heavy truck traffic and / or are truck routes (Figure 53).

The City of Saint John is served by two railways; the Canadian National (CN) railway, which is the sole Class 1 Railroad in Atlantic Canada, and New Brunswick Southern Railway (NBSR). The Mill is serviced with rail by NBSR, which is also a division of JDI. Direct rail connections to other Atlantic Provinces and the US northeast are made via the NBSR. There are several spur lines into the Mill site (Figure 53). One of the spur lines is dedicated to woodchip unloading from rail cars while other spurs are used for delivering pulping chemicals and other process input materials and for exporting Kraft pulp.

The regional road and rail network are well connected to Eastern Canada's largest port. Port Saint John is located at the head of Saint John Harbour near the mouth of the Saint John River (Figure 53). The Port has several berths capable of supporting a large variety of ships. There is also a wide range of facilities to handle all types of cargo and there are several large laydown areas within the Port's land holdings.

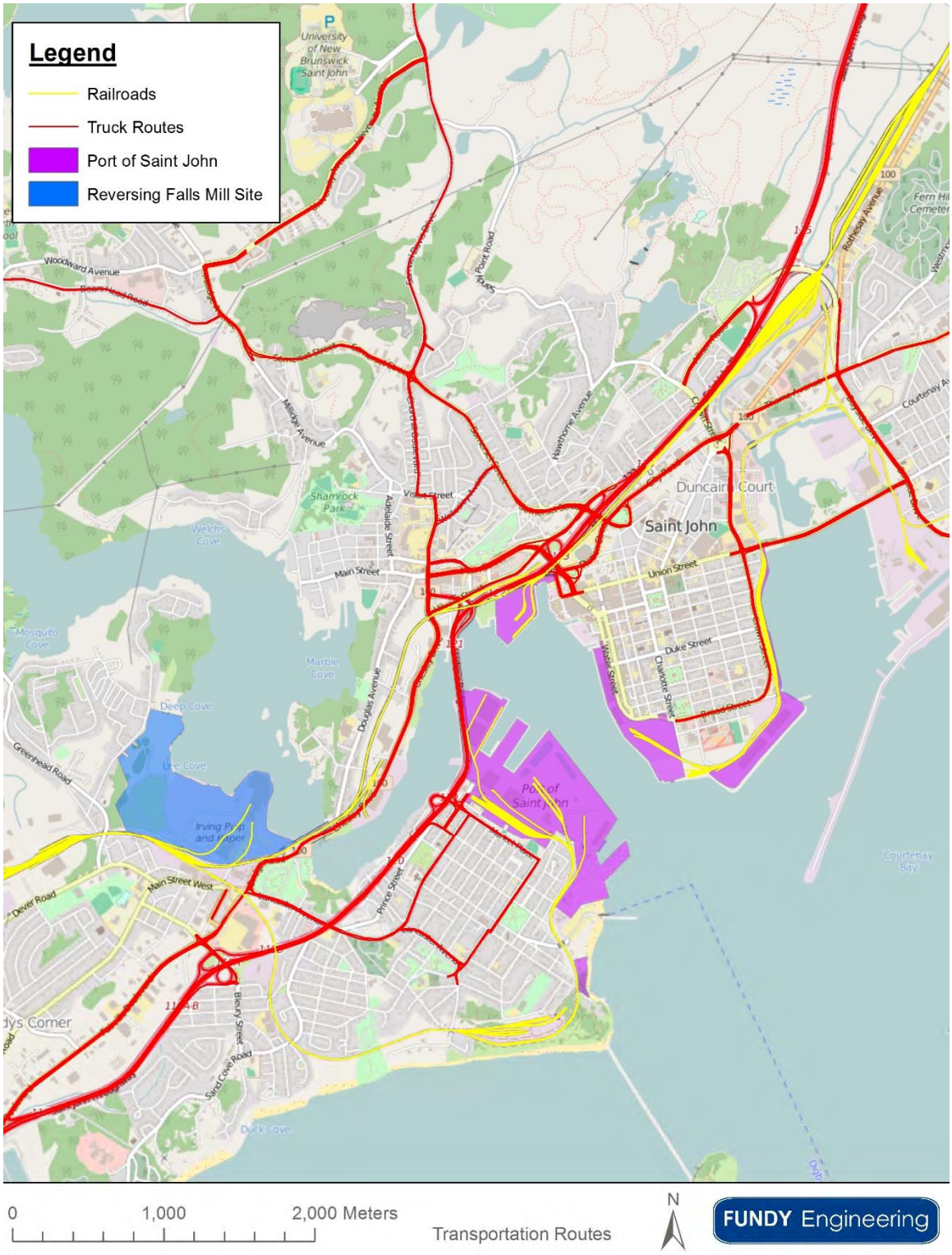


Figure 53. Map showing truck, railway, and port connections to the Reversing Falls Mill in Saint John, New Brunswick.

3.3.7 Municipal Services and Infrastructure

The City of Saint John has an extensive water and sewer network. Both services extend on to the Mill site (Figure 54). Potable water, process water, and fire water at the Mill are all supplied by the City of Saint John. Sanitary waste generated at the Mill is sent to the municipal collection system.

Figure 54. Aerial photograph, circa 2014, showing the major waterlines and sewer lines in the vicinity of the Reversing Falls Mill in Saint John, New Brunswick.

3.3.8 Aesthetics

As Canada's first incorporated city, Saint John has a rich collection of historic buildings. It is a city that has largely built out, not up; in 2011, the population across the 316 km^2 City was only 70 063 [*StatsCan*, 2013]. Only a few tall office buildings (*e.g.*, Bell, Brunswick House, City Hall, JDI, *etc.*) and churches (*e.g.*, Saint John's Anglican Stone Church, Trinity Church, St. Andrew and St. David, *etc.*) dominate Uptown Saint John's skyline (Figure 55). Saint John's east-side and west-side skylines are dominated by long-lived industries that are major employers of residents. To the east are industries such as Bayside Power, the Saint John Refinery, and Irving Paper while to the west are industries such as Moosehead Breweries and IPP.

Figure 55. Panoramic photographs showing the skyline of the east Saint John, Uptown Saint John, and west Saint John, New Brunswick.

3.3.9 Recreation and Tourism

The Mill site is a private and secure facility. It is not part of any International, National, Provincial, or Municipal park. It does not comprise a migratory bird sanctuary, ecological reserve, wildlife management area, wildlife refuge, or game sanctuary. The site is not protected environmentally in any manner (*i.e.*, protected watershed, wellfield protection zone, and / or protected natural area). This was confirmed through information reviewed within the ACCDC databases and mapping available from the New Brunswick Department of Natural Resources, the NBDELG, and the City of Saint John.

Hundreds of thousands of people are drawn to the region each year for the rich urban architecture, the region's natural beauty, and the unique maritime culture. A cruise ship business began in 1989 when a ship was forced into port during a hurricane. Since then, more than two million passengers have called on Saint John. There are many attractions that tourists are encouraged to visit as shown in Figure 56. According to *Discover Saint John*, the top attractions are the Reversing Falls / Rapids, the Saint John City Market, and the New Brunswick Museum.

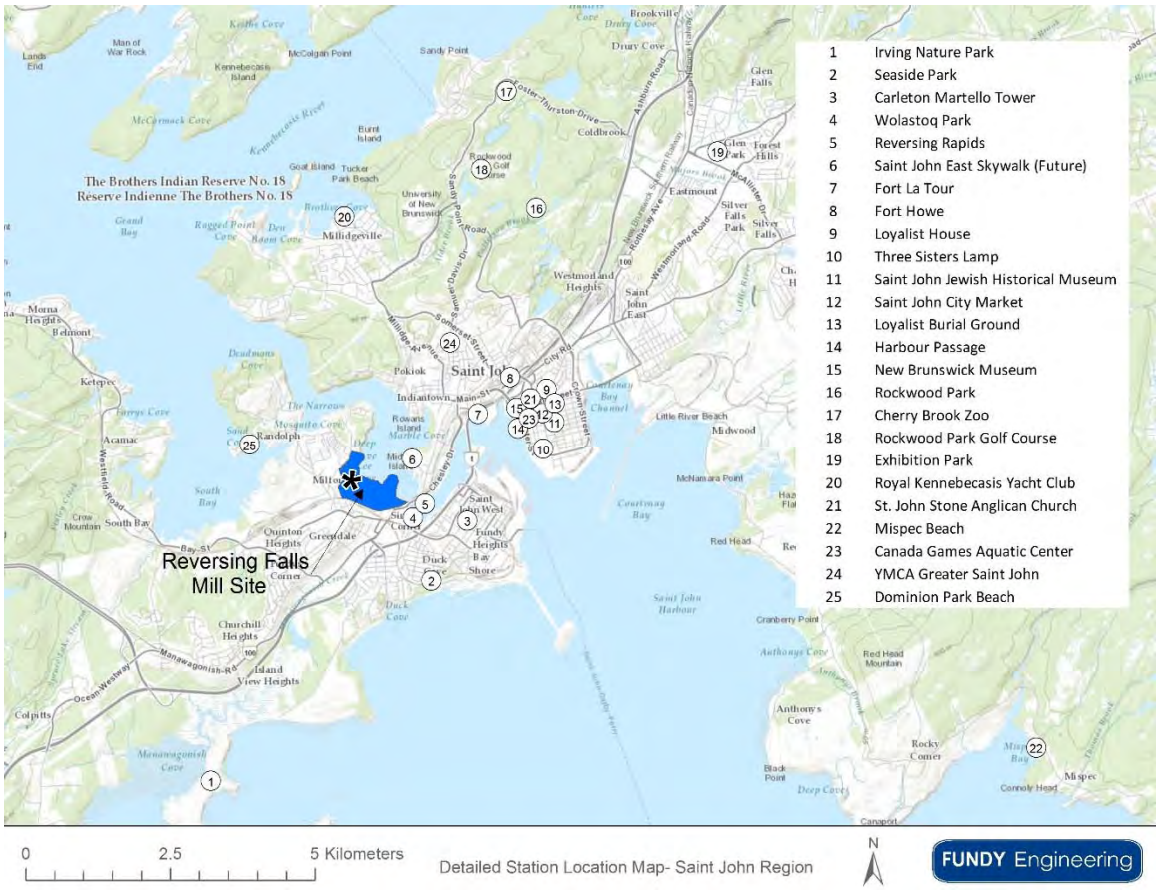


Figure 56. Several tourist attractions in the vicinity of the Reversing Falls Mill in Saint John, New Brunswick.

Saint John has several National Historic sites that tourists are lured by. Those sites include:

- Carleton Martello Tower;
- Fort Howe;
- Fort La Tour;
- Loyalist House;
- Saint John City Market; and
- St. John's Anglican Stone Church.

4.0 POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATION

4.1 PROJECT INTERACTIONS / SCOPING

As noted in Section 2.7, there are five Project stages. Different activities are associated with each stage and not all stages interact with the environment. For this EIA, environmental interactions are strictly limited to the spatial and temporal boundaries of this Project. For example, interactions are not considered in the transportation of wood chips to the Mill as that is already a pre-existing activity; however, the processing of Kraft pulp through the new bleached screening system and the new pulp dryer 24 hours per day, 7 days a week, and 365 days per year is considered. Similarly, the operation of the lime kiln at the Mill is not considered as it is not part of this Project, but operation of the new baling line is considered.

A high-level assessment of the Project stages and potential environmental interaction is summarized in Table 21. Accordingly, only Stages II, III, and V require further assessment here as they are the only stages that have potential interactions with the environment that can be identified.

Table 21. Project stages for the pulp dryer modernization project at the Reversing Falls Mill in Saint John, New Brunswick. Included are the activities associated with each stage and whether or not there is an interaction with the environment.

Stage	Activities	Interaction
I – Environmental permitting, monitoring, and compliance	• Desktop reviews • Non-intrusive field investigations • Permit applications • Site reviews and inspections • Development and review of best management practices	No
II – Construction	• Foundation excavation • Constructing buildings • Installing infrastructure • Commissioning infrastructure	Yes
III – Operation and maintenance	• Screening bleached pulp • Drying bleached pulp • Baling dried pulp	Yes
IV – Decommissioning	• Removing equipment and infrastructure • Site grading and leveling • Removing of contaminated materials • Reclaiming the site	Yes, but will be defined at a later date
V – Mishaps, errors, and / or unforeseen events	• Potential for spills, contaminant releases, fires, and / or explosions	Yes

Fundy Engineering's Project Team, based on previous environmental impact assessment experience and professional judgment, assessed potential interactions between Stages II, III, and V (*i.e.*, those with an environmental interaction as identified in Table 21) and all of the environmental components described in Section 3.0. Through that exercise, it was determined that there are 11 environmental components that require detailed assessment with respect to the Reversing Falls Mill Pulp Dryer Modernization Project (*i.e.*, those with a potential Project interaction). Those environmental components are identified below as Valued (socially, economically, culturally and / or scientifically) Environmental Components (VECs).

Table 22. Assessment of potential interactions of various stages of the pulp dryer modernization project at the Reversing Falls Mill in Saint John, New Brunswick and the environment. Check marks indicate that there is potential for interaction and requires further assessment.

Environmental Component	Stage and Environmental Interaction		
	II: Construction	III: Operation & Maintenance	V: Mishaps, Errors & Unforeseen Events
PHYSIO-CHEMICAL ENVIRONMENT			
Climate	NA	NA	NA
Air quality	✓	✓	✓
Sound emissions	✓	✓	✓
Topography	NA	NA	NA
Hydrology	✓	✓	✓
Geology	NA	NA	NA
Hydrogeology	✓	✓	✓
BIOLOGICAL ENVIRONMENT			
Terrestrial flora & fauna	✓	✓	✓
Aquatic flora & fauna	✓	✓	✓
SOCIO-ECONOMIC ENVIRONMENT			
Demographics & labour	✓	✓	✓
Archaeological and cultural features	NA	NA	NA
Land-use	NA	NA	NA
Transportation network	✓	✓	✓
Aesthetics	✓	✓	✓
Protected areas	NA	NA	NA
Recreation and tourism	✓	✓	✓
Health and safety	✓	✓	✓

4.2 OVERVIEW OF VALUED ENVIRONMENTAL COMPONENT ANALYSIS

Fundy Engineering employs a visual method of impact level when assessing VECs through the EIA process. Our proven method (Table 23) is a way for reviewers (*i.e.*, Regulator(s), stakeholders, and the general public) to quickly and easily review the impacts without having to understand a complex environmental assessment process. In the analysis of Project impacts on the environment, there are several terms that must be considered.

Project impact green lights are considered those activities that may yield short-term impacts. Those impacts would be experienced for a brief period of the Project (*i.e.*, a day or week during a Project Stage). For example, a green light may be applied to sound emissions if a pile driver were to be used for a one week period over a year-long construction period where the only loud activity anticipated is the driving of piles. Green lights are also applied to activities that have a positive outcome. Creating long-term employment through the development of a recreational facility, for example, would be a positive impact that would be assigned a green light in our analysis. If the impact is not entirely positive, then mitigation measures are likely required for green lights.

Project yellow lights are considered to be those activities that extend between the short-term and long-term. Impacts considered long-term are those that may be experienced for a prolonged period of time, such as during the entire duration of the Project. With yellow lights, long-term impacts are not permanent (*i.e.*, they are reversible and with as environmental protection methods are improved, the impact may be further reduced). An example of a yellow light would be increased erosion along a linear corridor resulting from the clearing and grubbing of a forest. The impact is reversible (*i.e.*, replanting of vegetation to return to pre-impact conditions) or can be mitigated (*i.e.*, through the implementation of best-management practices, such as silt fences and sedimentation basins). Mitigation measures are required for yellow lights.

Red lights are applied when long-term impacts are considered to be permanent. That is they may cause irreversible change in the environment. An example would be a large and persistent oil spill to a major drinking water aquifer. After halting the spill, considerable effort may be required to remediate the contamination. During remediation, which would likely be prolonged, a new source of drinking water would be required. Red lights require that mitigation measures be developed.

When there is no anticipated change to the component as a result of the project, a blue light is applied. Blue lights do not require mitigation because there is no change.

Table 23. Fundy Engineering's Valued Environment Component Assessment visual coding method, which is analogous to a traffic light.

Assessment Symbol	Description
	*Favourable or little to no impact*: criteria receiving this impact level have no significant problems associated with them; they are green lights for the Project.
	*Potential impacts that may require some degree of mitigation*: criteria receiving this impact level do not appear to have significant problems associated with them; they are yellow lights for the Project and should be approached with caution.
	*Not favorable or a major impact*: criteria receiving this impact level rating would be difficult to implement; they are red lights for the Project.
	*No change in existing impact*: criteria receiving this impact level have no additional potential impact from the Project than already currently exists.

Residual effects are also considered in the assessment of potential project environmental impacts. A residual effect is any measurable or demonstrable environmental impact that remains following the implementation of mitigation measures. Each Project activity, component, and associated mitigation measure is assessed on different attributes of the potential for environmental impact (*i.e.*, intensity, spatiotemporal extent, frequency, and reversibility). The potential for residual effects is described for each VEC below. In the instance where a residual effect is expected to occur, the potential impact is further assessed to determine whether any cumulative effects may arise through the interaction between the Project-specific impacts and similar effects from past, present, and / or reasonably foreseeable activities.

4.3 POTENTIAL PROJECT IMPACTS ON THE ENVIRONMENT

4.3.1 Valued Environmental Components Assessed

The following VECs were assessed for the pulp dryer modernization project at the Reversing Falls Mill in Saint John, New Brunswick:

- physio-chemical environment:
  - air quality;
  - sound emissions;
  - surface water quantity and quality; and
  - groundwater quantity and quality;
- biological environment:
  - terrestrial flora and fauna;
  - aquatic flora and fauna; and
- socio-economic environment:
  - labour and economy;
  - transportation network;
  - aesthetics;
  - recreation and tourism; and
  - health and safety.

The identified VECs were assessed with consideration given to risks associated with the construction and commissioning stage, the operation and maintenance stage, and any mishaps, errors, and / or unforeseen events (*i.e.*, malfunctions or accidents) that may occur as a result of the proposed Project. The assessment of the VECs listed above is described in detail in the sections that follow.

4.3.2 Physio-Chemical Environment

4.3.2.1 Air Quality

Air quality was selected as a VEC because it has the potential to be affected during all aspects of the Project (*e.g.*, construction and commissioning, operation and maintenance, and mishaps, errors, and / or unforeseen events). The following potential impacts associated with air quality were assessed:

- micro-climate (*i.e.*, temperature and precipitation) of the local area;
- emissions of CO;
- emissions of NO_X;
- emissions of SO_2;
- emissions of VOCs; and
- emissions of PM (*i.e.*, from exhausts and dusts).

4.3.2.1.1 Potential Impacts

The complete assessment of potential impacts of the potential Project on air quality is

provided in Table 24. Overall, the assessment yielded one green light, 10 yellow lights, and seven no change lights. As noted in Table 1, this Project is expected to yield a small positive impact to air quality in the area. That positive impact is attributed to the reduction in shunting of pulp bales from the Mill to the Tissue Mill and from the Mill to the east Saint John warehouse because there will be increased storage in the new warehouse and Tissue Mill clamptrucks will be able to move bales from the warehouse into the Tissue Mill. The potential impacts to air quality are related to construction equipment emissions and the emissions associated with equipment during any mishaps, errors, and / or unforeseen events. Those potential impacts can be reduced or eliminated using the mitigation measures described below.

4.3.2.1.2 Proposed Mitigation

At a minimum, the mitigation measures outlined below should be undertaken by Project personnel to ensure that potential impacts to air quality are minimized.

- Heavy equipment should only be operated at optimum loading rates.
- Heavy equipment should be turned off when not in use and / or when practical.
- The number of vehicle kilometers traveled should be kept to a minimum (*i.e.*, there will be no unnecessary operation of equipment in and around the site).
- Heavy equipment should be operated at moderate and steady speeds.
- Heavy equipment should only be refueled using a protocol designed to mitigate any risk to the environment.
- If the application of water as a dust suppressant is deemed necessary (*n.b.*, this is the preferred method of dust suppression), it should be applied using suitable equipment (*e.g.*, a tanker truck equipped with spray bars and methods of controlling water flow).

4.3.2.1.3 Potential Post-Mitigation Residual and Cumulative Impacts

Overall, this Project is expected to effect a positive change to local air quality as summarized in Table 1. There are no residual and / or cumulative impacts anticipated to air quality as a result of this Project.

4.3.2.2 Sound Emissions

Sound is emitted by all construction equipment. This sound is often above ambient sound levels. When they become too high, sound levels may be a nuisance to nearby residents and may cause disturbance to local wildlife. Additionally, sound levels can be a hazard to all Project personnel if appropriate precautions are not taken. Because of this, sound emissions were selected as a VEC. The following potential impacts were assessed for the Project:

- sound levels;
- sound duration;
- sound repetition; and
- ground vibration.

Sound waves generate ground vibration hence the reason for assessing the impact of the

Project on ground vibrations.

4.3.2.2.1 Potential Impacts

Table 25 is the complete assessment of potential impacts conducted for sound emissions associated with the Project. It is important to note that a distance of about 370 m separates the nearest residence (*i.e.*, on Harding Street) to the Project. The nearest business (*i.e.*, on Main Street) is about 250 m distant. Sound emission levels considerably dissipate over that distance.

Of the 12 potential impacts, seven were assigned yellow lights. Sound emission levels, sound repletion, and ground vibrations during Stage II and Stage V yielded yellow lights. No change lights were applied to all potential impacts during Stage III because the site is already used for commercial / industrial operations and no change in sound emission levels is anticipated between existing and future conditions. Equipment used for the proposed Project will be similar to that already used on the site. Because it is difficult to determine what type(s) of equipment would be required during a mishap, error, and / or unforeseen event, yellow lights were applied.

4.3.2.2.2 Proposed Mitigation

The mitigation measures provided below should be implemented by Project personnel to minimize the potential impact of sound emissions to nearby receptors (*i.e.*, residents and the general public), particularly during Project construction and operation and maintenance.

- All heavy equipment should be equipped with the appropriate manufacturer designed sound emission abatement equipment (*i.e.*, mufflers).
- Shrouding on equipment should be inspected regularly to ensure that it is in good condition and limits the level of sound emitted.
- The exhaust systems of all heavy equipment should be inspected regularly to ensure that mufflers are operating properly.
- Heavy equipment should be maintained according to manufacturer recommended servicing periods.
- The idling of all heavy equipment should be kept to a minimum.
- Any loud equipment (*i.e.*, > 90 dBA at the source) should be sited as far away as possible from the nearest sensitive receptor (*i.e.*, residents).
- Loud construction activity should be scheduled / planned to occur during normal workday / daylight hours, where possible.
- Contractor(s) / subcontractor(s) should ensure that all equipment has proper functioning noise abatement equipment.

4.3.2.2.3 Potential Post-Mitigation Residual and Cumulative Impacts

Project construction may result in some short-term sounds greater than are currently emitted from the Mill site. These potential impacts can be mitigated as noted above. During operation, it is anticipated that there will be no change in sound emissions.

4.3.2.3 Surface Water Quantity and Quality

The Mill is located on the bank of the Saint John River and some of the Project construction and operation activities have the potential to impact surface water. Therefore, surface water quantity and quality was selected as a VEC. The following potential impacts were assessed for the Project:

- turbidity / suspended sediment;
- surface water quantity (*i.e.*, increased runoff);
- surface water quality (*i.e.*, general chemistry and trace metals);
- contamination by hydrocarbons / hazardous chemicals; and
- surface water drainage characteristics.

4.3.2.3.1 Potential Impacts

The Project footprint is greater than 180 m from Lee Cove and greater than 150 m from Mill Cove. As a result, there is no requirement to obtain a Watercourse and Wetland Alteration permit from the NBDELG. The Mill's Contractor Safety and Environmental Program Manual (CONSEP) specifies the use of silt dams and holding basins, when required, for limiting the transport of sediment off-site. The existing storm water collection system and Mill's EPP will be used during Project construction and operation and maintenance. Therefore, the majority of the potential impacts (n = 9) were assigned no change lights (Table 26). All other potential impacts, which relate to the release of hydrocarbons or hazardous chemicals, were assigned yellow lights (n = 6).

A yellow light was applied to surface water quality during operation (Table 26) because, as noted in Table 1, two of the three project consequences are related to the Mill's effluent. BOD is expected to increase by 1.5 % and TSS is expected to increase by 1.5 %. Although these very small increases are projected, we do not expect that this will change the Mill's current effluent discharge compliance capability for BOD, TSS, and acute lethal toxicity limits. **The Mill's effluent will continue to comply with the limits outlined in the Water Quality ATO**. A yellow light was also applied to surface water quality during Stage IV and that is because a short duration release of effluent outside the regulatory limits could considerably affect the receiving water body.

4.3.2.3.2 Proposed Mitigation

The mitigation measures listed below should be employed to minimize the chance of activities related to the Project from affecting surface water environs through the introduction of hydrocarbons and hazardous chemicals and contaminants.

- Fuel storage and fueling / lubricating activities should only be performed in designated safe areas that are located such that minimum effects would be felt from a spill and harmful substances would in no circumstances enter surface water systems or storm water collection systems.
- Fuel storage and fueling / lubricating activities should only be performed in designated safe areas that are located > 30 m from a watercourse and / or wetland.

- All potential contaminants and contaminated materials will be stored in a contained area where they cannot become mobilized or access the ground surface (*i.e.*, be placed atop and within spill containment pads).
- Regular maintenance and inspection of equipment on site should be performed to minimize the risk of spills of oil based fluids that pose a threat to surface water systems.
- Appropriate spill response equipment (*i.e.,* spill kits) should be kept in designated areas, close to any designated fueling stations or potential contaminant storage areas. Equipment operators on site should be trained in the use of such equipment.
- All spills of hazardous materials should be reported immediately to the IPP Technical Department representative who will contact the appropriate Regulator(s).
- All solid waste generated during the Project works should be collected, properly stored, removed, and disposed of as outlined in the Mill's waste disposal guidelines.
- IPP should provide appropriate receptacles for Project personnel to dispose of personal garbage.
- The Project site should be kept clear of all solid waste and the site should be inspected daily to gather any debris and dispose of it in the appropriate receptacles.
- Sediment control measures (*e.g.*, silt fences, *etc.*) should be installed wherever necessary to minimize and / or eliminate the amount of sediment introduced to storm water systems and any watercourse, (see CONSEP Manual, Section 9).

4.3.2.3.3 Potential Post-Mitigation Residual and Cumulative Impacts

No residual and cumulative effects are likely to occur to the surface water so long as the mitigation measures provided here are followed.

4.3.2.4 Groundwater Quantity and Quality

Groundwater was identified as a VEC because surface water and groundwater systems along the banks of the Saint John River generally have strong communication systems. The specific potential impacts assessed were:

- groundwater quality (*i.e.*, microbiology, general chemistry, trace metals);
- groundwater quantity;
- contamination by hydrocarbons; and
- groundwater recharge areas.

4.3.2.4.1 Potential Impacts

Results of the groundwater quantity and quality impact assessment are provided in Table 27. Three yellow lights were applied to the potential impacts and are related to potential spills of hydrocarbons and hazardous chemicals. It is realized that contamination may occur to the groundwater system and potential impacts could be long-lasting depending on the degree of the spill and the initial clean-up efforts. All other potential impacts were assigned no change lights (n = 9).

4.3.2.4.2 Proposed Mitigation

The mitigation measures listed below should be employed to minimize the chance of Project activities from impacting the groundwater regime by eliminating the potential pathways where hydrocarbons and other pollutants may enter the system (*n.b.*, the mitigation measures are nearly identical to those provided for surface water protection and is because the two systems are often interconnected).

- Fuel storage and fueling / lubricating activities will only be performed in designated safe areas that will be located such that minimum effects would be felt from a spill and harmful substances would in no circumstances enter groundwater systems.
- Fuel storage and fueling / lubricating activities should only be performed in designated safe areas that are located > 30 m from a watercourse and / or wetland.
- All potential contaminants and contaminated materials will be stored in a contained area where they cannot become mobilized or access the ground surface (*i.e.*, be placed atop and within spill containment pads).
- Regular maintenance and inspection of equipment on site should be performed to minimize the risk of spills of oil based fluids that pose a threat to groundwater systems.
- Appropriate spill response equipment (*i.e.,* spill kits) should be kept in designated areas, close to designated fueling stations and all personnel on site should be trained in the use of such equipment.
- All spills of hazardous materials should be reported immediately to the IPP Technical Department representative who will contact the appropriate Regulator(s).

4.3.2.4.3 Potential Post-Mitigation Residual and Cumulative Impacts

If a spill migrates to the groundwater system, the potential impacts could be long lasting because groundwater environments are complex and often difficult to remediate. This is an extremely remote possibility because of the stringent environmental protection measures used on-site under IPP's existing EMS and through the environmental protection measures that will be set forth in the Project-specific EPP.

Table 24. Assessment of potential impacts of the pulp dryer modernization project at the Reversing Falls Mill in Saint John, New Brunswick on air quality.

Potential Impact	Stage II: Construction & Commissioning			Stage III: Operation & Maintenance			Stage V: Mishaps, Errors, and / or Unforeseen Events		
	Degree of Impact	Comment	Mitigation	Degree of Impact	Comment	Mitigation	Degree of Impact	Comment	Mitigation
Micro-climate (*i.e.*, temperature and precipitation)	=			=			=		
CO emissions	△	1	A, B	○	2	A, B	△	1	A, B
NO_X emissions	△	1	A, B	=			△	1	A, B
SO_2 emissions	△	1	A, B	=			△	1	A, B
VOC emissions	△	1	A, B	=			△	1	A, B
PM emissions (*e.g.*, exhausts and dusts)	△	1	A, B	=			△	1	A, B

COMMENTS

1 – The majority of Project construction equipment will effect a change in this parameter and / or emit these pollutants to the atmosphere leading to minor impacts within the local airshed.
2 – There will be a decrease of ~ 8 380 truck trips per year due to reductions in shunting pulp bales from the Mill to the Tissue Mill and from the Mill to the east Saint John warehouse (*i.e.*, there will be increased storage in the new warehouse and Tissue Mill clamptrucks will be able to move bales from the new warehouse into the Tissue Mill). It is estimated that trucking GHG emissions will decrease by 36.3 $t \cdot yr^{-1}$.

MITIGATING MEASURES

A – All Project personnel should be briefed on the potential impacts that equipment emissions can have on the quality of the local airshed. Briefing information should range from describing emissions that are released from equipment during operation to how those emissions can be reduced.
B – Mitigation measures developed for this Project should be adhered to in order to adequately address those potential issues.
C – In the event of an emergency, equipment with pollutant emission reduction technologies may not be readily available. What will be more important at this stage is correcting the error, mishap, and / or unforeseen event to limit any and all permanent environmental impact(s).

Table 25. Assessment of potential impacts of the pulp dryer modernization project at the Reversing Falls Mill in Saint John, New Brunswick on sound emissions.

Potential Impact	Stage II: Construction & Commissioning			Stage III: Operation & Maintenance			Stage V: Mishaps, Errors, and / or Unforeseen Events		
	Degree of Impact	Comment	Mitigation	Degree of Impact	Comment	Mitigation	Degree of Impact	Comment	Mitigation
Sound levels	△	1	A, B	=			△	2	C
Sound duration	=			=			△	2	C
Sound repetition	△		A, B	=			△	2	C
Ground vibration	△		A, B	=			△	2	C

COMMENTS

1 – The heavy equipment planned for constructing the Project may emit sound at levels less than currently emitted during normal Mill operations. Although back-up alarms on heavy equipment emit sounds at 120 dBA, existing loaders, bulldozers, and other heavy equipment used on site have those alarms in use and are not continuous in operation.
2 – Equipment brought in to mitigate any mishaps, errors, and / or unforeseen events may not have appropriate noise dampening measures or vibration reduction devices, but their operation would be expected to be of short duration.

MITIGATING MEASURES

A – All Project personnel should be briefed on the potential impacts that heavy equipment can have on the sound levels in the area.
B – Mitigation measures developed for this Project should be adhered to in order to adequately address those potential issues.
C – In the event of an emergency, equipment with proper sound abatement technologies may not be readily available. What will be more important at this stage is correcting the error, mishap, and / or unforeseen event to limit any and all permanent environmental impact(s).

Table 26. Assessment of potential impacts of the pulp dryer modernization project at the Reversing Falls Mill in Saint John, New Brunswick on surface water quantity and quality.

Potential Impact	Stage II: Construction & Commissioning			Stage III: Operation & Maintenance			Stage V: Mishaps, Errors, and / or Unforeseen Events		
	Degree of Impact	Comment	Mitigation	Degree of Impact	Comment	Mitigation	Degree of Impact	Comment	Mitigation
Turbidity / suspended solids	=			=			△	4	A, B, D
Surface water quantity (*i.e.*, change in runoff regime)	=			=			=		
Surface water quality (*i.e.*, change in general chemistry, trace metals)	=			△	3	C	△	5	A, B, C, D
Hydrocarbon / hazardous chemical contamination	△	1, 2	A, B	△	1, 2	A, B	△	1, 2	A, B, D
Surface water drainage characteristics	=			=			=		

COMMENTS

1 – There is a potential that hydrocarbons, through their storage and use on-site, could be introduced to surface water systems (*i.e.*, the Saint John River).
2 – There is a potential that hazardous chemicals, through their storage and use on-site, could be introduced to surface water systems (*i.e.*, the Saint John River).
3 – There will be a 1.5 % increase in effluent BOD due to increased pulp production and a 1.5 % increase in effluent TSS due to an increase in bio-solids generated in the moving bed bio-reactor; however, these increases are not expected to affect IPP's ability to meet effluent regulations specified in the Mill's ATO.
4 – Soil exposure may lead to the increased introduction of sediments to surface water systems, which can result in system quality changes and subsequently affecting the system's ability to support life processes.
5 – If the primary water treatment processes failed to work properly, there could be a short-term release of untreated water from the Mill.

MITIGATING MEASURES

A – All Project personnel should be briefed on the potential impacts that the Project could have on surface water quality.
B – Mitigation measures developed for this Project should be adhered to in order to adequately address those potential issues.
C – Mill effluent is monitored on a frequent basis such that any considerable changes in quality are quickly identified and remediated.
D – Emergency response / contingency plans should be designed to prevent any major and / or sustained environmental damage during any errors, mishaps, and / or unforeseen events.

Table 27. Assessment of potential impacts of the pulp dryer modernization project at the Reversing Falls Mill in Saint John, New Brunswick on groundwater quantity and quality.

Potential Impact	Stage II: Construction & Commissioning			Stage III: Operation & Maintenance			Stage V: Mishaps, Errors, and / or Unforeseen Events		
	Degree of Impact	Comment	Mitigation	Degree of Impact	Comment	Mitigation	Degree of Impact	Comment	Mitigation
Groundwater quality (*i.e.*, change in general chemistry, trace metals)	=			=			=		
Groundwater quantity (*i.e.*, decreased well yields)	=			=			=		
Hydrocarbon / hazardous chemical contamination	△	1	A, B	△	1	A, B	△	1	A, B
Groundwater recharge areas	=			=			=		

COMMENTS

1 – If a hydrocarbon or hazardous chemical spill migrates to the groundwater system, the potential impacts could be long lasting because groundwater systems are complex and often difficult to remediate once contaminated; however, there are no known groundwater users in the immediate area (*n.b.*, residential, commercial, and industrial water is supplied via the City of Saint John's municipal water distribution system). Also, many areas of the site where there is a potential for a spill to occur either have impermeable surfaces or are equipped with spill containment / collection systems.

MITIGATING MEASURES

A – All Project personnel should be briefed on the potential impacts that the Project could have on ground water quality.
B – Mitigation measures developed for this Project should be adhered to in order to adequately address those potential issues.

4.3.3 Biological Environment

4.3.3.1 Terrestrial Flora and Fauna

Based on information obtained from the ACCDC, some COSEWIC and *SARA* ranked species of terrestrial fauna do exist within a 5 km radial buffer surrounding the Project site (*i.e.*, refer to Section 3.2 for a description of the species, Appendix III for the ACCDC data report, and Table 16 for a listing and Figure 31, Figure 36, Figure 37, and Figure 39 for distribution maps). The following potential impacts were evaluated with respect to terrestrial flora and fauna:

- species of special conservation concern (*i.e.,* those listed under *SARA* and by the COSEWIC);
- existing vegetation and habitat;
- plant associations and biodiversity;
- wildlife species (*i.e.*, birds, animals, and mammals) and habitat (direct and indirect);
- wildlife species and habitat fragmentation; and
- natural wildlife migration patterns (*i.e.*, migratory birds) / nesting / food chains.

4.3.3.1.1 Potential Impacts

The Project site does not contain any substantial areas that are vegetated with terrestrial flora (*i.e.*, the Project site, as shown in Figure 3, is almost entirely covered with impermeable asphalt roadways / parking lots, some temporary buildings, and some planted green spaces). Because the site is almost completely devoid of vegetation, there is little to no habitat that would be desirable for terrestrial fauna. Access for large land mammals is also limited or restricted because of a perimeter security fence. None of those species identified in the ACCDC report are known to inhabit the property. Furthermore, the probability for any of those species being impacted by the proposed Project is extremely low given the existing and long-lived land-use as a heavy industrial site.

Migratory birds are afforded special protection under the *Migratory Birds Convention Act.* Several species of migratory birds are known to migrate through the region. The lack of vegetation and cover on the site makes it an unlikely area for nesting locations. The presence and continuous movement of heavy equipment on the site (*e.g.*, transport trucks, loaders, bulldozers, *etc.*) makes it unattractive for staging and stopover areas. Nearby nesting grounds and open waters used by migratory birds are also unlikely to be indirectly affected by the Project. Several sightings of ACCDC ranked migratory birds have been observed within a 5 km radial buffer around the site. As above, none of those species are known to inhabit or frequent the site, but they may be transient visitors.

The impact assessment for terrestrial flora and fauna is summarized in Table 28. Because of existing conditions as a heavy industrial site with a well-prepared and implemented EMS by IPP personnel, there is expected to be very little change between now and throughout the various Project stages. As a result, no change lights were applied to the majority of potential impacts (n = 12). Green lights were given to two potential impacts. Yellow lights were applied to four potential impacts and are related to species of special conservation concern, which are susceptible to environmental impacts.

4.3.3.1.2 Proposed Mitigation

The mitigation measures listed below should be employed to minimize the probability of activities related to the Project from affecting surrounding terrestrial flora and fauna.

- Project personnel should properly dispose of food scraps and garbage in the appropriate receptacles provided by IPP.
- Waste stored on-site should be stowed in an appropriate manner and will be transported to an appropriate disposal facility on a regular basis.
- Project personnel should be advised, prior to working on the Project site, to not feed or harass nuisance wildlife (*e.g.*, pigeons, sea gulls, rodents, *etc.*).
- No attempt should be made to chase, catch, divert, follow, or otherwise harass wildlife by vehicle or on foot.
- If injured or diseased wildlife are encountered, then the Department of Natural Resources and the Canadian Wildlife Service should be contacted to determine the appropriate course of action.
- If deceased animals are encountered, they should be removed and disposed of, as soon as possible, in consultation the Department of Natural Resources and the Canadian Wildlife Service.
- Heavy equipment and other vehicles used on the Project site should yield the right-of-way to wildlife.
- No Project personnel should affect wildlife populations by either hunting or trapping and firearms should be strictly prohibited on the Project site.
- If an active nest, den, *etc.* is encountered, it should be immediately reported to the Project manager / supervisor(s) who should ensure that a no-disturbance buffer zone is established.
- No Project personnel should deposit or permit to be deposited oil, oil wastes, or any other substance harmful to migratory birds in any waters or any area frequented by migratory birds.

4.3.3.1.3 Potential Post-Mitigation Residual and Cumulative Impacts

No residual and cumulative effects are likely to occur to terrestrial flora and fauna over the duration of the construction and operation of the Project assuming the above mitigation measures are implemented.

4.3.3.2 Aquatic Flora and Fauna

The Project site is adjacent to the Saint John River. Watercourses adjacent to the Project site, and the flora and fauna occupying them, may be negatively impacted by the Project in two ways: 1) via the release of contaminants, such as hydrocarbons from refueling activities and heavy equipment breakdown / malfunction; and 2) the release of sediments during surface water runoff. Therefore there is potential for the Project to have a negative impact on the aquatic flora and fauna contained within the Saint John River, which the ACCDC identifies as containing some aquatic fauna that are protected under the *SARA* or the COSEWIC (*e.g.*, the shortnose sturgeon, *etc.*; refer to Appendix III for the ACCDC report). The following potential impacts to aquatic flora and fauna were considered:

- species of special conservation concern (*i.e.,* those listed under *SARA* and by the COSEWIC);
- existing vegetation and habitat;
- plant associations and biodiversity;
- wildlife species (*e.g.*, fishes, mammals, *etc.*) and habitat (direct and indirect);
- wildlife species and habitat fragmentation; and
- natural wildlife migration patterns (*i.e.*, anadromous fishes) / food chains.

4.3.3.2.1 Potential Impacts

The impact assessment for aquatic flora and fauna is summarized in Table 29. There is not likely to be any change between now, through Project construction, and when the Project is in operation. Therefore, the majority of the potential impacts assessed were given no change lights (n = 15). Green lights were applied to two potential impacts and one yellow light was applied. Any identified potential impacts are easily mitigated.

4.3.3.2.2 Proposed Mitigation

The environmental protection measures provided below should be implemented by all Project personnel to minimize the potential impact on aquatic flora and fauna.

- The environmental spill response and reporting of IPP's EMS should continue to be implemented.
- Perimeter erosion and control measures, such as silt fences, should be established between the Project site and any adjacent waterbodies, where necessary, prior to any on-site construction activity.
- The Saint John River should be visually monitored within Lee Cove and Mill Cove to identify any sources of sediment inflow from the site, and if any sources are identified, they should be stopped using appropriate erosion and sediment control devices, such as silt fences, *etc.*

4.3.3.2.3 Potential Post-Mitigation Residual and Cumulative Impacts

No residual and cumulative effects are likely to occur to aquatic flora and fauna over the duration of the construction and operation of the Project assuming the above mitigation measures are implemented.

Table 28. Assessment of potential impacts of the pulp dryer modernization project at the Reversing Falls Mill in Saint John, New Brunswick on terrestrial flora and fauna.

Potential Impact	Stage II: Construction & Commissioning			Stage III: Operation & Maintenance			Stage V: Mishaps, Errors, and / or Unforeseen Events		
	Degree of Impact	Comment	Mitigation	Degree of Impact	Comment	Mitigation	Degree of Impact	Comment	Mitigation
SARA, COSWEIC and / or ACCDC listed species	△	1, 2, 3	A, B, C	○	1, 2, 3	A, B, C	△	1, 2, 3, 4	A, B, D
Existing vegetation and habitat	=			=			=		
Plant associations and biodiversity	=			=			=		
Wildlife species and habitat	=			=			=		
Wildlife species and habitat fragmentation	=			=			=		
Natural wildlife migration, nesting and food chains	△	1, 2, 3	A, B, C	○	1, 2, 3	A, B, C	△	1, 2, 3, 4	A, B, D

COMMENTS

1 – The Project site is devoid of any terrestrial flora and fauna (*n.b.*, non-flying transients / vagrants / migrants can make their way through the site).
2 – No terrestrial flora and fauna species of special concern are believed to exist on the Project site; however, ACCDC records suggest that some flying transient / vagrant / migrant species of special conservation concern, such as the Peregrine falcon or the Canada warbler, or rare species do exist within a 5 km radius of the site. Therefore, there is a possibility that they could pass through the site on occasion.
3 – Some flying fauna could seek out areas of the Project site during construction and or when it is in operation. For example, the Peregrine falcon prefers to nest high up, particularly near coastlines and water edges. The tall buildings could present an attractive nesting space for those individuals.
4 – Depending on the mishap, error, and / or unforeseen event, there is a possibility the impact could be long-lasting and could extend off-site to affect a species of special conservation concern.

MITIGATING MEASURES

A – All Project personnel should be briefed on the potential impacts that the Project could have on terrestrial flora and fauna.
B – Mitigation measures developed for this Project should be adhered to in order to adequately address those potential issues (*e.g.*, limiting Project lighting during normal bird migration season, *etc.*).
C – Measures should be established to discourage nesting on tall buildings on the Project site.
D – Emergency response and contingency plans should be designed to prevent any sustained environmental damage during any errors, mishaps, and / or unforeseen events.

Table 29. Assessment of potential impacts of the pulp dryer modernization project at the Reversing Falls Mill in Saint John, New Brunswick on aquatic flora and fauna.

Potential Impact	Stage II: Construction & Commissioning			Stage III: Operation & Maintenance			Stage V: Mishaps, Errors, and / or Unforeseen Events		
	Degree of Impact	Comment	Mitigation	Degree of Impact	Comment	Mitigation	Degree of Impact	Comment	Mitigation
SARA, COSWEIC and / or ACCDC listed species	△	1, 2	A, B	○	1, 3	A, B	△	1, 4	A, B, C
Existing vegetation and habitat	=			=			=		
Plant associations and biodiversity	=			=			=		
Aquatic species and habitat	=			=			=		
Aquatic species and habitat fragmentation	=			=			=		
Natural fish migration, spawning, and food chains	=			=			=		

COMMENTS

1 – There are no *SARA*, COSEWIC, and / or ACCDC listed species on the Project site; however, some may be present in the adjacent Saint John River (*e.g.*, shortnose sturgeon, Atlantic salmon, redbreast sunfish, *etc.*).
2 – For this Project, nothing is being constructed or operated within 30 m of any fish-bearing watercourse.
3 – The long-term operation and maintenance of the Project is expected to have little to no impact on any aquatic flora and fauna.
4 – If there is a mishap, error, and / or unforeseen event that may have the potential to impact aquatic flora and fauna, it is likely that it will be mitigated before it reaches a watercourse because of IPP's detailed EMS.

MITIGATING MEASURES

A – All Project personnel should be briefed on the potential impacts that the Project could have on aquatic flora and fauna.
B – Mitigation measures developed for this Project should be adhered to in order to adequately address those potential issues.
C – Emergency response and contingency plans should be designed to prevent any sustained environmental damage during any errors, mishaps, and / or unforeseen events.

4.3.4 Socio-Economic Environment

4.3.4.1 Labour and Economy

As described in Section 2.7.2.4, this Project has the potential to substantially and positively affect the local labour market and economy. Therefore those parameters were chosen as VECs to assess. The potential impacts, positive and negative, that were assessed with respect to labour and economy for the Project were:

- employment / workforce retention;
- skills training;
- local spending; and
- livelihood.

4.3.4.1.1 Potential Impacts

Table 30 presents the anticipated impact of the proposed Project on the local labour market and economy. It is believed that the Project will yield primarily positive and significant impacts to Saint John and the surrounding communities. Such benefits include the creation of jobs and an increase in local spending (*e.g.*, throughout local suppliers, within local retail establishments and restaurants, *etc.*). Therefore, the Project was given green lights for the majority of potential impacts (n = 7) related to the local labour market and economy.

The potential impact associated with labour and economy in the event of a mishap, error, and / or unforeseen event could not be determined with certainty. Therefore yellow lights were applied to those potential impacts (n = 4). For example, if there was a catastrophic event at the Mill, then there is the potential that regular employment at the Mill could be reduced until such time that the situation is rectified.

The same compliment of employees is expected to be used for operating the new pulp dryer as is currently used for three existing pulp dryers. Therefore, a no change light was applied to livelihood during Project operation and maintenance.

4.3.4.1.2 Proposed Mitigation

This Project is extremely positive for the local labour market and economy because it will provide much needed construction jobs in the region. There are no negative impacts anticipated. Therefore, no additional mitigation measures, other than those highlighted in Table 30 are required.

4.3.4.1.3 Potential Post-Mitigation Residual and Cumulative Impacts

No residual and cumulative effects are likely to be incurred within the local labour market and economy due to this Project.

4.3.4.2 Transportation Network

Through this Project, the local transportation network will see a moderate increase in heavy equipment traffic (*e.g.*, the hauling away of excavated material, importing fill and Project infrastructure, *etc.*). Additionally, during peak construction, several hundred workers are expected to be on the Mill site working specifically on the Project. The potential impacts that were assessed with respect to the local transportation network were:

- traffic hazards;
- damage to infrastructure; and
- conflict with existing traffic.

4.3.4.2.1 Potential Impacts

The movement of heavy equipment in and out of the Mill site is a normal occurrence. Trucks and trains regularly import wood chips and other production materials and export Kraft pulp and by-products. It is common for the Mill to experience rapid and large increases in workforce. For example, during routine Mill maintenance, shutdowns, and upgrades, there are often hundreds of workers on the site. Effective project management by IPP personnel in the past has ensured that maintenance, shutdown, and upgrade traffic and employment numbers were smoothly integrated into regular operations.

The impact assessment for the local transportation network yielded two green lights, three no change lights, and four yellow lights (Table 31). No change lights were applied to Project operation and maintenance because there are not expected to be any large increases in traffic once Project construction is complete. Although yellow lights dominated the impact assessment, they can be easily managed by implementing the mitigation measures identified below.

4.3.4.2.2 Proposed Mitigation

In addition to the normal project management practices undertaken at the Mill during routine operation and during Mill maintenance, shutdowns, and upgrades, the measures provided below should be implemented by all Project personnel to minimize the potential impact on the local transportation network.

- All vehicles permitted on local roadways should be maintained according to provincial regulations with respect to registration, licensing, insurance, and safety inspection.
- All Project personnel operating vehicles permitted on local roadways should obey the posted speed limits and other posted signs, such as weight restrictions.
- All vehicles permitted on the local roadways, save for personal vehicles, should be operated outside of normal peak traffic hours, if there are any traffic congestion periods.
- Road traffic control measures (*e.g.*, use of flaggers, escort vehicles, *etc.*) should be used when transporting over-sized loads on public roadways.

4.3.4.2.3 Potential Post-Mitigation Residual and Cumulative Impacts

No residual and cumulative effects are likely to be incurred to the local transportation

network due to this Project.

4.3.4.3 Aesthetics

There will be a modest change to the skyline as a result of the Project. During Project construction, there will be several large cranes on-site that will be used for aerial lifting and erecting. The Project is located in a topographically high area (*i.e.*, adjacent to existing Tissue Mill). For personnel safety, there are requirements to light equipment and work areas during low-light and evening hours. As part of the Project, the air from the dryer will still be exhausted to the atmosphere and will continue to result in a visible "water vapour" plume. Therefore, the following potential impacts to aesthetics were assessed:

- visual pollution;
- light pollution;
- locale consonance; and
- odour.

4.3.4.3.1 Potential Impacts

The impact assessment for aesthetics, which is summarized in Table 32, yielded four green lights, two no change lights, and six yellow lights. The Project equipment will also blend into the industrial landscape at the Mill. Yellow lights were applied only to potential construction impacts and potential impacts related to mishaps, errors, and / or unforeseen events. Although yellow, those impacts are expected to be short-lived and implementation of the mitigation measures identified below will help reduce the potential impact.

4.3.4.3.2 Proposed Mitigation

The mitigation measures provided below should be undertaken by all Project personnel to ensure that the potential impacts to aesthetics are minimized.

- During Project construction, lighting during low-light and night-time conditions should be oriented such that it does not shine directly towards residential areas (*i.e.*, Milford) and / or high-traffic areas (*i.e.*, Reversing Falls Bridge).
- Permanent Project lighting should be down-shielded and directed away from nearby receptors, such as residences.

4.3.4.3.3 Potential Post-Mitigation Residual and Cumulative Impacts

No residual and cumulative effects are likely to occur to local aesthetics over the duration of Project construction and operation of the renewed Mill assuming the above mitigation measures are implemented.

4.3.4.4 Recreation and Tourism

There are several tourist attractions within 5 km of the Project site (Figure 56) that are visited by locals and visitors to the region. As a result, the following potential impacts to aesthetics were assessed:

- site visitation and access;

- visitor numbers;
- economy and revenue generation; and
- scenic character.

4.3.4.4.1 Potential Impacts

Table 33 summarizes the potential impacts the Project may have on local recreation and tourism. Five yellow lights were applied to the Project and are particularly associated with mishaps, errors, and / or unforeseen events. The assessment also yielded four no change lights and three green lights.

4.3.4.4.2 Proposed Mitigation

It is difficult to develop mitigation measures related to tourist attractions that are not located on the Mill site. Emergency response and contingency plans should be designed to prevent any major and / or sustained environmental damage on the Mill site in order to preserve what attracts people to the region.

4.3.4.4.3 Potential Post-Mitigation Residual and Cumulative Impacts

No residual and cumulative impacts were identified.

4.3.4.5 Health and Safety

The proposed development has the potential to affect the health and safety of Project personnel, as well as the general public and visitors. For this reason, health and safety was selected as a VEC. The following potential impacts pertaining to health and safety were assessed for the Project:

- occupational and personal hazards;
- local airshed contamination;
- solid waste and sanitary waste generation; and
- traffic hazards.

4.3.4.5.1 Potential Impacts

The impact assessment for health and safety is summarized in Table 34. Maintaining a safe work site is of paramount importance to IPP as described in Section 2.7.2.7. Therefore, green lights (n = 8) were given to the majority of potential impacts on the basis that the hazards associated with health and safety are well defined and understood and can be mitigated through IPP's rigorous health and safety protocols. Some potential impacts that may be present during construction or may occur as a result of mishaps, errors, and / or unforeseen events were given yellow lights (n = 4). Almost all workplace incidents resulting in bodily harm or death can be attributed to mishaps, errors, and / or unforeseen events. Despite the rigorous mitigation measures implemented to prevent such incidents from happening, impacts may result.

4.3.4.5.2 Proposed Mitigation

To mitigate any potential impact associated with health and safety, all Project personnel should be briefed on health and safety issues prior to implementing their tasks associated with the Project (*e.g.*, during a site safety orientation session, toolbox meeting, tail gate meetings, *etc.*). They should be instructed on what Personal Protective Equipment (PPE) they must wear, what guards are to be in place, what measures are to be undertaken to protect the general public, and how rules and regulations with respect to roadways and equipment must be followed at all times. In addition to this, safety areas such as first aid stations, fire extinguisher storage areas, eye wash stations, and spill clean-up stations should be erected in various strategic locations around the Project site. Project personnel should be briefed on their general use, capabilities, and limitations.

Various safety procedures and protocols should be put in place, not only to protect those working on the site, but also used to protect the general public and visitors from any harm. The mitigation measures provided below should be undertaken by all Project personnel to ensure that the potential risks to Project personnel and public health and safety are minimized.

- All Project personnel should make occupational health and safety and public health and safety a primary objective in all of their activities related to the Project.
- All laws and regulations related to health and safety should be followed and all of those laws and regulations are applicable to all Project personnel, with no exceptions.
- All Project personnel should be adequately trained to do their job so that they conform to the occupational health and safety standards and public health and safety standards.
- IPP should ensure that occupational health and safety standards and general public health and safety standards are part of the Project working environment.
- All Project personnel should wear appropriate PPE for the tasks they are performing.
- IPP should ensure that Project personnel wear appropriate PPE for the tasks they are performing.
- All Project personnel should report any fatal or serious incident that results in lost time or property damage and those reports should be submitted promptly by IPP to the appropriate regulatory authorities.
- IPP should be vigilant in ensuring that non-authorized persons do not circulate in designated Project areas. They should provide appropriate means by use of barricades, fences, warning signs, temporary lighting and security guard as deemed necessary to protect the site against entry by non-authorized persons during the day and night.

4.3.4.5.3 Potential Post-Mitigation Residual and Cumulative Impacts

No residual and cumulative effects are anticipated, with respect to health and safety, over the construction and operation of the Project, if the above mitigation measures are implemented.

Table 30. Assessment of potential impacts of the pulp dryer modernization project at the Reversing Falls Mill in Saint John, New Brunswick on labour and economy.

Potential Impact	Stage II: Construction & Commissioning			Stage III: Operation & Maintenance			Stage V: Mishaps, Errors, and / or Unforeseen Events		
	Degree of Impact	Comment	Mitigation	Degree of Impact	Comment	Mitigation	Degree of Impact	Comment	Mitigation
Employment / worker retention	○	1	A	○	5		△	8	C
Skills training	○	2	B	○	6		△	8	C
Local spending	○	3		○	7		△	8	C
Livelihood	○	4		=			△	8	C

COMMENTS

1 – There will be a signficant increase in employment for the local labour market (*i.e.*, ~ 450 person years). A Project of this magnitude and complexity has the capacity to retain skilled labour and to draw skilled labour to the region.
2 – Many of the Project construction jobs require skilled labour, such as pipefitters and boilermakers. There will likely be considerable skills training spin-offs (*i.e.*, increased enrollment in trades courses at local colleges and trade schools) as a result of this Project.
3 – This Project has an anticipated capital expenditure of $250 million, which will result in considerable spending in the local economy for many goods and services (*e.g.*, workers will patronize service businesses and eateries, *etc.*).
4 – Project construction may result in many people launching a career in skilled trades.
5 – Although there will be no increase in the labour required to operate the Project, there may be an increase in the skilled labour required during maintenance operations and shutdowns due to the highly technical and more modernized equipment being installed.
6 – Mill employees will require initial detailed skills training and then routine skills development in order to operate and maintain the Project equipment.
7 – Local spending is expected to slightly increase as a result of modest pulp production increases (*e.g.*, fuel for trucks, *etc.*).
8 – In the event of a major mishap, error, and / or unforeseen event, there may be a reduction temporarily in the permanent staff until the impacts are mitigated. It would be expected that any employment reduction would be short-lived.

MITIGATING MEASURES

A – Data indicate that there is ample room to grow employment in the local labour market (*i.e.*, unemployment rate in Saint John is currently > 10 %).
B – Local labour unions may have to coordinate the amount of available workers with the contractors.
C – Mitigation measures developed for this Project should be adhered to in order to adequately address any potential impacts in order to minimize the amount of lost work time.

Table 31. Assessment of potential impacts of the pulp dryer modernization project at the Reversing Falls Mill in Saint John, New Brunswick on the transportation network.

Potential Impact	Stage II: Construction & Commissioning			Stage III: Operation & Maintenance			Stage V: Mishaps, Errors, and / or Unforeseen Events		
	Degree of Impact	Comment	Mitigation	Degree of Impact	Comment	Mitigation	Degree of Impact	Comment	Mitigation
Traffic hazards	△	1	A	=			△	4	D
Damage to infrastructure	○	2, 3	B	=			○	2	B
Conflict with existing traffic	△	1	C	=			△	4	D

COMMENTS

1 – There will be an increase in heavy equipment traffic to and from the Mill during Project construction.
2 – Existing infrastructure is designed to standards capable of supporting the movement of heavy equipment to and from the Mill (*e.g.*, truck routes are designed for specific load limits, turning radii, *etc.*). Shippers are required to ensure that loads do not exceed specified limits in order to protect and maintain infrastructure.
3 – Property tax increases, which may result from this Project, would increase the amount of money available to the municipal and provincial government for maintaining or improving public infrastructure.
4 – In the event of a major mishap, error, and / or unforeseen event, there may be an increase in traffic temporarily until the impacts are mitigated. It would be expected that any traffic increase would be short-lived.

MITIGATING MEASURES

A – Traffic control measures, such as using flagging crews, should be implemented to mitigate potential traffic hazards.
B – Heavy equipment haulers should adhere to weight restrictions and load limits.
C – To avoid traffic congestion, movement of heavy equipment to and from the Mill during Project construction should be scheduled outside of normal peak traffic hours (*i.e.*, 7:30 AM to 8:30 AM and 4:30 PM to 5:30 PM).
D – Mitigation measures developed for this Project should be adhered to in order to adequately address any potential impacts.

Table 32. Assessment of potential impacts of the pulp dryer modernization project at the Reversing Falls Mill in Saint John, New Brunswick on aesthetics.

Potential Impact	Stage II: Construction & Commissioning			Stage III: Operation & Maintenance			Stage V: Mishaps, Errors, and / or Unforeseen Events		
	Degree of Impact	Comment	Mitigation	Degree of Impact	Comment	Mitigation	Degree of Impact	Comment	Mitigation
Visual	△	1	A	○	5		△	7	D
Light pollution	△	2	A, B	○	6	C	△	7	D
Locale consonance	○	3		=			△	7	D
Odour	○	4		=			△	7	D

COMMENTS

1 – Tall cranes (*i.e.*, up to 60 m tall) may obstruct skyline views as the structures may be visible for many kilometers.
2 – Lighting may spill beyond the work areas and into adjacent commercial and residential areas.
3 – Construction activities at the site conform to routine operation, maintenance, and shutdown activities.
4 – Any odours generated through Project construction (*e.g.*, exhausts, *etc.*) will likely dissipate before reaching nearby receptors as the nearest residence on Collins Street is ~ 180 m distant from the Mill's property line.
5 – Once the construction cranes are gone, the new dryer building should meld with the other tall structures at the Mill site. The visual "water vapour" plume will continue to exist from the pulp dryer building.
6 – Permanent Project lighting will be similar in quantity to the existing; however, the lighting will be of a newer technology that limits potential offsite impacts.
7 – In the event of a major mishap, error, and / or unforeseen event, there may be short-lived impacts to aesthetics (*e.g.*, the erection of several tall cranes, the use of additional temporary lighting, the release of an unpleasant odour, *etc.*).

MITIGATING MEASURES

A – Construction lighting should be confined to the areas actively being worked.
B – Construction lighting should be oriented such that it does not shine directly towards residential areas and / or high-traffic areas.
C – Permanent Project lighting will be limited to that necessary for Project personnel to perform their work safely. The lighting will be down-shielded and / or oriented away from neighbouring receptors.
D – Mitigation measures developed for this Project should be adhered to in order to adequately address any potential impacts.

Table 33. Assessment of potential impacts of the pulp dryer modernization project at the Reversing Falls Mill in Saint John, New Brunswick on recreation and tourism.

Potential Impact	Stage II: Construction & Commissioning			Stage III: Operation & Maintenance			Stage V: Mishaps, Errors, and / or Unforeseen Events		
	Degree of Impact	Comment	Mitigation	Degree of Impact	Comment	Mitigation	Degree of Impact	Comment	Mitigation
Site visitation / access	=			=			△	4	A, B
Visitor numbers	=			=			△	4	A, B
Economy and revenue generation	○	1		○	1		△	4	A, B
Scenic character	△	2	A, B	○	3		△	4	A, B

COMMENTS

1 – By increasing the local employment rate and local spending, local people may have more disposable income for spending on extra-curricular activities like recreation and tourism.
2 – Tall structures may affect the scenic nature of the area, but people are still going to visit the top attractions, such as the renowned Reversing Falls.
3 – Once Project construction is complete, the new buildings and infrastructure will blend into the industrial landscape.
4 – Depending on the type / degree of event, there may be a possibility that access to one of the immediately adjacent tourist sites (*e.g.*, Fallsview Park, Wolastoq Park, *etc.*) could be restricted for a short period of time, which could reduce the number of visitors.

MITIGATING MEASURES

A – Mitigation measures should be developed for this Project to minimize any potential impacts to recreation and tourism.
B – Emergency response and contingency plans should be designed to prevent any major and / or sustained environmental damage.

Table 34. Assessment of potential impacts of the pulp dryer modernization project at the Reversing Falls Mill in Saint John, New Brunswick on health and safety.

Potential Impact	Stage II: Construction & Commissioning			Stage III: Operation & Maintenance			Stage V: Mishaps, Errors, and / or Unforeseen Events		
	Degree of Impact	Comment	Mitigation	Degree of Impact	Comment	Mitigation	Degree of Impact	Comment	Mitigation
Occupational and personal hazards	●	1	A	●	1	A	▲	1, 5	A, C
Local airshed contamination	▲	2	A, B	●	1	A	▲	1, 5	A, C
Solid waste and sanitary waste generation	●	3	A	●	1	A	●	1, 5	A, C
Traffic hazards	▲	4	A, B	●	1	A	●	1, 5	A, C

COMMENTS

1 – The implementation of health and safety protocols is a fundamental component to the operation of the Mill. If there is not currently a developed health and safety protocol for a specific task, it is expected that one will be developed to protect the health and safety of Project personnel.
2 – As noted in the respective VEC potential impact assessment, there is expected to be moderate impact on the local air quality during construction as a result of increased operation of heavy equipment emitting pollutants to the airshed.
3 – Sanitary and solid wastes generated during Project construction will be handled appropriately (*e.g.*, sanitary waste will be collected and disposed of using a licensed wastewater hauler, approved construction and demolition debris will be sent to the Crane Mountain Landfill, *etc.*).
4 – As noted in the respective VEC potential impact assessment, there is expected to be moderate increase in potential traffic hazards during Project construction. Traffic hazards may exist at the Mill site and on roadways being used to transport materials on and off site.
5 – All mishaps, errors, and / or unforeseen events pose potential impacts to the health and safety of Project personnel.

MITIGATING MEASURES

A – All Project personnel should be briefed on the potential impacts that the Project could have on health and safety. They should be instructed on what personal protective equipment is required to be worn, what guards should be in place, what measures will be taken to protect other workers and the general public, and how rules and regulations with respect to the environment, roadways, and equipment should be strictly adhered to.
B – Mitigation measures noted in the assessment of the respective VEC should be implemented and followed.
C – Emergency response and contingency plans should be designed to prevent any major and / or sustained environmental damage.

4.3.5 Summary of Potential Environmental Impacts

IPP is committed to environmental excellence and continually explores innovative ways to reduce their environmental footprint. The Mill produces high quality products in and environmentally sustainable and socially responsible manner by operating under stringent environmental policies. Employees are committed to:

- continually seeking to understand operational impacts on the air, water, soil, forest ecosystem, and local communities;
- actively working to continuously improve our environmental performance;
- meeting or exceeding relevant environmental legislation and regulations;
- meeting the requirements of organizations and associations to which we belong;
- educating other employees and contractors about environmental concerns, their environmental responsibilities, and corporate policies and best practices;
- encouraging other employees and contractors be environmental advocates; and
- cooperating with efforts to raise public awareness about environmental issues.

As described above, 11 VECs were assessed for potential impacts to the environment by the proposed Project. An overall VEC impact assessment summary is provided in Table 35. The results indicate that in many instances, there are no changes anticipated as a result of this Project.

Table 35. Summary of the potential impacts of the pulp dryer modernization project at the Reversing Falls Mill in Saint John, New Brunswick on selected valued environmental components.

VEC	Number of Lights For Stage II / III / V				Overall VEC Impact Assessment*
	Green	Yellow	Red	No Change	
PHYSIO-CHEMICAL ENVIRONMENT					
Air quality	0 / 1 / 0	5 / 0 / 5	0 / 0 / 0	1 / 5 / 1	
Sound emissions	0 / 0 / 0	3 / 0 / 4	0 / 0 / 0	1 / 4 / 0	
Surface water quantity and quality	0 / 0 / 0	1 / 2 / 3	0 / 0 / 0	4 / 3 / 2	
Groundwater quantity and quality	0 / 0 / 0	1 / 1 / 1	0 / 0 / 0	3 / 3 / 3	
BIOLOGICAL ENVIRONMENT					
Terrestrial flora and fauna	0 / 2 / 0	2 / 0 / 2	0 / 0 / 0	4 / 4 / 4	
Aquatic flora and fauna	0 / 1 / 0	1 / 0 / 1	0 / 0 / 0	5 / 5 / 5	
SOCIO-ECONOMIC ENVIRONMENT					
Labour and economy	4 / 3 / 0	0 / 0 / 4	0 / 0 / 0	0 / 1 / 0	
Transportation network	1 / 0 / 1	2 / 0 / 2	0 / 0 / 0	0 / 3 / 0	
Aesthetics	2 / 2 / 0	2 / 0 / 4	0 / 0 / 0	0 / 2 / 0	
Recreation and tourism	1 / 2 / 0	1 / 0 / 4	0 / 0 / 0	2 / 2 / 0	
Health and safety	2 / 4 / 2	2 / 0 / 2	0 / 0 / 0	0 / 0 / 0	
TOTALS	28	55	0	67	

NOTES: *No change lights are excluded from the determination of the overall VEC impact; the coloured light that received the greatest number of assignments in the environmental assessment determines the ultimate VEC impact

All told, 150 specific possible impacts were assessed (Table 35). Of those, 45 % (n = 67) yielded no change lights. As an ultimate overall VEC potential impact assessment (*i.e.*, based on the summation of all possible impacts for the 11 VECs), the proposed Project is expected to have little to no impact on the environment, especially in light of the mitigation measures developed. Therefore, the Project should proceed as detailed within this EIA document.

Although the ultimate VEC yielded a yellow light, the majority of the yellow lights were applied to potential impacts during Stage II and / or Stage V (Table 35). **There are very few operational impacts associated with this Project; as shown in Table 1, there are few Project consequences.**

4.4 PROJECT-SPECIFIC ENVIRONMENTAL PROTECTION PLAN

A Project-specific environmental protection plan will be developed. The EPP will be an important component to the overall Project because it will dictate the importance of Best-Management Practices (BMPs) that shall be undertaken by all those associated with the Project to ensure environmental protection. The EPP will provide a practical means for conveying BMPs to IPP for ensuring the implementation of the outlined standards and regulations throughout the entire Project. It will be a dynamic document to be used by Project personnel in the field and at the corporate level for ensuring commitments made in the EIA are implemented and monitored.

More specifically, the purpose of the EPP will be to:

- outline IPP's commitments to minimize potential Project environmental impacts, including commitments made during the regulatory review process of the EIA;
- comply with conditions and requirements of an "EIA Approval", if and when issued;
- comply with the conditions of any authorization(s), license(s), and / or permit(s) issued to complete the project;
- provide a reference document for IPP and all contractor personnel to use when planning and / or conducting specific Project activities; and
- provide a summary of environmental issues and protection measures to be implemented during the Project.

The EPP will be developed in accordance with applicable federal and provincial environmental protection legislation and regulations. IPP will continue to take a proactive approach toward creating a safe and secure work environment and maintain a system to manage environmental effects of the Project. They will identify health, safety, environmental, and security issues as part of the execution planning and manage the environmental effects of the Project and work in ways that are environmentally, economically, and socially justified and legally compliant. Specific health, environmental, safety, and security issues will be addressed in the execution plans and procedures for the Project.

5.0 PUBLIC CONSULTATION PROCESS

The fundamental principle of public consultation is to ensure that those individuals and / groups who are potentially affected directly and indirectly by the Project are notified of the registration. Furthermore, the public is able to obtain information on the likely effects of the Project and they are canvassed for their input, views, and concerns related to those likely effects. For the Project to be inclusive and transparent, it must include a public consultation component (*i.e.*, any person or group who expresses interest in the proposed Project is consulted). It is recognized that not all concerns can be addressed to the satisfaction of all parties; however, it is the intent of IPP to respond to the public in an open and forthright manner and to resolve as many of the public's concerns as possible, while identifying those that cannot be resolved. The information collected during the public consultation process is taken into account during the EIA decision-making process. In support of that, the Proponent will prepare a report for the NBDELG after the public consultation process is complete. That report will document the public consultation process and outline the issues brought forward, those that were resolved, and those that were not.

5.1 PARTIES TO INCLUDE IN PUBLIC CONSULTATION PROCESS

5.1.1 Local People, NGOs, and Community Groups

Fundy Engineering and IPP will reach out to local residents, NGOs (*i.e.*, the West Side Business Coalition, The Chamber, Enterprise Saint John, and Uptown Saint John), and community groups (*i.e.*, Atlantic Coastal Action Program (ACAP) and the Saint John Citizens' Coalition for Clean Air). Generally, these groups are direct conduits to the community. Relayed Project information will include:

- who is involved;
- what is the purpose of the proposed Project;
- where the proposed Project will occur;
- when the proposed Project will occur;
- why the proposed Project is being considered; and
- how the proposed Project will be undertaken.

5.1.2 Regulatory Agencies

A pre-registration consultation meeting was held with representatives of the NBDELG (*i.e.*, Shawn Hamilton, Mark Glynn, and Emilie Tremblay) and IPP (*i.e.*, Jim Brewster, David Muir, Greg MacKenzie, Helen Tanfara, and Jason Smith) on 4 February 2016 at the NBDELG's head office. During the meeting it was identified that only one regulatory agency has jurisdiction over the pulp dryer modernization project:

- the NBDELG through the EIA regulation of the *Clean Environment Act* and approval the Mill's existing ATOs (*i.e.*, I-8660 WQ and I-7850 AQ).

5.2 PROJECT PUBLIC CONSULTATION PROCESS PLAN

It is the Proponent's responsibility to demonstrate that the potentially affected public and other stakeholders are given the opportunity to actively participate in the EIA review process. Fundy Engineering has developed an organized information dissemination program, whereby relevant, sufficient, and credible information is presented.

The public consultation plan for this Project was developed in accordance with the process described in Appendix C of *A Guide to Environmental Impact Assessment in New Brunswick* [*NBDELG*, 2012]. The step-wise process proposed for the public consultation plan for this EIA is described in detail below. Our process satisfies the component of the NBDELG EIA Determination Review Summary highlighted in Figure 57.

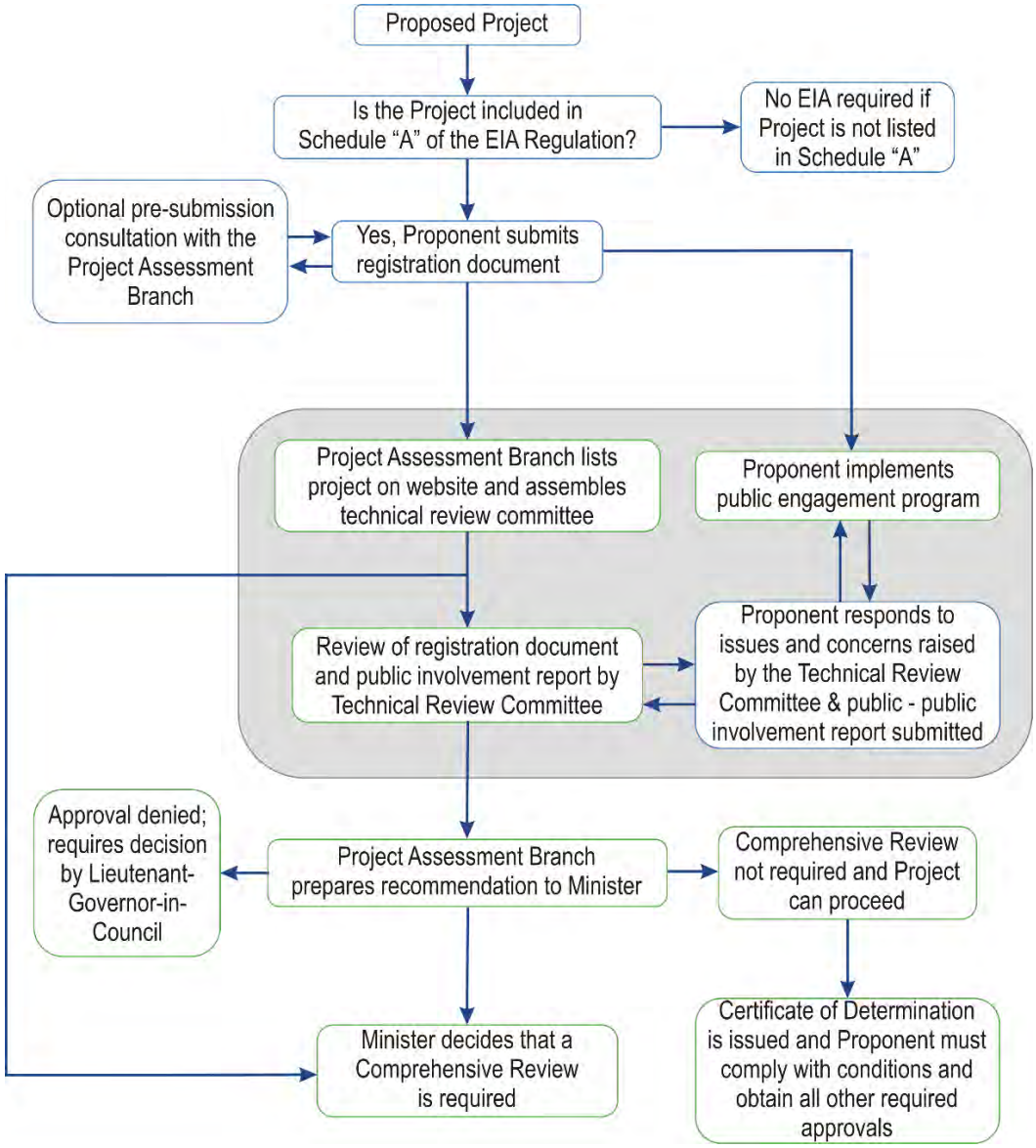


Figure 57. The NBDELG EIA Determination Review process highlighting the public consultation component of the process (*i.e.*, the grey box).

The public will be informed of this project and the EIA registration document will be made available for review. Comments regarding the document will be collected and addressed as part of this process (*i.e.*, there is a two way flow of information between the proponent and the public with opportunities for the public to express their views).

5.2.1 Step 1: Direct Communication with Elected Officials and Service Groups

Formal notification of the Project registration document (*i.e.*, in the form of an information letter) will be sent to elected officials (*i.e.*, Saint John Lancaster MLA, Saint John Mayor and Deputy Mayor and City Councilors), local service groups and community groups, environmental groups (*i.e.*, ACAP Saint John and the Saint John Citizens' Coalition for Clean Air), and other key stakeholder groups (*i.e.*, the West Side Business Coalition, The Chamber (*i.e.*, the Saint John Region Chamber of Commerce), Enterprise Saint John, and Uptown Saint John). Direct communication will enable those individuals and groups to become more familiar with the Project, ask questions, and / or raise any and all concerns.

5.2.2 Step 2: Direct Written Communication with Nearby Residents

A limited mail out comprising a project information sheet will be sent to local residents and businesses.

5.2.3 Step 3: Notifications on the NBDELG Website and at the Head Office

The NBDELG shall place notice of the EIA registration on its website (*i.e.*, http://www2.gnb.ca/content/dam/gnb/Departments/env/pdf/EIA-EIE/Registrations-Engegistrements/EIA.pdf) and shall have the EIA document available for public review at the Project Assessment Branch head office located on the second floor of 20 McGloin Street in Fredericton, New Brunswick. To satisfy this requirement, IPP will provide an electronic version of the registration document (*i.e.*, as a PDF document) and two hard copies to the NBDELG.

5.2.4 Step 4: Documentation Availability with Stakeholder and NBDELG Offices

Copies of the Project registration document, and any subsequent submissions made in response to issues raised by the Technical Review Committee (TRC), will be made available to any interested member of the public, stakeholder group, and / or Aboriginal group. A copy of the EIA document along with any subsequent revision will be placed at the Saint John NBDELG regional office at 8 Castle Street where it will be made available to the public.

5.2.5 Step 5: Public Notice Announcement

As required, a public notice will be placed in at least one local newspaper that has general circulation in Saint John County and / or at least one provincial daily newspaper (*i.e.*, *Telegraph Journal*). The standard notice for an EIA registration document, which will be used for publicly announcing the proposed Project is presented in Figure 58.

NOTICE

Registration of Undertaking
Environmental Impact Assessment Regulation
Clean Environment Act, Opportunity for Public Comment

On 12 May 2016, Irving Pulp & Paper submitted for registration the following activity with the Department of Environment and Local Government in accordance with Section 5(1) and Schedule "A" of the Environmental Impact Assessment Regulation: "Environmental Impact Assessment: Pulp Dryer Modernization".

This EIA examines the modernization of the pulp dryers at the Reversing Falls Mill in Saint John, New Brunswick. The Project will keep the Mill current and will maintain efficient and environmentally-sound processes. By installing new best-available pulp drying technology, emissions such as greenhouse gases at the Mill will decrease. Overall, this Project will yield positive socio-economic and environmental impacts.

A public open house will be held on a date yet to be determined at a location near the Reversing Falls Mill.

The Proponent's registration document can be examined at:

Fundy Engineering
27 Wellington Row
Saint John, NB

Saint John Free Public Library
Market Square
Saint John, NB

and at:

NBDELG Regional Office
8 Castle Street
Saint John, NB

NBDELG Head Office
20 McGloin Street, 2nd floor
Fredericton, NB

Any comments should be submitted directly to the Proponent at:

Irving Pulp & Paper
% Fundy Engineering
27 Wellington Row
Saint John, N.B.

matt.alexander@fundyeng.com

Receipt of comments is requested on or before 15 June 2016. Additional information about the proposal and the public involvement process is available at:

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

Notice placed by: Irving Pulp & Paper, Limited

Figure 58. Example of the public notice announcement that will be placed by the Proponent in at least one local newspaper and / or at least one provincial daily newspaper.

5.2.6 Step 6: Local Area Availability of the Registered Document

Copies of the Project registration document, and any subsequent submissions made in response to issues raised by the TRC, will be made available in at least two locations local to the Project. Locations proposed for viewing the document locally include the Regional NBDELG Office (*i.e.*, 8 Castle Street), the Saint John Free Public Library (*i.e.*, Market Square), and Fundy Engineering's Saint John office (*i.e.*, 27 Wellington Row). A copy of the Project registration document and any subsequent information will be made available to any member of the public, stakeholder, and / or Aboriginal group upon request.

5.2.7 Step 7: Open House and / or Public Meeting

There is no requirement, under a Determination Review, to host an open house and / or public meeting; however, during the pre-registration consultation meeting, representatives

with the NBDELG recommended hosting an open house. The open house will involve the use of story boards staffed with Project personnel and a question and answer session. Tentatively, the open house will be conducted at a location near the Reversing Falls Mill at a date and location yet to be determined. Details of the open house, including a list of attendees, questions asked, *etc.* will be included in the public involvement report submitted to the NBDELG.

5.2.8 Step 8: Documentation of Public Consultation Activities

The NBDELG Minister (*i.e.*, the Honourable Brian Kenny) will only provide an EIA determination once sufficient information has been received. This includes documentation of public and stakeholder concerns and Proponent responses. Within 60 days of registering the proposed Project, a report documenting the above public consultation process will be submitted to the NBDELG. In addition, this report will be made available for public review. The report will:

- describe the public consultation activities including copies of newspaper notices, and letters distributed;
- identify the key public and private stakeholders including Aboriginal Groups that were directly contacted during the public consultation process;
- include copies of any and all correspondence received from and sent to stakeholders and the general public;
- describe any issues or concerns received during the public consultation program, which includes the names and affiliations of the person(s) providing the comments;
- indicate how those issues and concerns were, or will be, considered and / or addressed; and
- describe any proposed future public consultation with respect to the Project.

IPP will adhere to the report requirements listed above. Given the Registration date of 12 May 2016, the deadline of 15 June 2016 for public comments, the report documenting the public consultation process will be released prior 6 July 2016.

6.0 PROJECT APPROVAL

6.1 PROVINCIAL APPROVAL

6.1.1 Environmental Impact Assessment Approval

As per Schedule A, item *k)* (*i.e.*, all facilities for the commercial processing or treatment of timber resources…) of the Environmental Impact Assessment Regulation **[87-83]** of the New Brunswick *Clean Environment Act*, this Project triggers EIA review. As previously noted, the purpose of an EIA is to identify and evaluate the potential impacts that the proposed Project will have on the environment. The EIA also identifies and presents measures to mitigate those potential environmental impacts. This EIA must also adhere to the Sector Guidelines for Timber Processing Project.

A copy of the *Clean Environment Act* can be found at:

<http://laws.gnb.ca/en/showfulldoc/cs/C-6//20130718>;

a copy of the EIA Regulation can be found at:

<http://laws.gnb.ca/en/showfulldoc/cr/87-83//20130718>; and

a copy of the Sector Guidelines can be found at:

<http://www2.gnb.ca/content/dam/gnb/Departments/env/pdf/EIA-EIE/SectorGuidelines/TimberProcessing.pdf>.

Contact information for the NBDELG's Environmental Assessment Section of the Sustainable Development and Impact Evaluation Branch is as follows:

NBDELG
Environmental Assessment
Sustainable Development and Impact Evaluation
PO Box 6000
Fredericton, NB
E3B 5H1

✆ 506.444.5382
🖷 506.453.2627
🖰 www.gnb.ca/environment
✉ eia-eie@gnb.ca

6.1.2 Approval Of A Source

Part I of the Air Quality Regulation **[97-133]** (*i.e.*, Sections 3 through 12) of the New Brunswick *Clean Air Act* and the Water Quality Regulation **[82-126]** of the New Brunswick *Clean Environment Act* requires owners and / or operators of a facility that releases a contaminant to the environment to apply for and obtain approval for the construction, operation, and modification of the source. There are several source classes as shown in Table 36.

Table 36. The source, [C], is classified based on a permitted release rate of one or more of the following parameters. Source: New Brunswick *Clean Air Act*.

Class	SO_2 ($t \cdot yr^{-1}$)	PM ($t \cdot yr^{-1}$)	Gas Emissions Rate ($m^3 \cdot min^{-1}$)
1A	[C] > 1 000	[C] > 1 000	N / A
1B	250 < [C] < 1 000	250 < [C] < 1 000	[C] > 3 000
2	100 < [C] < 250	100 < [C] < 250	600 < [C] < 3 000
3	10 < [C] < 100	10 < [C] < 100	30 < [C] < 600
4	[C] < 10	[C] < 10	[C] < 30

Application for an Approval Of A Source (AOAS) is a pre-cursor to obtaining an Approval to Construct (ATC) and an Approval to Operate (ATO).

A copy of the *Clean Air Act* can be found at:

<http://laws.gnb.ca/en/ShowPdf/cs/C-5.2.pdf>; and

a copy of the Air Quality Regulation can be found at:

<http://laws.gnb.ca/en/ShowPdf/cr/97-133.pdf>.

A copy of the *Clean Environment Act* can be found at:

<http://laws.gnb.ca/en/showfulldoc/cs/C-6//20130718>;

a copy of the Water Quality Regulation can be found at:

<http://laws.gnb.ca/en/ShowPdf/cr/82-126.pdf>; and

a copy of the Used Oil Regulation can be found at:

<http://laws.gnb.ca/en/ShowPdf/cr/2002-19.pdf>.

The application form for Part I (*i.e.*, General Information) of an AOAS can be found at:

<http://www2.gnb.ca/content/dam/gnb/Departments/env/pdf/Air-Lair/RequestingApprovalOfSourceDagrementPourUneSource.pdf>.

After the NBDELG reviews the completed and submitted Part I, the applicant is advised what detailed technical information is required for Part II of the application.

6.1.3 Approval To Construct

Part I of the Air Quality Regulation **[97-133]** (*i.e.*, Sections 3 through 12) of the New Brunswick *Clean Air Act* and the Water Quality Regulation **[82-126]** of the New Brunswick *Clean Environment Act* requires owners and / or operators of a facility that releases a contaminant to the environment to apply for and obtain approval for the construction of the source. Construction of the facility may only commence after an ATC has been issued by the NBDELG Minister and construction must be done in accordance with the terms and conditions imposed on the approval issued for that source.

The process to apply for and obtain and ATC is described in Section 6.1.2 above.

6.1.4 Approval To Operate

6.1.4.1 Air Quality

On 1 June 2012, a Class 1A ATO, under the Air Quality Regulation **[97-133]** of the New Brunswick *Clean Air Act* was issued to IPP for operation of the Reversing Falls Mill. That ATO is valid through 31 May 2017 (*i.e.*, refer to Appendix II).

6.1.4.2 Water Quality

As per the Water Quality Regulation **[82-126]** of the New Brunswick *Clean Environment Act*, a Class 1A ATO was issued to IPP for operation of the Reversing Falls Mill. That ATO was issued on 15 April 2014 and is valid through 30 April 2019 (*i.e.*, refer to Appendix II).

6.2 FEDERAL APPROVAL

There are no known permits, licenses, and / or authorizations required to be issued by any federal government department or agency for the Project to be carried out.

7.0 FUNDING

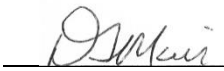
The capital cost for this Project is estimated at $250 million. The Project will be solely funded by Irving Pulp & Paper, Limited. No provincial or federal monies are being used for this Project.

8.0 SIGNATURES

This Project Environmental Impact Assessment was prepared in accordance with the Environmental Impact Assessment Regulation **[87-83]** under the New Brunswick *Clean Environment Act* and on the advice of and in consultation with the various Regulators. Fundy Engineering & Consulting Ltd. prepared the document on behalf of Irving Pulp & Paper, Limited. The Proponent has reviewed the document and understands the information contained within. Irving Pulp & Paper, Limited commits to undertaking all environmental mitigation measures described within this Environmental Impact Assessment document and those mitigation measures.

Respectfully submitted,

Proponent Signature:



Mr. David Muir, *P.Eng.*
Director of Environmental Affairs
J.D. Irving Limited

Environmental Consultant Signature:

Dr. Matt Alexander, *P.Geo., EP*
Environmental Scientist
Fundy Engineering & Consulting Ltd.

12 May 2016

9.0 REFERENCES

Below is a list of reference documents that were used to prepare this EIA document. Any and all of these documents are available to the TRC upon request.

Committee On the Status of Endangered Wildlife In Canada (COSEWIC). 2016. Species profiles. Information was obtained online at:

<http://www.cosewic.gc.ca/eng/sct0/index_e.cfm>

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<http://website.nbm-mnb.ca/Transition/english/16_pulpandpapermill.asp>

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10.0 GLOSSARY

Aboriginal Peoples: are the indigenous peoples recognized in the *Canadian Constitution Act*, 1982.

airshed: a geographical area that shares the same air mass due to topography, meterology, and / or climate and as a result, it behaves in a coherent way with respect to the dispersion of emissions.

anadromous: fish that hatch and rear in freshwater, migrate to the ocean to grow and mature, and then migrate back to freshwater to spawn and reproduce.

anthropogenic: caused by human activity.

aquifer: a saturated permeable geologic unit that can transmit significant quantities of water under ordinary hydraulic conditions.

archaeological and cultural features: all evidence of human occupation that comes out of the ground or underwater or on the ground, including shell middens, fishing stations, large First Nation villages, sugar-bush camps, shipbuilding yards, trading posts, shipwrecks, cemeteries, military forts, and a variety of other locations where humans, both long ago and more recently.

Automated Control System (ACS): a computerized network that monitors and regulates a production process in the absence of direct human intervention.

avian: a bird.

baseline: background or pre-activity data that can be used for comparison when conducting further analyses.

bedrock: solid rock encountered below the soil or any other unconsolidated cover that occurs on the Earth's surface.

Best Management Practices (BMPs): techniques used to guide design and construction of an Undertaking to minimize adverse environmental impacts.

Biochemical Oxygen Demand (BOD; BOD_5): a standard measure of wastewater strength that quantifies the amount of oxygen consumed in a stated period of time and at a specific temperature, usually 5 days at 20 °C.

broke: waste paper, either made during a sheet break or trimmings; it is gathered up and put in a re-pulper for recycling back into the process.

brownfield: abandoned or underused industrial and commercial sites that may be or perceived to be contaminated and / or need extensive redevelopment.

bylaw: a law made by municipal government.

carbon dioxide (CO_2): an atmospheric gas, composed of carbon and oxygen, that is a major component of the carbon cycle and the predominant gas contributing to the greenhouse effect and is therefore known as a contributor to climate change. It is produced through natural processes, but is also released through anthropogenic activities, such as the combustion of fossil fuels to produce electricity.

carbon monoxide (CO): a colourless, odourless, and highly toxic gas that is a byproduct of combustion.

circa (ca): makes reference to an approximate date when the actual date is unknown.

Clean Water Act: a provincial *Act* administered by the New Brunswick Department of the Environment, which deals with protecting the overall water environment for all New Brunswicker's to enjoy.

Clean Environment Act: a provincial *Act* administered by the New Brunswick Department of the Environment, which deals with protecting the overall environment for all New Brunswicker's to enjoy.

climate: a description of aggregate weather conditions or the sum of all statistical weather information that is used to describe a place or region.

combustion emissions: air pollutants released solely as a result of burning material.

Committee On the Status of Endangered Wildlife In Canada (COSEWIC): a committee of experts that assesses and designated which wild species are in some danger of disappearing from Canada.

contamination: the presence of a substance of concern, or a condition, in concentrations above appropriate pre-established criteria in soil, sediment, surface water, groundwater, air, and / or structures.

cultural resources: archaeological and historic resources that are eligible for or listed by the government including buildings, sites, districts, structures, or objects having historical, architectural, archaeological cultural, or scientific importance.

cumulative impact: the impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions.

Distributed Control System (DCS): a dynamic computerized network designed to regulate and monitor a production process.

emission: a form of pollution discharged into a receiving body from smokestacks, pipes, vents, surface areas of commercial or industrial facilities, from motor vehicles, locomotives, aircrafts, *etc.*

endangered: a species that is facing imminent extirpation.

Environmental Impact Assessment (EIA): a study undertaken to assess the effect on a specified environment of the introduction of any new factor that may upset the current ecological balance and includes the social and physical environment of the surrounding area.

Environmental Protection Plan (EPP): a description of what will be done to minimize the environmental effects pre-, during, and post-construction of the Undertaking. The plan also includes mitigation measures.

Environmentally Significant Area (ESA): spaces that are provided special protection because they represent a habitat that is integral to the overall ecological health of the region.

erosion: the wearing away of land surface by wind or water, which naturally occurs from weather or runoff but can be intensified by land-clearing practices related to farming, residential or industrial development, road building, timber cutting, *etc.*

excavate: the process of making a hole in something or removing a part of something by scooping or digging it out.

First Nations: a collective group of Aboriginals that are living on a reserve.

Fisheries Act: a federal *Act* administered by the Department of Fisheries and Oceans with respect to fish and fisheries in Canadian Waters.

Fläkt Dryer: a pulp dryer that uses heated air to dry and support the pulp web as it is fed into the upper deck of the dryer and travels back and forth among several decks via turning rolls before it is fed from the dryer to the cutters and layboys at the lower deck.

floodplain: the part of the ground surface inundated with water on a recurring basis, usually associated with the one percent recurrence interval (100-year) flow.

flora: the collective plant life occurring in an area or time period, especially the naturally occurring indigenous plant life.

Fourdrinier Machine: a papermaking machine that uses a specially woven plastic fabric mesh conveyor belt, which is known as a wire as it was originally woven from bronze, in the forming section where a slurry of wood fibre is drained to create a continuous paper web.

fugitive emissions: pollutants released to the atmosphere but not through stacks, vents, pipes, or any other confined air stream.

Fundy Coast Ecoregion: the southern area of New Brunswick along the Bay of Fundy that is characterized by a distinctive climate, reflected in recurring patterns of vegetation on comparable landforms and soils that are different from the six other New Brunswick Ecoregions.

geology: the science that studies Earth by looking at its composition and the processes past and present that shaped it, both on the surface and within.

glacial: pertaining to an interval of geologic time that was marked by an equatorward advance of ice during an ice age.

glaciomarine: deposits consisting of sediments that were transported by glacial ice and marine water.

greenfield: a previously undeveloped open space, such as agricultural fields or forests, that has not been used for commercial or industrial activities and is presumed to be free of contamination.

ground truth: the process of verifying the correctness of remote sensing information by use of ancillary information, such as field studies.

groundwater: subsurface water that occurs beneath the water table in soils and geologic formations that are fully saturated.

hazardous materials: a solid, liquid, or gaseous material that, upon exposure, constitutes an identifiable risk to human health or the natural environment. Hazardous material criteria are established with regard to appropriate regulatory requirements.

headbox: the pressure chamber where turbulence is applied to break up fibre clumps in the slurry and to distribute the fibre slurry uniformly across the wire.

herptile: reptile or amphibian.

hibernaculum: an over-wintering area used to hibernate and survive the winter; bats typically seek out caves to hibernate.

hydrocarbons: a broad family of organic compounds that are comprised predominantly of carbon and hydrogen in various combinations; crude oil, natural gas, petroleum products, etc. are all various forms of hydrocarbons.

hydrogeology: the scientific study of groundwater geology and the geological environments that control the occurrence, movement, production, and characteristics of groundwater.

hydrology: an earth science that encompasses the occurrence, distribution, movement, and properties of water.

impermeable: not allowing water to pass through.

Important Bird Area (IBA): an area recognized as being globally important for the conservation of bird populations. There are about 10 000 sites globally.

Kraft pulping: is a process for converting wood into wood pulp consisting almost entirely of cellulose fibers. The process involves treating wood chips with a mixture of sodium hydroxide and sodium sulfate (*i.e.*, white liquor) to break the bonds that link lignin to the cellulose.

land parcel: an area of land for which rights or ownership can be purchased.

land use: the way that land is developed and used in terms of the kinds of activities allowed (*e.g.*, agriculture, residences, industries, *etc.*).

layboy: a device used to evenly stack sheets of pulp or paper received from cutters, ruling machines, paper machines, and printing presses.

lithology: a description of the physical character of a rock as determined by eye or with a low-power magnifier, and based on colour, structures, mineralogic components, and grain size.

long-term impacts: those that are experienced for a prolonged period, such as during the entire duration (*i.e.*, operation) of the Undertaking.

lubricants: a substance used to reduce the friction between surfaces or as process materials either incorporated into other materials used as processing aids in the manufacturing of other products, or as carriers for other materials.

micro-climate: an area influenced by natural or human-made features that alter the climatic conditions from the general regional climate.

migratory birds: land birds that migrate very long distances to breed or escape temperatures outside their normal optimum temperature range.

morainal sediments: glacial drift materials deposited mainly by direct glacial action and possessing initial constructional form independent of the material beneath it.

n: see sample size.

outcrop: exposed stratum or body of ore at the surface of the Earth.

outfall: the place where a sewer, drain, or stream discharges into adjacent water.

Parcel / Property IDentification (PID) number: a unique number given to a land parcel for tracking information, such as deed holders, size, environmental issues, *etc.*

Parcel Information: Service New Brunswick (SNB) maintains a network of registries across the province where legal plans and documents related to the ownership of real property can be registered and made available for public scrutiny. The records in the Registries provide land ownership information dating back to the issuance of the original crown grants. Instruments registered or filed in the registry include deeds, mortgages, wills, subdivision plans, *etc*.

permanent impacts: those that cause irreversible change to the environment.

petroleum hydrocarbons: a family of naturally occurring liquid organic compounds,

physiographic region: an area having a pattern of relief features or landforms that differ significantly from that of adjacent areas.

plastic specks: trace plastic particles contained in the wood (*e.g.*, from cutting, shipping, handling, *etc.*) that can contaminate the pulp and cause pinholes, streaks, and cuts in the pulp sheets.

precipitation: any kind of water that falls from the sky (*i.e.*, snow, rain, freezing rain, sleet, hail, virga, *etc.*) as part of the weather at a specified place within a specified period of time.

pre-cast: a concrete unit, structure, or member that is cast and cured in an area other than its final position or place.

primary treatment: the first stage of wastewater treatment, which typically involves the removal of floating debris and solids by screening and / or settling processes.

receptor: a sensitive component of the ecosystem that reacts to or is influenced by environmental stressors.

Saint John Census Metropolitan Area: an area used for collecting census data, which is comprised of the city of Saint John, the suburbs of Rothesay, Quispamsis, Grand Bay-Westfield, and rural areas of Hampton and St. Martins.

Saint John Station A: the weather station at the Saint John airport where various weather parameters are monitored and recorded for determining the climate of the area.

sanitary waste: liquid or solid waste originating solely from humans and human activities, such as wastes collected from toilets, showers, wash basins, sinks used for cleaning domestic areas, sinks used for food preparation, clothes washing operations, and sinks or washing machines where food and beverage serving dishes, glasses, and utensils are cleaned, but does not include hazardous or radioactive materials.

shives: fibre bundles that are not separated in the pulping process and can contaminate the pulp because they are longer and several times larger than single fibres.

short-term impacts: those that are only experienced for a brief period or during a portion of the Undertaking (i.e., during the pre-construction, construction, or commissioning).

solid waste: non-liquid or gaseous waste that can be accepted for disposal in a landfill or incinerator and includes food waste, paper and cardboard, yard waste, metals, plastics, *etc.*, but does not typically include industrial waste, medical waste, or hazardous waste.

special concern: a species that may become threatened or endangered because of a combination of biological characteristics and identified threats.

Species At Risk Act (SARA): a federal *Act* administered by Environment Canada with the goal of protecting Canada's wildlife.

surface water: all water that flows in watercourses and wetlands or is held in reservoirs above the Earth's surface.

surficial sediments: unconsolidated alluvial (*i.e.*, formed by running water), residual, or glacial deposits overlying bedrock or occurring on or near the surface of the earth.

terrestrial: relating to or inhabiting the land (*e.g.*, terrestrial plants live on the land as opposed to in the water).

threatened: a species that is likely to become endangered if nothing is done to the factors leading to its extirpation or extinction.

till: unsorted and unstratified drift consisting of a heterogeneous (*i.e.*, non-uniform) mixture of clay, sand, gravel, and boulders that is deposited by and underneath a glacier.

topography: the physical features of a geographical area including relative elevations and the position of natural and anthropogenic features.

Total Suspended Solids (TSS): a measure of the amount of particles that are dispersed in a liquid due to turbulent mixing, which can create turbid and cloudy conditions; includes a wide variety of materials, such as silt, organics, industrial wastes, and sewage.

varmint: small nuisance animals, such as raccoons, foxes, and coyotes.

wastewater: liquid or waterborne wastes polluted or fouled from household, commercial, or industrial applications along with any surfacewater, stormwater, or groundwater infiltration.

watershed: an area of land that drains to a single outlet and is separated from other watersheds by a divide.

Watercourse and Wetland Alteration (WAWA) permit: in New Brunswick, watercourses and wetlands are afforded protection under the *Clean Water Act* (Regulation 90-80) with respect to a temporary or permanent change made at, near, or to a watercourse or wetland or to the water flow in a watercourse or wetland. The permits are administered by the New Brunswick Department of the Environment.

watercourse: 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.

weather: the state of the atmosphere at any given time.

wetland: land that either periodically or permanently, has a water table at, near, or above the land's surface or that is saturated with water and sustains aquatic processes as indicated by the presence of hydric soils, hydrophytic vegetation, and biological activities adapted to wet conditions.

white water: filtrate from the Fourdrinier that is stored in a white water chest from which it is pumped to the headbox.

wire: the woven mesh fabric loop that is used for draining the pulp slurry from the headbox; until the 1970s, bronze wires were used, but now they are woven from coarse and very stiff mono-filament synthetics similar to fishing line.

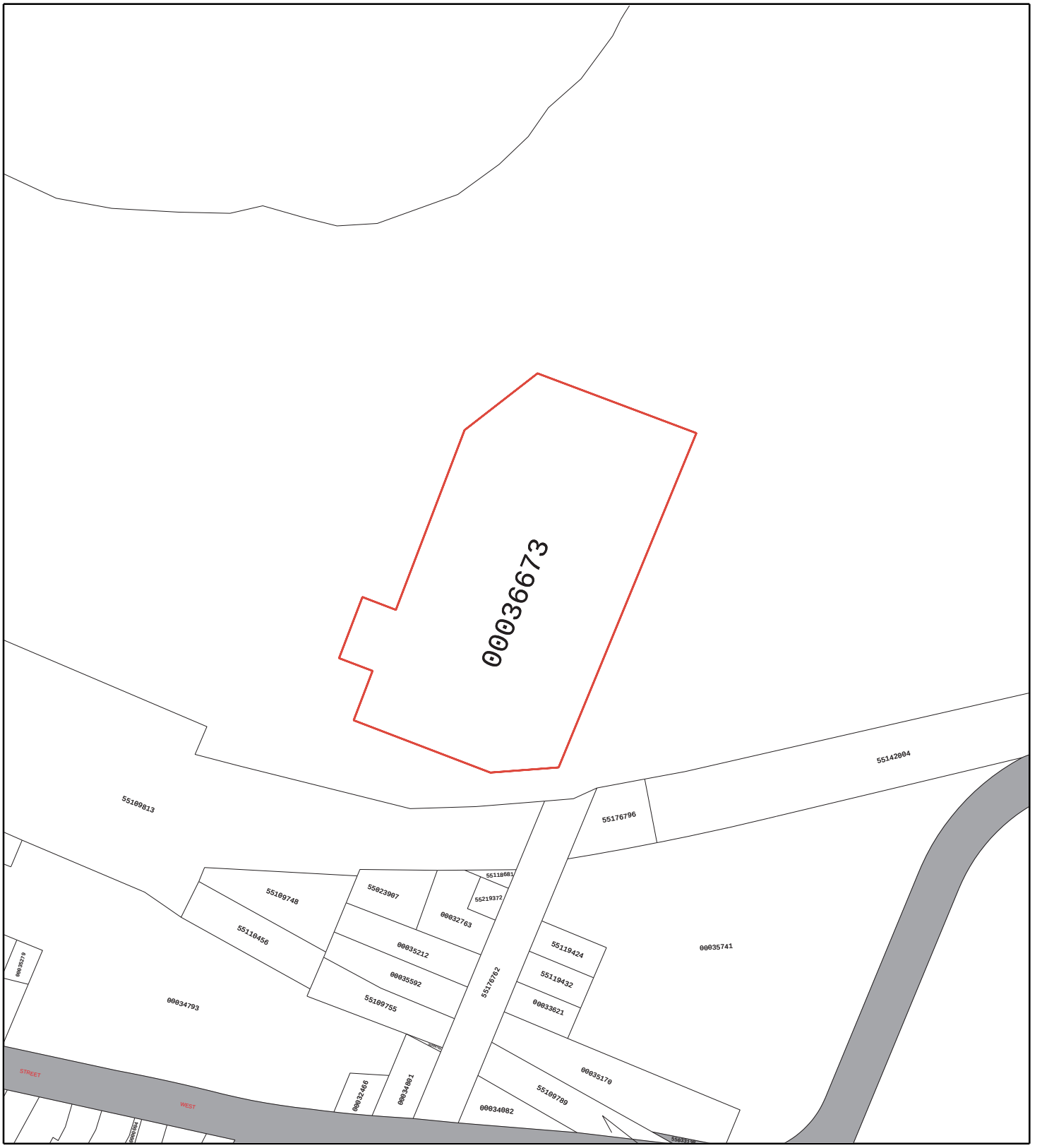
11.0 REPORT DISCLAIMERS AND DISCLOSURES

The sole purpose of this report and the associated services performed by Fundy Engineering & Consulting Ltd. is to complete an Environmental Impact Assessment document for pulp dryer modernization project at the Irving Pulp & Paper, Limited Reversing Falls Mill in Saint John, New Brunswick. The scope of services was defined by the New Brunswick Department of the Environment and Local Government's guidelines to Environmental Impact Assessment in New Brunswick [*NBDELG*, 2012] and the *NBDELG* [2004] Sector Guidelines for Timber Processing Projects.

This report was prepared on behalf of and for the exclusive use of the Client. The report expresses the professional opinion of Fundy Engineering experts and is based on their technical / scientific knowledge. Fundy Engineering & Consulting Ltd. accepts no liability or responsibility whatsoever for or in respect of any use of or reliance upon this report or data by any third-party. Fundy Engineering makes no guarantee that the Client will be successful in the regulatory approval.

Appendix I:

Service New Brunswick Property Information



Map Scale / Échelle cartographique 1 : 2479

While this map may not be free from error or omission, care has been taken to ensure the best possible quality. This map is a graphical representation of property boundaries which approximates the size, configuration and location of properties. It is not a survey and is not intended to be used for legal descriptions or to calculate exact dimensions or area.

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PID Databank Information

PID:	36673
Apparent Parcel Access:	Private Access
Status:	Current
Effective Date/Time:	2003-06-24 11:38:59
Page:	1
Legal Description:	Place Name: City of Saint John Parish/County: Parish N/A, County of Saint John Label of Parcel on Plan: Lot 89-1 Registration No. of Plan: Number 2447 Registration County: Saint John County Registration Date of Plan: 27 January, 1989 Title of Plan: Irving Pulp & Paper, Limited Subdivision Together with the benefit of a right-of-way described in Deed Number 11738052 registered on 07 February, 2001 in the Saint John County Registry Office in Book 2167 at Page 531.

Click *Here* to request an Official Report

Note: There is a fee for requesting an Official PID Databank report.

New Nouveau Brunswick CANADA

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PID Databank Information

PID:	36673
Apparent Parcel Access:	Public Access
Status:	Historical
Effective Date/Time:	2003-06-16 10:46:01
Page:	1
Legal Description:	Place Name: City of Saint John Parish/County: Parish N/A, County of Saint John Label of Parcel on Plan: Lot 89-1 Registration No. of Plan: Number 2447 Registration County: Saint John County Registration Date of Plan: 27 January, 1989 Title of Plan: Irving Pulp & Paper, Limited Subdivision Together with the benefit of a right-of-way described in Deed Number 11738052 registered on 07 February, 2001 in the Saint John County Registry Office in Book 2167 at Page 531.

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Parcel Information

PID:	36673	**County:**	Saint John
Status:	Active	**Active Date/Time:**	
Land Related Description:	Land	**Management Unit:**	NB1104
Area:	1.78	**Area Unit:**	Hectares
Date Last Updated:	2015-01-20 10:22:35	**Harmonization Status:**	Harmonized
Land Titles Status:	Land Titles	**Land Titles Date/Time:**	2003-06-16 14:48:36
Date of Last CRO:	2015-01-20 10:52:51	**Manner of Tenure:**	Not Applicable
Land Gazette Information:	YES		
Description of Tenure:			

Public Comments:

MAP / CARTE 06N76NW

Parcel Interest Holders

Owner	Qualifier	Interest Type
Irving Consumer Products Limited		Owner
Irving Consumer Products Limited		Owner
Produits de Consommation Irving Limitée		Owner
Produits de Consommation Irving Limitée		Owner

Assessment Reference

PAN	PAN Type	Taxing Authority Code	Taxing Authority
4132566		550	City of/Cité de Saint John

Parcel Locations

Civic Number	Street Name	Street Type	Street Direction	Place Name
	Mill	Street	West	Saint John
486	Mill	Street		Saint John
488	Mill	Street		Saint John

County Parish

County	Parish
Saint John	City of/Ville de Saint John

Documents

Number	Registration Date	Book	Page	Code	Description
34549700	2015-01-16			6600	Change of Terms

Documents (cont.)

Number	Registration Date	Book	Page	Code	Description
34549585	2015-01-16			6600	Change of Terms
34548132	2015-01-15			4820	Land Titles Rectification
34542564	2015-01-14			6110	Discharge of Mortgage
34529017	2015-01-08			3210	Corporate Affairs Change of Name
32283534	2012-12-19			5110	Collateral Mortgage
26752429	2009-01-23			6110	Discharge of Mortgage
26651225	2008-12-22			5110	Collateral Mortgage
16709322	2003-07-25			5100	Mortgage
16441025	2003-06-16			3800	Land Titles First Notice
16441017	2003-06-16			3720	Land Titles First Order
16440571	2003-06-16			3900	Land Titles First Application
12296332	2001-06-21	2178	393	6100	Discharge, Release or Satisfaction
11779551	2001-02-21	2171	138	5100	Mortgage
11738052	2001-02-07	2167	531	1100	Deed/Transfer
11015055	2000-05-09	2114	463	3200	Change of Name or Amalgamation
10438597	1999-08-25	2066	194	5900	Notice of Security Interest
354467	1989-01-01	1349	262	103	Debenture, Voluntary Charge
343277	1987-01-01	1261	197	101	Deed
297214	1981-01-01	948	153	118	Change of Name
180902	1960-01-01	374	95	101	Deed

Plans

Number	Suffix	Registation Date	Code	Description	Lot Information	Orientation
11738045		2001-02-07	9020	Easement or Right-of-Way		Provincial Grid
2447		1989-01-27	9050	Subdivision & Amalgamations	Lot 89-1	Provincial Grid
172	F33	1960-08-25	9040	Retracement & Plan or Return of Survey		Magnetic
170	F33	1960-08-25	9040	Retracement & Plan or Return of Survey		Magnetic

Parcel Relations

No Records Returned

Non-Registered Instruments

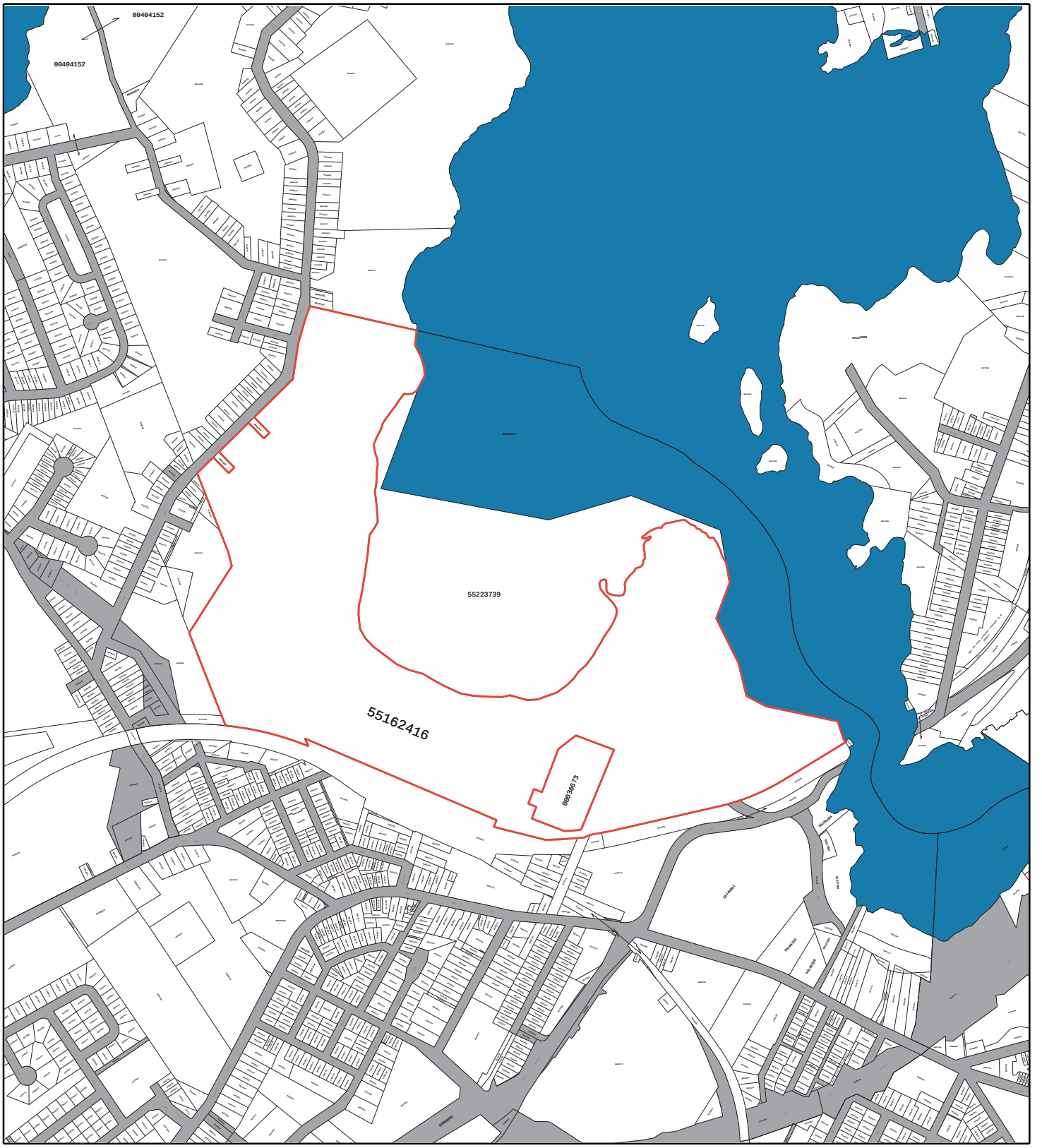
No Records Returned

PAN Information

PAN:	4132566	**Status:**	Open
Assessed Owner(s):	Irving Consumer Products Limited	**Mailing Address:**	PO BOX 5777 SAINT JOHN NB
Assessment Year:	2015	**Postal Code:**	E2L 4M3
Current Assessment:	$ 17,470,600	**Current Levy:**	$ 853,071.94
Location:	MILL ST WEST	**County:**	St. John
Property Description:	TISSUE MILL & LOT 89-1	**Tax Class:**	Fully Taxable
Property Type Code:	308	**Property Type Name:**	Pulp and Paper Mills
Taxing Authority Code:	550	**Neighbourhood Code:**	35
Taxing Authority Description:	City of/Cité de Saint John	**Neighbourhood Description:**	SOUTH MANAWAGONISH RD,MAIN ST,NORTH THRU
Sequence Number:	C005	**Sub Unit:**	0
Harmonization:	COMPLETED (One to one match of parcels)	**Farm Land Identifiation Program:**	No
PID:	36673	**PID (2nd):**	-
More PID(s):	No		

Sale Price Information

Price: $1 **Date:** 2015-01-01



Map Scale / Échelle cartographique 1 : 10339

While this map may not be free from error or omission, care has been taken to ensure the best possible quality. This map is a graphical representation of property boundaries which approximates the size, configuration and location of properties. It is not a survey and is not intended to be used for legal descriptions or to calculate exact dimensions or area.

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PID Databank Information

PID:	55162416
Apparent Parcel Access:	Public Access
Status:	Current
Effective Date/Time:	2003-12-12 07:58:53
Page:	1
Legal Description:	Place Name: City of Saint John Parish/County: Parish N/A, County of Saint John Label of Parcel on Plan: Lot A Registration No. of Plan: 16060387 Registration County: Saint John County Registration Date of Plan: 08 April, 2003 Title of Plan: Plan of Survey, Irving Pulp & Paper, Limited Property Together with the following rights, privileges and benefits described in Deed Number 138737 registered in the Saint John County Registry Office on 22 November, 1946 in Book 261 at Page 32:- (a) all rights in connection with a water supply; (b) all booms and booming privileges, rafting booms, holdings grounds, shore rights, shore privileges, shore agreements, river rights, river privileges, river agreements and all other rights, privileges, agreements, equipment and installations used or useful for the purpose of driving, running, rafting, storing or holding logs in or on the Saint John River or its tributaries or on the shores or banks thereof; (c) all electric power rights and railway siding rights; (d) a right of way over Union Point Road and also the right to use the wharf known as the Cushing Lath Wharf for landing pulp wood or other materials; (e) the right in the Cushing Pond to store and pile in the customary manner 5 million superficial feet of logs for the requisite purposes of a pulp mill. Also together with a right of way containing 3 metres wide as described in Deed Number 11738052 registered in the Saint John County Registry Office on 07 February, 2001 in Book 2167 at Page 531.

Click *Here* to request an Official Report

Note: There is a fee for requesting an Official PID Databank report.

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PID Databank Information

PID:	55162416
Apparent Parcel Access:	Public Access
Status:	Historical
Effective Date/Time:	2003-12-11 13:18:55
Page:	1
Legal Description:	Place Name: City of Saint John Parish/County: Parish N/A, County of Saint John Label of Parcel on Plan: Lot A Registration No. of Plan: 16060387 Registration County: Saint John County Registration Date of Plan: 04 April, 2003 Title of Plan: Plan of Survey, Irving Pulp & Paper, Limited Property Together with the following rights, privileges and benefits described in Deed Number 138737 registered in the Saint John County Registry Office on 22 November, 1946 in Book 261 at Page 32:- (a) all rights in connection with a water supply; (b) all booms and booming privileges, rafting booms, holdings grounds, shore rights, shore privileges, shore agreements, river rights, river privileges, river agreements and all other rights, privileges, agreements, equipment and installations used or useful for the purpose of driving, running, rafting, storing or holding logs in or on the Saint John River or its tributaries or on the shores or banks thereof; (c) all electric power rights and railway siding rights; (d) a right of way over Union Point Road and also the right to use the wharf known as the Cushing Lath Wharf for landing pulp wood or other materials; (e) the right in the Cushing Pond to store and pile in the customary manner 5 million superficial feet of logs for the requisite purposes of a pulp mill. Also together with a right of way containing 3 metres wide as described in Deed Number 11738052 registered in the Saint John County Registry Office on 07 February, 2001 in Book 2167 at Page 531.

Click *Here* to request an Official Report

Note: There is a fee for requesting an Official PID Databank report.

New Nouveau Brunswick CANADA

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Parcel Information

PID:	55162416	**County:**	Saint John
Status:	Active	**Active Date/Time:**	2003-04-08 12:33:10
Land Related Description:	Land	**Management Unit:**	NB1104
Area:	48.7	**Area Unit:**	Hectares
Date Last Updated:	2015-05-07 14:18:24	**Harmonization Status:**	Harmonized
Land Titles Status:	Land Titles	**Land Titles Date/Time:**	2003-12-11 16:28:19
Date of Last CRO:	2015-05-07 14:19:13	**Manner of Tenure:**	Not Applicable
Land Gazette Information:	YES		
Description of Tenure:			
Public Comments:			

Parcel Interest Holders

Owner	Qualifier	Interest Type
Irving Pulp & Paper, Limited		Owner
Air Liquide Canada Inc.		Lessee

Assessment Reference

PAN	PAN Type	Taxing Authority Code	Taxing Authority
5669948		550	City of/Cité de Saint John

Parcel Locations

Civic Number	Street Name	Street Type	Street Direction	Place Name
408	Mill	Road		Saint John

County Parish

County	Parish
Saint John	City of/Ville de Saint John

Documents

Number	Registration Date	Book	Page	Code	Description
34814583	2015-05-07			6100	Discharge, Release or Satisfaction
34625583	2015-02-19			5200	Debenture or Other Voluntary Charge
33429359	2013-12-20			5200	Debenture or Other Voluntary Charge
30051115	2011-05-03			2200	Easement
28920172	2010-06-30			5200	Debenture or Other Voluntary Charge

Date/Time: 2015-11-04 11:02:17

Documents (cont.)

Number	Registration Date	Book	Page	Code	Description
28911130	2010-06-29			4820	Land Titles Rectification
26794140	2009-02-04			5900	Notice of Security Interest
19997973	2005-03-18			1100	Deed/Transfer
19832238	2005-02-07			3210	Corporate Affairs Change of Name
17618415	2003-12-11			3800	Land Titles First Notice
17618407	2003-12-11			3720	Land Titles First Order
17616849	2003-12-11			3900	Land Titles First Application
16622350	2003-07-14			2200	Easement
12308616	2001-06-22	2179	1	5900	Notice of Security Interest
11738052	2001-02-07	2167	531	1100	Deed/Transfer
11015055	2000-05-09	2114	463	3200	Change of Name or Amalgamation
10438597	1999-08-25	2066	194	5900	Notice of Security Interest
415321	1997-06-09	1904	279	102	Lease
406947	1996-05-06	1828	188	119	Other
406624	1996-04-22	1825	160	101	Deed
405571	1996-02-20	1815	221	101	Deed
324751	1985-09-19	1112	162	101	Deed
227090	1970-11-25	635	892	101	Deed
180899	1960-08-25	374	93	101	Deed
177978	1959-11-25	366	290	107	Discharge
175156	1959-02-28	357	528	101	Deed
175316	1959-02-26	357	512	119	Other
174982	1959-02-06	357	379	101	Deed
171907	1958-04-21	348	599	101	Deed
168542	1957-03-22	340	415	101	Deed
161098	1954-10-28	319	440	101	Deed
153903	1952-05-19	300	541	101	Deed
152010	1951-08-09	296	263	101	Deed
151110	1951-04-28	294	180	118	Change of Name

Documents (cont.)

Number	Registration Date	Book	Page	Code	Description
142158	1948-03-03	270	212	101	Deed
138737	1946-11-22	261	321	101	Deed
122539	1936-10-03	219	415	101	Deed

Plans

Number	Suffix	Registation Date	Code	Description	Lot Information	Orientation
16620719		2003-07-14	9020	Easement or Right-of-Way		Provincial Grid
16060387		2003-04-08	9040	Retracement & Plan or Return of Survey	Lot A	Provincial Grid
34	D6	1951-08-09	9040	Retracement & Plan or Return of Survey		Magnetic

Parcel Relations

Related PID	Type Of Relation	Lot Information
34108	Parent	
428656	Parent	
55066823	Parent	
55066963	Parent	
55066989	Parent	
55066997	Parent	
55067003	Parent	
55067011	Parent	Parcel K
55067029	Parent	Parcel B
55067037	Parent	
55067045	Parent	
55067052	Parent	
55067060	Parent	
55067078	Parent	
55067086	Parent	
55067094	Parent	
55067102	Parent	
55116636	Parent	Lot 95-1
55122519	Parent	

Non-Registered Instruments

No Records Returned

PAN Information

PAN:	5669948	**Status:**	Open
Assessed Owner(s):	IRVING PULP & PAPER LIMITED *	**Mailing Address:**	300 UNION ST, PO BOX 5777 SAINT JOHN NB
Assessment Year:	2015	**Postal Code:**	E2L 4M3
Current Assessment:	$ 36,485,400	**Current Levy:**	$ 1,781,545.60
Location:	MILL ST	**County:**	St. John
Property Description:	PULP MILL & LAND	**Tax Class:**	Fully Taxable
Property Type Code:	308	**Property Type Name:**	Pulp and Paper Mills
Taxing Authority Code:	550	**Neighbourhood Code:**	35
Taxing Authority Description:	City of/Cité de Saint John	**Neighbourhood Description:**	SOUTH MANAWAGONISH RD,MAIN ST,NORTH THRU
Sequence Number:	C011	**Sub Unit:**	0
Harmonization:	COMPLETED (One to one match of parcels)	**Farm Land Identifiation Program:**	No
PID:	55162416	**PID (2nd):**	-
More PID(s):	No		

Sale Price Information

No Records Returned

Appendix II:

Reversing Falls Mill's Approvals To Operate

New Nouveau Brunswick
CANADA

April 17, 2012
File: 26545-I2-1

Mrs. Jasna Krstic
Environmental Coordinator
Irving Pulp & Paper, Limited
Mill Street
P.O. Box 3007
Saint John, NB, E2M 3H1

Dear Mrs. Krstic:

RE: Approval to Operate I-7850 for the Irving Pulp & Paper, Limited Reversing Falls Mill

On behalf of the Honorable Bruce Fitch, Minister of the Department of Environment and Local Government, I am writing to inform you that your Approval to Operate the Irving Pulp & Paper Reversing Falls Mill, has been renewed. This Approval, **I-7850,** has been issued under the *Air Quality Regulation – Clean Air Act.* A copy of Approval, I-7850, is enclosed.

Please note that this Approval includes terms and conditions that must be adhered to. Care should be taken to ensure that all such terms and conditions are complied with, in the specified time frame. Also, please ensure that a copy of the Approval and all attached Schedules is posted in a prominent location in the office or working area of your Facility.

If you have any questions or concerns about your Approval, please contact me at (506) 444-5601 or Emilie.Tremblay@gnb.ca .

Sincerely,

Emilie Tremblay, P. Eng.
Industrial Processes Section, Impact Management Branch

Enclosure

New Nouveau Brunswick

APPROVAL TO OPERATE

I-7850

Pursuant to paragraph 5 (3) (a) of the *Air Quality Regulation - Clean Air Act*, this Approval to Operate is hereby issued to:

Irving Pulp & Paper, Limited Les Pâtes & Papier Irving, Limitée

for the operation of the

Reversing Falls Mill

Description of Source:	**Kraft Pulp and Tissue Mill**
Source Classification:	**Air Quality Regulation** **Class 1A**
Parcel Identifier:	**55162416, 00036673**
Mailing Address:	**P.O. Box 3007** **Station "B"** **Saint John, NB E2M 3H1**
Conditions of Approval:	**See attached Schedule (s)"A" and "B" of this Approval**
Supersedes Approval:	**I-5827**
Valid From:	**June 01, 2012**
Valid To:	**May 31, 2017**

Recommended by: _____
Community Planning & Environmental Protection Division

Issued by: _____
Minister of Environment

MAY 9 2012
Date

SCHEDULE "A"

A. DESCRIPTION AND LOCATION OF SOURCE

Irving Pulp & Paper, Limited Les Pâtes & Papier Irving, Limitée operates a Mill Complex that consists of a kraft pulp mill having a reference production rate of approximately 1000 air dry tonnes per day of bleached kraft pulp, and a tissue mill with a reference production rate of approximately 200 machine dry tonnes per day of tissue. The complex is situated in the vicinity of the Reversing Falls on the Saint John River in the City of Saint John, New Brunswick. There exist *potential* environmental impacts from the release of trace amounts of air contaminants from a variety of Mill Complex Emission Sources.

The operation of the Irving Pulp & Paper, Limited Les Pâtes & Papier Irving, Limitée Mill Complex at the property referenced by the Parcel Identifiers 00036673 and 55162416 in the City of Saint John, County of Saint John, and the Province of New Brunswick is hereby approved under the *Air Quality Regulation - Clean Air Act* and is subject to the following:

B. DEFINITIONS

1. **"Approval Holder"** means Irving Pulp and Paper, Limited.

2. **"Department"** means the New Brunswick Department of Environment.

3. **"Minister"** means the Minister of Environment and includes any person designated to act on the Minister's behalf.

4. **"Director"** means the Director of the Impact Management Branch of the Department of Environment and includes any person designated to act on the Director's behalf.

5. **"Inspector"** means an Inspector designated under the *Clean Air Act*, the *Clean Environment Act*, or the *Clean Water Act*.

6. **"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.

7. **"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.

8. **"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.

9. **"Facility"** means the property, buildings, and equipment and all contiguous property in the title of the Approval Holder at that location.

10. **"Mill Complex Emission Sources"** means all stationary vents, stacks, and storage piles at the Facility that release or have the potential to release air contaminants to the environment. For the purposes of this Approval the primary Mill Complex Emission Sources include: Woodchip Storage Piles; Brownstock Washing System Vents and/or Stacks; Oxygen Delignification System Vents and/or Stacks; Bleach Plant Vents and/or Stacks; Pulp Dryer Vents and/or Stacks, Teller Scrubber Exhaust Stack; Smelt Dissolving Tank; Lime Kiln Exhaust Stack; Power Boiler Exhaust Stack (if greater than 700 hours of operation per year); Woodwaste Boiler Exhaust Stack; Tissue Boiler Exhaust Stack (if greater than 700 hours of operation per year); and Incinerator Exhaust Stack. The air contaminants that are or could be released from these sources in trace amounts are provided in the attached Schedule B document.

C. TERMS AND CONDITIONS

GENERAL

11. This Facility has been classified as a **Class 1A** source, pursuant to the *Air Quality Regulation 97-133* filed under the *Clean Air Act*. The Approval Holder shall pay the appropriate fee **on or before April 1 of each year.**

12. **Prior to September 30, 2016**, the Approval Holder shall make application in writing for a renewal of this Approval on a form provided by the Minister.

13. The issuance of this Approval does not relieve the Approval Holder from compliance with other by-laws, federal or provincial acts or regulations, or any guidelines issued pursuant to regulations.

14. An Inspector, at any reasonable time, has the authority to inspect the Facility and carry out such duties as defined in the *Clean Air Act*, the *Clean Environment Act* and/or the *Clean Water Act*.

15. The terms and conditions of this Approval are severable. If any term and/or condition of this Approval is held invalid, is revoked or is modified, the remainder of the Approval shall not be affected.

16. The Approval Holder shall operate the Facility in compliance with the *Air Quality Regulation 97-133* filed under the *Clean Air Act* of the Province of New Brunswick. Violation of this Approval or any condition stated herein constitutes a violation of the *Clean Air Act* of the Province of New Brunswick.

17. The Approval Holder shall make application in writing, on a form provided by the Minister, for approval to undertake any modification to the Facility that would significantly change the current composition and/or quantity of contaminants being discharged to the environment. The Minister must receive such application **at least 240 days prior** to the planned modification commencement.

18. In the event of facility closure, the Approval Holder shall notify the Minister in writing **at least ninety (90) days prior** to the anticipated closure date.

19. The Approval Holder shall immediately notify the Minister in writing of any change in its name or address.

EMERGENCY REPORTING

20. 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 Regional Office is provided below:

Saint John Regional Office (506) 658-2558

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.**

21. Within 24 hours of the time of initial notification, a copy of a **Preliminary Emergency Report** shall be faxed, by a designate representing the Approval Holder, to the Department's applicable Regional Office *as well as* the Department's Central Office using the fax numbers provided below. The Preliminary Emergency Report shall clearly communicate all information available at the time about the environmental emergency.

Within five (5) days of the time of initial notification, a copy of a **Detailed Emergency Report** shall be faxed, by a designate representing the Approval Holder, to the Department's applicable Regional Office *as well as* 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.

Saint John Regional Office Fax No: (506) 658-3046
Central Office Fax No: (506) 457-7805

LIMITS

22. The Approval Holder shall ensure that odour, dust or noise being released 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.

23. The Approval Holder shall ensure that the emissions of Sulphur Dioxide (SO_2) from all applicable Mill Complex Emission Sources at the Facility do not exceed 2000 tonnes per year for any calendar year.

24. The Approval Holder shall ensure that, as a result of the operation of the Mill Complex alone, the Maximum Ground Level Concentration Limits provided in Schedule B of this Approval are at no time exceeded at any location outside the boundaries of the Facility.

25. The Approval Holder shall ensure that the Teller Scrubber, Woodwaste Boiler, and Lime Kiln are operated such that they conform, at all times, with the following limiting criteria:

Point Source	Parameter Limiting Criteria
Teller Scrubber Exhaust Stack	Particulate Matter (PM) concentration is limited to a maximum of 250 milligrams per cubic metre of dry gas corrected to 21 degrees Celsius and 101.3 kilopascals. Total Reduced Sulphur (TRS) concentration is limited to a maximum of 15 parts per million by volume, at stack conditions for any 4 hour rolling average.
Woodwaste Boiler Exhaust Stack	Particulate Matter (PM) concentration is limited to a maximum of 250 milligrams per cubic metre of dry gas corrected to 21 degrees Celsius and 101.3 kilopascals and 12% carbon dioxide.
Lime Kiln Exhaust Stack	Particulate Matter (PM) emission rate is limited to a maximum of 0.50 kilograms per unbleached air dry tonne of pulp production. Total Reduced Sulphur (TRS) concentration is limited to a maximum of 15 parts per million by volume, at stack conditions for any 4 hour rolling average.

FACILITY MANAGEMENT

26. The Approval Holder shall ensure that at no time is the No.1 Power Boiler operated at the Facility. This boiler is presently under decommissioned status. In the event the Approval Holder wishes to operate the boiler, the Approval Holder is required to apply on a form provided by the Minister and receive an Approval from the Minister, prior to commencing boiler operation.

27. The Approval Holder is permitted to burn up to three tractor trailer loads of Flakeboard Company Limited (FCL) woodwaste per day in the Woodwaste Boiler. The FCL woodwaste must be blended with the Approval Holders existing woodwaste mixtures, which would then not contain greater than 25% of the FCL woodwaste. FCL woodwaste consists of reject medium density fiberboard material that has been tub-ground to a consistent two inch minus fiber size and has a moisture content of approximately 10% at the time of generation.

28. The Approval Holder is permitted to utilize waste derived fuel as a fuel source subject to the following restrictions:

(a) the waste derived fuel can only be utilized as a fuel source in the Recovery Boiler, Lime Kiln and the Woodwaste Boiler;
(b) the waste derived fuel can only be received from a waste derived fuel carrier and/or receiver approved by the Department;
(c) a maximum of approximately 250,000 litres per month of waste derived fuel is permitted to be utilized;
(d) an analysis for the parameters listed below shall be obtained from the waste derived fuel carrier and/or receiver for each load of waste derived fuel intended to be supplied to the Approval Holder. The analysis of the waste derived fuel shall be completed by a laboratory certified to test the waste derived fuel for the parameters listed below; and
(e) the waste derived fuel is only permitted to be received and utilized as a fuel source if the used fuel meets the specifications listed below:

Concentration limits for waste derived fuel:

Parameter & Unit	Maximum	Minimum
PCBs / ppm	5	
Organic Halogen,Total / ppm	1000	
Arsenic / ppm	5	
Cadmium / ppm	2	
Sulphur / %	1	
Lead / ppm	100	
Zinc / ppm	1500	
Flash Point / Celsius		61
Chromium / ppm	10	

29. The Approval Holder shall burn the following items in the Woodwaste Boiler; small quantities of oily waste, spilled oil, oily rags, bark or sawdust used to absorb spilled oil, and other materials including commercial absorbents approved by the Director, all of which originate from regular maintenance work or the cleanup of small spills. These materials shall be added directly to the woodwaste stream that feeds the Woodwaste Boiler and are not exposed to rain.

30. The Approval Holder shall ensure that the Dissolving Tank exhaust gas is collected and directed to the Teller Scrubber for treatment prior to being released to the environment, at all times other than times of general maintenance on the Dissolving Tank exhaust gas distribution system.

31. The Approval Holder shall ensure that the Recovery Boiler exhaust gas is collected and directed to the Teller Scrubber for treatment prior to being released to the environment, at all times other than times of general maintenance on the Recovery Boiler exhaust gas distribution system.

32. The Approval Holder shall ensure that, at all times, the Dilute Non-Condensable Gases (DNCG), Non-Condensable Gases (NCG), and Stripped Off-Gases (SOG) generated at the Facility are collected and directed to an Incineration System for incineration.

33. The Approval Holder shall ensure that the Brown Stock exhaust gas is collected and directed to the SO_2 Scrubber for treatment prior to being released to the environment, at all times other than; (1) times of general maintenance on the Brown Stock exhaust gas distribution system, or (2) times of general maintenance or planned outages of the #3 Power Boiler, or (3) other unforeseen short-term outages.

TESTING AND MONITORING

34. The Approval Holder shall ensure that all source testing events undertaken by the Approval Holder, or on behalf of the Approval Holder, are completed in accordance with the requirements embodied in the Department's Guidance Document for Source Testing.

35. Each year the Approval Holder shall undertake two source testing events to determine the Particulate Matter concentration in milligrams per cubic metre and emission rate in grams per second released to the environment from the following Mill Complex Emission Sources:

- Teller Scrubber Exhaust Stack;
- Woodwaste Boiler Exhaust Stack; and
- Lime Kiln Exhaust Stack.

36. **By July 31 of each year**, the Approval Holder shall ensure that the first source testing event, as required in item 35 under the Terms and Conditions section of this Approval, is completed.

37. **By December 31 of each year**, the Approval Holder shall ensure that the second source testing event, as required in item 35 under the Terms and Conditions section of this Approval, is completed.

38. The source testing events as required in item 35 under the Terms and Conditions section of this Approval shall be subject to the following additional requirements and exemptions:

(a) During 2014, the Approval Holder shall include a Particle Size Distribution (PSD) Study on the Lime Kiln Exhaust Stack. The PSD Study shall determine the concentration in milligrams per cubic metre and emission rate in grams per second of the Particulate Matter less than or equal to 10 microns in diameter and Particulate Matter less than or equal to 2.5 microns in diameter that is being released to the environment from each source;

(b) In any given year, if the Power Boiler and/or the Tissue Boiler are operated for more than 700 hours total for that year, the Approval Holder shall ensure that the Power Boiler Exhaust Stack and/or the Tissue Boiler Exhaust Stack are included in the first round source testing event for next year;

(c) Should the results of the first source testing event of a given year be accepted by the Department, the Approval Holder will be exempt from completing the second source testing event if the results of the first source testing event are equal to or less than the limiting criterion shown in the table below.

Point Source	Parameter Limiting Criteria
Teller Scrubber Exhaust Stack	Particulate Matter (PM) concentration is limited to a maximum of 100 milligrams per cubic metre of dry gas corrected to 21 degrees Celsius and 101.3 kilopascals.
Woodwaste Boiler Exhaust Stack	Particulate Matter (PM) concentration is limited to a maximum of 100 milligrams per cubic metre of dry gas corrected to 21 degrees Celsius and 101.3 kilopascals and 12% carbon dioxide.
Lime Kiln Exhaust Stack	Particulate Matter (PM) emission rate is limited to a maximum of 0.30 kilograms per unbleached air dry tonne of pulp production.

39. **Prior to August 31, 2014**, the Approval Holder shall complete a Total Reduced Sulphur Ambient Monitoring Network Study to evaluate the effectiveness of the current ambient Total Reduced Sulphur monitoring stations located around the Mill Complex. The study should be conducted in accordance with generally accepted guidance for siting air quality monitors and as a minimum include a determination of the annual wind direction profile around the mill and how the current monitoring coverage around the mill compares to the annual wind direction profile in terms of percent of time the wind direction influences the monitors. Prior to commencement of the study the Approval Holder shall submit to the Director the terms of reference for the study for review and approval.

40. **Prior to August 31, 2014**, the Approval Holder shall undertake a source testing event to determine the Chlorine and Chlorine Dioxide concentration in micrograms per cubic metre and emission rate in grams per second released to the environment from the Bleach Plant Vents and/or Stacks.

41. The Approval Holder shall ensure that the Teller Scrubber Exhaust Stack, and the Lime Kiln Exhaust Stack are equipped with continuous emission monitors. The monitors shall be capable of providing continuous readings of the Total Reduced Sulphur (TRS) concentration in parts per million by volume in the exhaust gas in the stacks. The monitors shall be located, maintained, and operated in a manner and on a schedule that is acceptable to the Department.

42. The Approval Holder shall ensure that three ambient air quality monitors are set up surrounding the Facility. The monitors shall be capable of providing an indication of the 1-hour and 24-hour rolling average ground level concentration of Total Reduced Sulphur (TRS) in parts per million by volume at the monitoring locations. The monitors shall be located, maintained, and operated in a manner and on a schedule that is acceptable to the Department.

43. The Approval Holder shall ensure that the Chlorine Dioxide Generator Tailgas Scrubber is equipped with a continuous emission monitor. The monitor shall be capable of providing continuous readings of the Chlorine Dioxide (ClO_2) concentration in parts per million by volume and kg/hr being released to the environment. The monitor shall be located, maintained, and operated in a manner and on a schedule that is acceptable to the Department.

REPORTING

44. In the event the Approval Holder receives a complaint from the public regarding unfavorable environmental impacts associated with the Facility, the Approval Holder is to report this complaint by facsimile to the Department's applicable Regional Office within one business day of receiving the complaint.

45. In the event the Approval Holder violates any Term and Condition of this Approval or the *Air Quality Regulation*, the Approval Holder is to immediately report this violation by facsimile to the Department's applicable Regional Office and the Central Office in Fredericton at **(506) 457-7805.** In the event the violation may cause the health or safety of the general public to be at risk and/or significant harm to the environment could or has resulted, the Approval Holder shall follow the Emergency Reporting procedures contained in this Approval.

46. **By July 15 of each year**, the Approval Holder shall ensure that a Pre-test Plan pertaining to the first source testing event, as required in item 36 under the Terms and Conditions section of this Approval, is completed in accordance with the Department's Guidance Document for Source Testing and filed with the Department for review.

47. **By December 15 of each year**, the Approval Holder shall ensure that a Pre-test Plan pertaining to the source testing as required in item 37 under the Terms and Conditions section of this Approval, is completed in accordance with the Department's Guidance Document for Source Testing and filed with the Department for review.

48. **By August 31 of each year**, the Approval Holder shall ensure that a Final Report on the source testing as required in item 36 under the Terms and Conditions section of this Approval, is completed in accordance with the Department's Guidance Document for Source Testing and filed with the Department for review.

49. **By January 31 of each year**, where applicable, the Approval Holder shall ensure that a Final Report on the source testing as required in item 37 under the Terms and Conditions section of this Approval, is completed in accordance with the Department's Guidance Document for Source Testing and filed with the Department for review.

50. **Prior to September 30, 2014**, the Approval Holder shall submit to the Department the Final Report required in item 39 under the Terms and Conditions section of this Approval.

51. **Prior to July 31, 2014**, the Approval Holder shall ensure that a Pre-test Plan, pertaining to the source testing event required in item 40 under the Terms and Conditions section of this Approval, is completed in accordance with the Department's Guidance Document for Source Testing and filed with the Department for review.

52. **Prior to September 30, 2014**, the Approval Holder shall ensure that a Final Report, pertaining to the source testing event required in item 40 under the Terms and Conditions section of this Approval, is completed in accordance with the Department's Guidance Document for Source Testing and filed with the Department for review.

53. **By the end of each month**, the Approval Holder shall submit to the Approvals Branch in Fredericton and the Regional Office in Saint John, a Monthly Air Quality Report for the previous month. The report can be submitted either by e-mail, fax or mail provided that the submitted copies are signed. The report shall contain the following information:

(a) copies of any reports related to the Emergency Response section of this Approval;
(b) a table, in a format approved by the Department, showing the 1-hour average of Total Reduced Sulphur (TRS) concentration in the Teller Scrubber Exhaust Stack and Lime Kiln Exhaust Stack, in parts per million, and a graph showing the 4-hour rolling average, and including a summary of the number of valid hours of data and the number of hours when the 4-hour rolling average is greater than 15 parts per million for the Teller Scrubber Exhaust Stack and 15 parts per million for the Lime Kiln Exhaust Stack;

(c) a table, in a format approved by the Department, showing the number of Dilute Non-Condensable Gases (DNCG), Non-Condensable Gases (NCG), and Stripped Off-Gases (SOG) venting incidents and their duration and including a running total for the year to date;

(d) a summary of any operating problems related to the continuous emission monitors and/or ambient air quality monitors;

(e) a table, in a format approved by the Department, showing the 1-hour average of Total Reduced Sulphur (TRS) and 24-hour rolling average for ambient Total Reduced Sulphur (TRS) measured at the three monitoring stations and a graph showing the 1-hour and 24-hour rolling average;

(f) a summary of the monthly waste derived fuel volume and analysis;

(g) a table, in a format approved by the Department, showing the chlorine dioxide emissions measured by the Chlorine Dioxide Generator Tailgas Scrubber continuous emission monitor in units of parts per million and kg/hr; and,

(h) a detailed statement from the Approval Holder indicating compliance with Condition 27 of this Approval.

54. **By January 31 of each year,** the Approval Holder shall submit to the Approvals Branch in Fredericton an Annual Air Contaminant Emission Report including:

(a) an itemized list of all fuel-fired sources;

(b) for each fuel-fired source, the amount of each type of fuel burned including used oil, and the % sulphur content of each type;

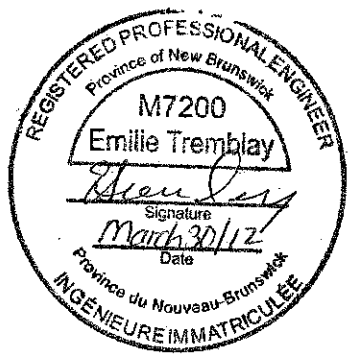
(c) a calculation of the annual emission in tonnes of Sulphur Dioxide, Particulate Matter, Nitrogen Oxides from fuel burning for each fuel-fired source; and

(d) a calculation of the annual emission in tonnes of Sulphur Dioxide produced from the incineration of Dilute Noncondensible Gases (DNCGs), Non-Condensible Gases (NCGs), and Stripped Off-gases (SOGs).

(e) the annual inventory data in tonnes per year for all the air contaminants listed in Schedule B of this Approval as result of the Mill Complex operation.

Prepared by:

Emilie Tremblay, P.Eng.
Approval Engineer, Industrial Processes



SCHEDULE "B"

AIR CONTAMINANTS (MAXIMUM GROUND LEVEL CONCENTRATION LIMITS)

Air Contaminant	Maximum Ground Level Concentration (ug/m3)*	Limiting Effect	Irving Pulp and Paper Ltd. - Mill Complex Emission Sources
Acetaldehyde	500	Health	Noncondensible Gas (NCG) and Stripper Off-gas Vents and/or Stacks; Brown Stock Washing System Vents and/or Stacks; Oxygen Delignification System Vents and or Stacks; Bleach Plant Vents and/or Stacks; Pulp Dryer Vent and/or Stacks; Teller Scrubber Exhaust Stack; Smelt Dissolving Tank Vent; and Lime Kiln Exhaust Stack.
Acetone	48000	Odour	Noncondensible Gas (NCG) and Stripper Off-gas Vents and/or Stacks; Brown Stock Washing System Vents and/or Stacks; Oxygen Delignification System Vents and or Stacks; Bleach Plant Vents and/or Stacks; Pulp Dryer Vent and/or Stacks; Teller Scrubber Exhaust Stack; Smelt Dissolving Tank Vent; and Lime Kiln Exhaust Stack.
Ammonia	100	Odour	Smelt Dissolving Tank Vent.
Antimony	25	Health	Lime Kiln Exhaust Stack; Power Boiler Exhaust Stack; Woodwaste Boiler Exhaust Stack; Tissue Boiler Exhaust Stack; and Incinerator Exhaust Stack.
Arsenic	0.3	Health	Lime Kiln Exhaust Stack; Power Boiler Exhaust Stack; Woodwaste Boiler Exhaust Stack; Tissue Boiler Exhaust Stack; and Incinerator Exhaust Stack.
Barium	10	Health	Lime Kiln Exhaust Stack; Power Boiler Exhaust Stack; Woodwaste Boiler Exhaust Stack; Tissue Boiler Exhaust Stack; and Incinerator Exhaust Stack.
Benzene	-	-	Lime Kiln Exhaust Stack; Power Boiler Exhaust Stack; Woodwaste Boiler Exhaust Stack; Tissue Boiler Exhaust Stack; and Incinerator Exhaust Stack.
Beryllium	0.01	Health	Lime Kiln Exhaust Stack; Power Boiler Exhaust Stack; Woodwaste Boiler Exhaust Stack; Tissue Boiler Exhaust Stack; and -

			Incinerator Exhaust Stack.
Cadmium	**2**	**Health**	**Lime Kiln Exhaust Stack; Power Boiler Exhaust Stack; Woodwaste Boiler Exhaust Stack; Tissue Boiler Exhaust Stack; and Incinerator Exhaust Stack.**
Carbon Monoxide	**15000 (8 hour average)**	**Health**	**Lime Kiln Exhaust Stack; Power Boiler Exhaust Stack; Woodwaste Boiler Exhaust Stack; Tissue Boiler Exhaust Stack; and - Incinerator Exhaust Stack.**
Chlorine Dioxide	**30**	**Health**	**Bleach Plant Vents and/or Stacks**
Chlorine	**150**	**Health**	**Bleach Plant Vents and/or Stacks**
Chromium	**1.5**	**Health**	**Lime Kiln Exhaust Stack; Power Boiler Exhaust Stack; Woodwaste Boiler Exhaust Stack; Tissue Boiler Exhaust Stack; and Incinerator Exhaust Stack.**
Cobalt	**0.1**	**Health**	**Lime Kiln Exhaust Stack; Power Boiler Exhaust Stack; Woodwaste Boiler Exhaust Stack; Tissue Boiler Exhaust Stack; and Incinerator Exhaust Stack.**
Copper	**50**	**Health**	**Lime Kiln Exhaust Stack; Power Boiler Exhaust Stack; Woodwaste Boiler Exhaust Stack; Tissue Boiler Exhaust Stack; and Incinerator Exhaust Stack.**
Cresols	**75**	**Health**	**Oxygen Delignification System Vents and or Stacks;**
Dimethyl Sulphide	**30 (1-hour average)**	**Odour**	**Noncondensible Gas (NCG) and Stripper Off-gas Vents and/or Stacks; Brown Stock Washing System Vents and/or Stacks; Oxygen Delignification System Vents and or Stacks; Bleach Plant Vents and/or Stacks; Pulp Dryer Vents and/or Stacks Teller Scrubber Exhaust Stack; Smelt Dissolving Tank Vent; and Lime Kiln Exhaust Stack.**
Dimethyl Disulphide	**40 (1-hour average)**	**Odour**	**Noncondensible Gas (NCG) and Stripper Off-gas Vents and/or Stacks; Brown Stock Washing System Vents and/or Stacks; Oxygen Delignification System Vents and or Stacks; Bleach Plant Vents and/or Stacks; Pulp Dryer Stacks and or Vents; Teller Scrubber Exhaust Stack; Smelt Dissolving Tank Vent; and Lime Kiln Exhaust Stack.**
Ethylbenzene	**4000 (1-hour average)**	**Odour**	**Lime Kiln Exhaust Stack; Power Boiler Exhaust Stack; Woodwaste Boiler Exhaust Stack; Tissue Boiler Exhaust Stack; and Incinerator Exhaust Stack.**
Fluorides	**0.86**	**Vegetation**	**Lime Kiln Exhaust Stack; Power Boiler**

			Exhaust Stack; Woodwaste Boiler Exhaust Stack; Tissue Boiler Exhaust Stack; and Incinerator Exhaust Stack.
Formaldehyde	**65**	**Odour**	**Oxygen Delignification System Vents and or Stacks; Brown Stock Washing System Vents and/or Stacks; Bleach Plant Vents and/or Stacks; Pulp Dryer Vents and/or Stacks; Teller Scrubber Exhaust Stack; Smelt Dissolving Tank Vent; and Lime Kiln Exhaust Stack.**
Hydrogen Sulphide	**5**	**Odour**	**Noncondensible Gas (NCG) and Stripper Off-gas Vents and/or Stacks; Brown Stock Washing System Vents and/or Stacks; Oxygen Delignification System Vents and or Stacks; Bleach Plant Vents and/or Stacks; Pulp Dryer Vents and/or Stacks; Teller Scrubber Exhaust Stack; Smelt Dissolving Tank Vent; and Lime Kiln Exhaust Stack.**
Lead	**2**	**Health**	**Lime Kiln Exhaust Stack; Power Boiler Exhaust Stack; Woodwaste Boiler Exhaust Stack; Tissue Boiler Exhaust Stack; and Incinerator Exhaust Stack.**
Methanol	**4000**	**Health**	**Noncondensible Gas (NCG) and Stripper Off-gas Vents and/or Stacks; Brown Stock Washing System Vents and/or Stacks; Oxygen Delignification System Vents and or Stacks; Bleach Plant Vents and/or Stacks; Pulp Dryer Vents and/or Stacks; Teller Scrubber Exhaust Stack; Smelt Dissolving Tank Vent; and Lime Kiln Exhaust Stack.**
Methyl Ethyl Ketone	**1000**	**Health**	**Noncondensible Gas (NCG) and Stripper Off-gas Vents and/or Stacks; Brown Stock Washing System Vents and/or Stacks; Oxygen Delignification System Vents and or Stacks; Bleach Plant Vents and/or Stacks; - Pulp Dryer Vents and/or Stacks; Teller Scrubber Exhaust Stack; Smelt Dissolving Tank Vent; and Lime Kiln Exhaust Stack.**
Methyl Mercaptan	**20 (1-hour average)**	**Odour**	**Noncondensible Gas (NCG) and Stripper Off-gas Vents and/or Stacks; Brown Stock Washing System Vents and/or Stacks; Oxygen Delignification System Vents and or Stacks; Bleach Plant Vents and/or Stacks; Pulp Dryer Vents and/or Stacks; Teller Scrubber Exhaust Stack; Smelt Dissolving Tank Vent; and Lime Kiln Exhaust Stack.**

Mercury	**2**	**Health**	**Lime Kiln Exhaust Stack; Power Boiler Exhaust Stack; Woodwaste Boiler Exhaust Stack; Tissue Boiler Exhaust Stack; and Incinerator Exhaust Stack.**
Molybdenum	**120**	**Health**	**Lime Kiln Exhaust Stack; Power Boiler Exhaust Stack; Woodwaste Boiler Exhaust Stack; Tissue Boiler Exhaust Stack; and Incinerator Exhaust Stack.**
Naphthalene	**22.5**	**Odour**	**Lime Kiln Exhaust Stack; Power Boiler Exhaust Stack; Woodwaste Boiler Exhaust Stack; Tissue Boiler Exhaust Stack; and Incinerator Exhaust Stack.**
Nickel	**2**	**Vegetation**	**Lime Kiln Exhaust Stack; Power Boiler Exhaust Stack; Woodwaste Boiler Exhaust Stack; Tissue Boiler Exhaust Stack; and Incinerator Exhaust Stack.**
Nitrogen Oxides	**200**	**Health**	**Tellers Scrubber Exhaust Stack Lime Kiln Exhaust Stack; Power Boiler Exhaust Stack; Woodwaste Boiler Exhaust Stack; Tissue Boiler Exhaust Stack; and Incinerator Exhaust Stack.**
Particulate Matter	**120**	**Health**	**Tellers Scrubber Exhaust Stack Lime Kiln Exhaust Stacks; Power Boiler Exhaust Stack; Woodwaste Boiler Exhaust Stack; Tissue Boiler Exhaust Stack; and Incinerator Exhaust Stack.**
Particulate Matter < 10 microns in aerodynamic diameter.	**-**	**-**	**Lime Kiln Exhaust Stack; Power Boiler Exhaust Stack; Woodwaste Boiler Exhaust Stack; Tissue Boiler Exhaust Stack; and Incinerator Exhaust Stack.**
Particulate Matter < 2.5 microns in aerodynamic diameter.	**-**	**-**	**Lime Kiln Exhaust Stack; Power Boiler Exhaust Stack; Woodwaste Boiler Exhaust Stack; Tissue Boiler Exhaust Stack; and Incinerator Exhaust Stack.**
Phenol	**100**	**Health**	**Teller Scrubber Exhaust Stack.**
Selenium	**10**	**Health**	**Lime Kiln Exhaust Stack; Power Boiler Exhaust Stack; Woodwaste Boiler Exhaust Stack; Tissue Boiler Exhaust Stack; and Incinerator Exhaust Stack.**
Sulphur dioxide	**150**	**Health**	**Tellers Scrubber Exhaust Stack; Lime Kiln Exhaust Stacks; Power Boiler Exhaust Stack; Woodwaste Boiler Exhaust Stack; Tissue Boiler Exhaust Stack; and Incinerator Exhaust Stack.**
Sulphuric acid	**35**	**Corrosion**	**Teller Scrubber Exhaust Stack**
Toluene	**2000**	**Odour**	**Lime Kiln Exhaust Stack; Power Boiler**

			Exhaust Stack; Woodwaste Boiler Exhaust Stack; Tissue Boiler Exhaust Stack; and Incinerator Exhaust Stack.
Vanadium	**2**	**Health**	**Lime Kiln Exhaust Stack; Power Boiler Exhaust Stack; Woodwaste Boiler Exhaust Stack; Tissue Boiler Exhaust Stack; and Incinerator Exhaust Stack.**
Zinc	**120**	**Health**	**Lime Kiln Exhaust Stack; Power Boiler Exhaust Stack; Woodwaste Boiler Exhaust Stack; Tissue Boiler Exhaust Stack; and Incinerator Exhaust Stack.**

APPROVAL TO OPERATE

I-8660

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

Irving Pulp & Paper, Limited Les Pâtes & Papier Irving, Limitée

for the operation of the

Reversing Falls Mill

Description of Source:	**Kraft Pulpmill and Tissue Paper Mill**
Source Classification:	**Fees for Industrial Approvals Regulation - Clean Water Act** **Class 1A**
Parcel Identifier:	**55162416, 00036673**
Mailing Address:	**P.O. Box 5777** **300 Union Street** **Saint John, NB E2L 4M3**
Conditions of Approval:	**See attached Schedule "A" of this Approval**
Supersedes Approval:	**I-6975**
Valid From:	**May 01, 2014**
Valid To:	**April 30, 2019**

Recommended by: _____
Environment Division

Issued by: _____ April 15, 2014
for the Minister of Environment and Local Government Date

SCHEDULE "A"

A. DESCRIPTION AND LOCATION OF SOURCE

Irving Pulp & Paper, Limited Les Pâtes & Papier Irving, Limitée operates a Mill Complex that consists of a kraft pulpmill having a reference production rate of approximately 1000 air dry tonnes per day of bleached kraft pulp, and a tissue mill with a reference production rate of approximately 200 machine dry tonnes per day. The Mill Complex is situated in the vicinity of the Reversing Falls on the St. John River in the City of Saint John.

There exist *potential environmental impacts* to the soil, surface water and groundwater from i) the accidental spill and/or improper handling, treatment and disposal of the wastewater and ii) the accidental spill, leakage and/or improper storage and handling of petroleum products or chemicals.

The operation of Irving Pulp & Paper, Limited Les Pâtes & Papier Irving, Limitée, at the properties referenced by the Parcel Identifiers 00036673 and 55162416 in the City of Saint John, County of St. John, and the Province of New Brunswick, is hereby approved subject to the following:

B. DEFINITIONS

1. **"Approval Holder"** means Irving Pulp & Paper, Limited Les Pâtes & Papier Irving, Limitée.

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

3. **"Minister"** means the Minister of Environment and Local Government and includes any person designated to act on the Minister's behalf.

4. **"Director"** means the Director of the Impact Management Branch of the Department of Environment and Local Government and includes any person designated to act on the Director's behalf.

5. **"Inspector"** means an Inspector designated under the *Clean Air Act*, the *Clean Environment Act*, or the *Clean Water Act.*

6. **"Facility"** means the property, buildings, and equipment as identified in the Description of Source above, and all contiguous property in the title of the Approval Holder at that location.

7. **"wastewater"** means any liquid that exists or that is generated from any unit operation or ancillary equipment at the Facility and is being discharged to the environment.

8. **"wastewater stream"** means any stream of wastewater generated at the Facility and discharged to the environment. Wastewater streams include, but are not limited to, the Main Mill, Finishing Room, and Cooling Water Outfalls.

9. **"RPR"** means the reference production rate, which is the highest value of the 90th percentiles of the daily production of finished product at the mill in tonnes for any of the previous three years.

10. **"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.

11. **"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.

12. **"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.

13. "**hazardous waste"** means any waste material intended for disposal or recycling, that is identified as a hazardous waste by the federal *Export and Import of Hazardous Waste and Hazardous Recyclable Material Regulations*, and/or is included in Class 1 and/or Class 7 of the federal *Transportation of Dangerous Goods Regulations*. This definition excludes any waste(s) for which the Director has issued a written exemption.

14. "**Hazardous Waste Receiver**" means an approved or acceptable business that receives hazardous waste from a Hazardous Waste Collection and Transportation Network for transfer, treatment, storage, or disposal.

15. **"Approved Material"** means, for the purposes of this Approval, the following types of hazardous wastes and hazardous recyclable materials that are approved to be generated, stored, transferred and/or treated by the Approval Holder: Black Liquor, R.O. (Reverse Osmosis) Concentrate, used CED (cupriethylenediamine) solution for lab tests, used C.O.D. (Chemical Oxygen Demand) Vials, Asbestos, Nuclear Devices (for use in level indicators), and untreated Dregs. Other waste materials that are deemed hazardous by the Approval Holder must be approved by the Director.

C. TERMS AND CONDITIONS

GENERAL

16. This Facility has been classified as a **Class 1A** source pursuant to the *Fees for Industrial Approvals Regulation 93-201* under the *Clean Water Act.*

17. **By April 01 of each year**, the Approval Holder shall pay the appropriate annual fee for a **Class 1A** source, pursuant to the *Fees for Industrial Approvals Regulation 93-201* filed under the *Clean Water Act.*

18. The Approval Holder shall maintain throughout the period of this Approval, Environmental Liability Insurance with coverage of at least one million dollars ($1,000,000.00) for the operation of the Facility.

19. If in the opinion of the Minister the environmental impact of the Facility is unacceptable, the Minister reserves the right to cancel this Approval and issue a new Approval as deemed necessary.

20. The issuance of this Approval does not relieve the Approval Holder from compliance with other by-laws, federal or provincial acts or regulations, or any guidelines issued pursuant to regulations.

21. An Inspector, at any reasonable time, has the authority to inspect the Facility and carry out such duties as defined in the *Clean Air Act*, the *Clean Environment Act* and/or the *Clean Water Act*.

22. The terms and conditions of this Approval are severable. If any term and/or condition of this Approval is held invalid, is revoked or is modified, the remainder of the Approval shall not be affected.

23. The Approval Holder shall operate the Facility in compliance with the *Water Quality Regulation 82-126* filed under the *Clean Environment Act* of the Province of New Brunswick. Violation of this Approval or any condition stated herein constitutes a violation of the *Clean Environment Act* of the Province of New Brunswick.

24. The Approval Holder shall immediately notify the Minister in writing of any change in its name or address.

25. The Approval Holder shall notify the Minister in writing of any plans to modify the operation of the Facility that would result in a significant change in the characteristics or increased rate of discharge of any contaminant to the environment **at least ninety (90) days prior** to the modification.

26. **Prior to February 01, 2019**, the Approval Holder shall make application in writing for a renewal of this Approval on a form provided by the Minister.

27. The Approval Holder shall be identified by the following provincial identification generator number whenever hazardous waste is shipped from the Facility:

NB005055

28. The Approval Holder shall be identified by the following provincial identification receiver number whenever hazardous waste is received at the Facility:

NBR000213

EMERGENCY REPORTING

29. 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 Regional Office is provided below:

Saint John Regional Office (506) 658-2558

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**.

30. Within 24 hours of the time of initial notification, a copy of a **Preliminary Emergency Report** shall be faxed, by a designate representing the Approval Holder, to the Department's applicable Regional Office *as well as* the Department's Central Office using the fax numbers provided below. The Preliminary Emergency Report shall clearly communicate all information available at the time about the environmental emergency.

Within five (5) days of the time of initial notification, a copy of a **Detailed Emergency Report** shall be faxed, by a designate representing the Approval Holder, to the Department's applicable Regional Office *as well as* 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.

Saint John Regional Office Fax No: (506) 658-3046

Central Office Fax No: (506) 457-7805

LIMITS

31. The Approval Holder shall ensure that all the wastewater streams are non-acutely lethal to rainbow trout.

32. The Approval Holder shall ensure that the combined Biochemical Oxygen Demand (BOD) loading in all the wastewater streams does not exceed the following limits:

Daily Maximum:	12.5 x RPR (kg over any 24-hour period)
Monthly Average:	7.5 x RPR (kg per day)

33. The Approval Holder shall ensure that the combined Total Suspended Solids (TSS) loading of all the wastewater streams does not exceed the following limits:

Daily Maximum:	18.75 x RPR (kg over any 24-hour period)
Monthly Average:	11.25 x RPR (kg per day)

34. The Approval Holder shall ensure that each wastewater stream has a pH between 6.0 and 9.5, as determined by the 24 hour composite value. In no case is the pH of any wastewater stream to be above 11.5 or below 2.5 at any point, as determined by a 15 minute average.

    The pH limits apply to all outfalls at all times, with the exception that for those periods of time when, at the main mill outfall, flow is less than 500 m^3/hr and when, at the smaller volumetric flowrate outfalls (Finishing Room and Cooling Water Outfalls), flows are less than 40% of nominal flowrates, such as occurs during shutdown periods.

FACILITY MANAGEMENT

35. The Approval Holder shall ensure that the Hog and Press Outfall is sealed and that no liquid is released to the environment from that outfall. If, at any time, the Approval Holder wishes to re-open the Hog and Press Outfall, the Approval Holder shall first apply for and receive approval from the Department.

36. The Reverse Osmosis (RO) Concentrate shall not be discharged directly to the environment. The RO Concentrate must be handled and disposed of in a manner agreeable to the Department.

37. The Approval Holder shall maintain a Hazardous Waste Contingency Plan, describing the measures that will be taken by the Facility in the event of an environmental emergency. The Approval Holder shall respond to all environmental emergencies in accordance with the Hazardous Waste Contingency Plan. Where there are differences between the requirements of this Approval and the Hazardous Waste Contingency Plan, this Approval will take precedence.

38. The Approval Holder shall ensure that the Facility is equipped with, or has access to, all emergency clean-up material required to implement the procedures described in the Contingency Plan, including but not limited to: a recovery drum, absorbent material, rags, and a shovel.

39. The Approval Holder shall ensure that all Hazardous Waste generated at the Facility is collected and transported by a Hazardous Waste Collection and Transportation Network, as defined in this Approval.

40. The Approval Holder shall ensure that all Hazardous Waste at the Facility is stored in a dedicated Hazardous Waste Storage System. The system shall be set-up to ensure that all Hazardous Waste is:

    a) secured in sealed and chemically resistant containers;
    b) away from high traffic areas and protected from vehicle impacts;
    c) away from electrical panels;
    d) in a containment area that has secondary containment adequate to contain 110 % of the nominal volume of the largest container in the containment area;
    e) in a containment area that is designed to prevent contact between incompatible materials; and
    f) in a containment area designed to prevent the release or discharge of Hazardous Waste to the environment as a result of a spill.

TESTING AND MONITORING

41. The Approval Holder shall ensure that all outdoor aboveground petroleum and chemical storage systems that are in service are visually inspected for leaks once per month.

42. The Approval Holder shall ensure that the volumetric flowrate (to determine the daily flow in cubic metres) of each wastewater stream is metered on a continuous basis.

43. The Approval Holder shall ensure that all the wastewater streams are equipped with a monitoring and sampling station that is operating and maintained on a continual basis, unless otherwise specified by the Minister in writing.

44. The Approval Holder shall ensure that all the wastewater monitoring and sampling stations are capable of collecting 24-hour composite samples and grab samples of wastewater.

45. The Approval Holder shall ensure that on alternate days, at least three times per week, a 24-hour composite sample of each wastewater stream is collected and sent to a laboratory for determination of BOD using the Determination of Biochemical Oxygen Demand, Method H-2, published by the Pulp and Paper Technical Association of Canada (PAPTAC) or the Standard Methods for the Examination of Water and Wastewater.

46. The Approval Holder shall ensure that a 24-hour composite samples of each wastewater stream is collected and sent to a laboratory for determination of TSS using the Determination of Solids Content of Pulp and Paper Effluents, Method H-1, published by the Pulp and Paper Technical Association of Canada (PAPTAC) or the Standard Methods for the Examination of Water and Wastewater.

47. The Approval Holder shall ensure that at least once per month a grab sample of each wastewater stream is collected and sent to a Standards Council of Canada (SCC) accredited or equivalent laboratory to determine the Acute Lethality Toxicity using the Reference Method for Determining the Acute Lethality of Effluent to Rainbow Trout, EPS 1/RM/13.

48. The Approval Holder shall ensure all 24-hour composite samples of wastewater streams are collected and tested to determine the pH of the respective sample.

RECORD KEEPING

49. The Approval Holder shall keep an electronic record, or alternate format approved by the Director, of all Hazardous Waste generated, received and distributed.

REPORTING

50. In the event the Approval Holder receives a complaint from the public regarding unfavorable environmental impacts associated with the Facility, the Approval Holder is to report this complaint by facsimile to the Department's applicable Regional Office within one business day of receiving the complaint.

51. 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.

52. In the event the Approval Holder violates any Term and Condition of this Approval or the *Water Quality Regulation*, the Approval Holder is to immediately report this violation by facsimile or email to the Department's applicable Regional Office and the Central Office in Fredericton at **(506) 457-7805**, during normal business hours or as soon as possible the next business day. In the event the violation may cause the health or safety of the general public to be at risk and/or significant harm to the environment could or has resulted, the Approval Holder shall follow the Emergency Reporting procedures contained in this Approval.

53. **By the end of the following month**, the Approval Holder shall ensure that a Monthly Water Quality Report is submitted to the Department's Central Office and the Regional Office in Saint John. The report shall contain as a minimum:

a) a summary of any operating and equipment problems resulting in an exceedance of the limits or violation of any condition of this Approval;
b) a summary of the results of the petroleum and chemical storage systems' monthly visual inspection;
c) the results of BOD testing and the calculated monthly average BOD loading, in kilograms per day;
d) the results of daily TSS testing results and the calculated monthly average TSS loading, in kilograms per day;
e) the results of monthly rainbow trout toxicity testing, reported as lethal or non-lethal;
f) the results of daily pH monitoring, including the 24 hour average, the minimum and maximum values for that period, based on the 15 minute averages, and the number of 15 minute periods that the pH was outside of the 6.0 to 9.5 range for the main mill outfall, for each 24 hour period.
g) the daily volumetric flowrate of the wastewater streams, in cubic metres per day;
h) the daily total and calculated monthly average mill production of finished products, in tonnes per day; and
i) a copy of all records required under Record Keeping.

54. **By January 31 of each year**, the Approval Holder shall ensure that the RPR value being used for that year is provided to the Department in writing.

55. **By January 31 of each year**, the Approval Holder shall prepare and submit to the Department for review an annual contingency plan that is designed to provide the notification and reporting procedure during upset conditions and the action plan that is intended to be followed for experienced upset conditions. The Hazardous Waste Contingency Plan required under Hazardous Waste Management may be included in this plan.

56. **By July 15 of each year**, the Approval Holder shall submit to the Department proof of Environmental Insurance coverage, as required under General.

Prepared by: _____
Emilie Tremblay, P.Eng.
Approval Engineer, Industrial Processes

Appendix III:

Atlantic Canada Conservation Data Centre Reports

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

DATA REPORT 5511: Saint John Irving PP, NB

Prepared 9 February 2016
by J. Churchill, Data Manager

CONTENTS OF REPORT

Map 1. A 100 km buffer around the study area

1.0 PREFACE

The Atlantic Canada Conservation Data Centre (ACCDC) 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 ACCDC 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 ACCDC is supported by 6 federal agencies and 4 provincial governments, as well as through outside grants and data processing fees. URL: www.ACCDC.com.

Upon request and for a fee, the ACCDC 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 ACCDC 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
StJohnIrvingNB_5511ob.xls	All Rare and legally protected *Flora and Fauna* within 5 km of your study area
StJohnIrvingNB_5511ob100km.xls	A list of Rare and legally protected *Flora and Fauna* within 100 km of your study area
StJohnIrvingNB_5511ma.xls	All *Managed Areas* in your study area
StJohnIrvingNB_5511sa.xls	All *Significant Natural Areas* in your study area
StJohnIrvingNB_5511ff.xls	Rare and common *Freshwater Fish* in your study area (DFO database)
StJohnIrvingNB_5511bp.xls	Rare and common *Pelagic Birds* in your study area (CWS database)

1.2 RESTRICTIONS

The ACCDC 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 ACCDC 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 ACCDC 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) ACCDC 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) ACCDC 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 ACCDC data response.

1.3 ADDITIONAL INFORMATION

The attached file DataDictionary 2.1.pdf provides metadata for the data provided.

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

Plants, Lichens, Ranking Methods, All other Inquiries
Sean Blaney, Senior Scientist, Executive Director
Tel: (506) 364-2658
sblaney@mta.ca

Animals (Fauna)
John Klymko, Zoologist
Tel: (506) 364-2660
jklymko@mta.ca

Plant Communities
Sarah Robinson , Community Ecologist
Tel: (506) 364-2664
srobinson@mta.ca

Data Management, GIS
James Churchill, Data Manager
Tel: (902) 679-6146
jlchurchill@mta.ca

Billing
Jean Breau
Tel: (506) 364-2657
jrbreau@mta.ca

Questions on the biology of Federal Species at Risk can be directed to ACCDC: (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 Stewart Lusk, Natural Resources: (506) 453-7110.

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 Sherman Boates, NSDNR: (902) 679-6146. To determine if location-sensitive species (section 4.3) occur near your study site please contact a NSDNR Regional Biologist:

Western: Duncan Bayne
(902) 648-3536
baynedz@gov.ns.ca

Western: Donald Sam
(902) 634-7525
samdx@gov.ns.ca

Central: Shavonne Meyer
(902) 893-6353
meyersj@gov.ns.ca

Central: Kimberly George
(902) 893-5630
georgeka@gov.ns.ca

Eastern: Mark Pulsifer
(902) 863-7523
pulsifmd@gov.ns.ca

Eastern: Donald Anderson
(902) 295-3949
andersdg@gov.ns.ca

Eastern: Terry Power
(902) 563-3370
powertd@gov.ns.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

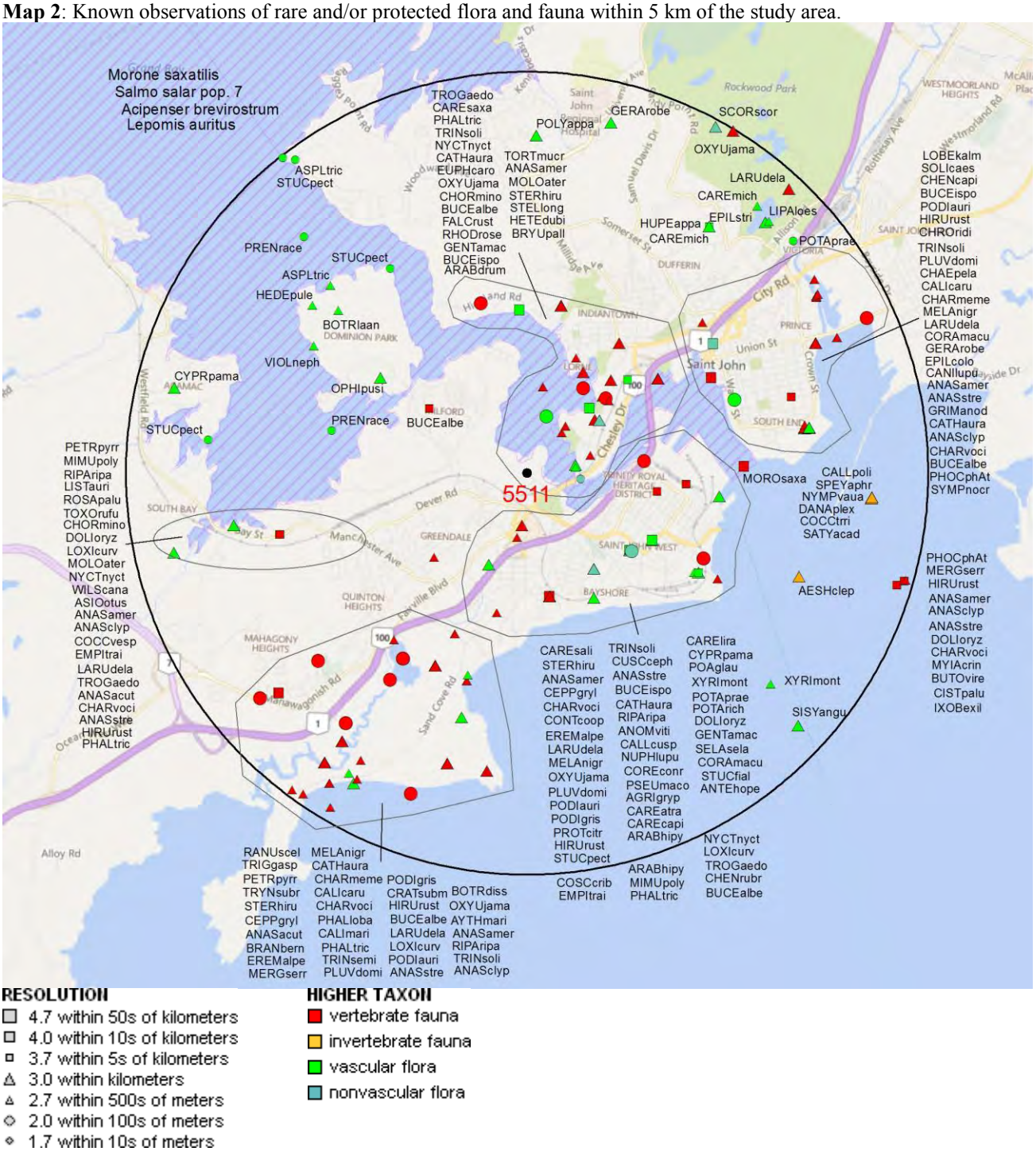
2.1 FLORA

A 5 km buffer around the study area contains 83 records of 52 vascular, 8 records of 7 nonvascular flora (Map 2 and attached: *ob.xls).

2.2 FAUNA

A 5 km buffer around the study area contains 890 records of 56 vertebrate, 10 records of 7 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 5 km of the study area.



3.0 SPECIAL AREAS

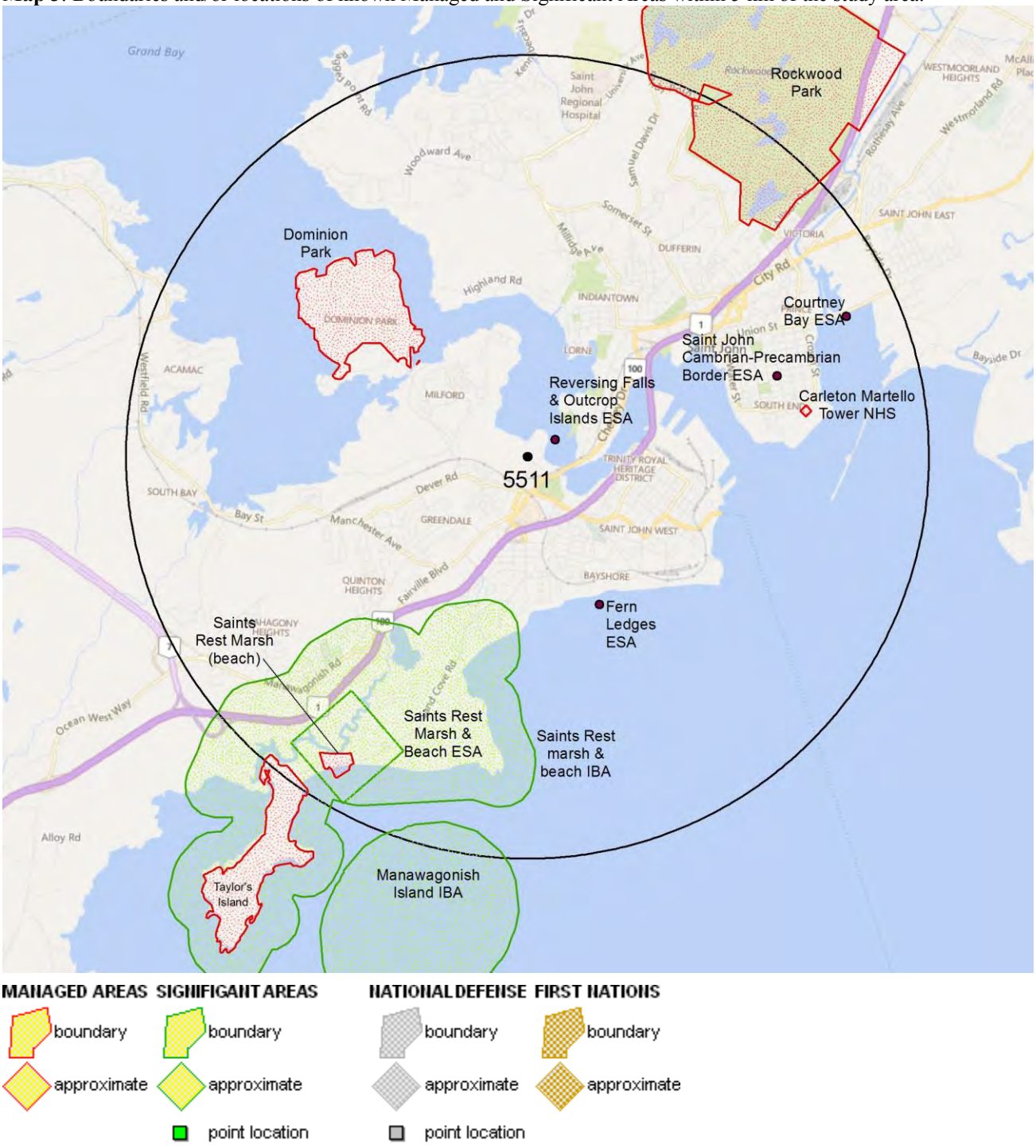
3.1 MANAGED AREAS

The GIS scan identified 5 managed areas in the vicinity of the study area (Map 3 and attached file: *ma*.xls)

3.2 SIGNIFICANT AREAS

The GIS scan identified 7 biologically significant sites in the vicinity of the study area (Map 3 and attached file: *sa*.xls)

Map 3: Boundaries and/or locations of known Managed and Significant Areas within 5 km of the study area.



4.0 RARE SPECIES LISTS

Rare and/or endangered taxa (excluding "location-sensitive" species, section 4.3) within the 5 km-buffered 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	Prov GS Rank	# recs	Distance (km)
N	*Anomodon viticulosus*	a Moss				S1	2 May Be At Risk	1	1.5 ± 1.0
N	*Coscinodon cribrosus*	Sieve-Toothed Moss				S1	2 May Be At Risk	1	1.6 ± 0.0
N	*Bryum pallescens*	Pale Bryum Moss				S1S2	5 Undetermined	1	1.1 ± 1.0
N	*Tortula mucronifolia*	Mucronate Screw Moss				S1S2	3 Sensitive	1	0.7 ± 0.0
N	*Scorpidium scorpioides*	Hooked Scorpion Moss				S2	3 Sensitive	1	4.9 ± 1.0
N	*Calliergonella cuspidata*	Common Large Wetland Moss				S2S3	3 Sensitive	1	1.5 ± 1.0
N	*Grimmia anodon*	Toothless Grimmia Moss				SH	5 Undetermined	2	2.8 ± 10.0
P	*Antennaria howellii ssp. petaloidea*	Pussy-Toes				S1	2 May Be At Risk	1	2.5 ± 5.0
P	*Chenopodium capitatum*	Strawberry-blite				S1	2 May Be At Risk	1	3.6 ± 1.0
P	*Corema conradii*	Broom Crowberry				S1	2 May Be At Risk	1	1.8 ± 10.0
P	*Ranunculus sceleratus*	Cursed Buttercup				S1	2 May Be At Risk	2	4.4 ± 0.0
P	*Carex saxatilis*	Russet Sedge				S1	2 May Be At Risk	2	2.0 ± 10.0
P	*Sisyrinchium angustifolium*	Narrow-leaved Blue-eyed-grass				S1	2 May Be At Risk	1	4.6 ± 1.0
P	*Cuscuta cephalanthi*	Buttonbush Dodder				S1?	2 May Be At Risk	1	1.8 ± 1.0
P	*Pseudognaphalium macounii*	Macoun's Cudweed				S2	3 Sensitive	1	1.6 ± 0.0
P	*Arabis drummondii*	Drummond's Rockcress				S2	3 Sensitive	3	0.6 ± 1.0
P	*Stellaria longifolia*	Long-leaved Starwort				S2	3 Sensitive	2	1.1 ± 10.0
P	*Chenopodium rubrum*	Red Pigweed				S2	3 Sensitive	2	2.4 ± 1.0
P	*Hedeoma pulegioides*	American False Pennyroyal				S2	4 Secure	1	3.4 ± 0.0
P	*Carex livida var. radicaulis*	Livid Sedge				S2	3 Sensitive	1	1.6 ± 2.0
P	*Carex salina*	Saltmarsh Sedge				S2	3 Sensitive	2	1.2 ± 1.0
P	*Cypripedium parviflorum var. makasin*	Small Yellow Lady's-Slipper				S2	2 May Be At Risk	2	1.6 ± 2.0
P	*Stuckenia filiformis ssp. alpina*	Thread-leaved Pondweed				S2	3 Sensitive	2	1.6 ± 0.0
P	*Potamogeton richardsonii*	Richardson's Pondweed				S2	3 Sensitive	1	1.6 ± 1.0
P	*Asplenium trichomanes*	Maidenhair Spleenwort				S2	3 Sensitive	2	4.9 ± 0.0
P	*Selaginella selaginoides*	Low Spikemoss				S2	3 Sensitive	1	1.6 ± 6.0
P	*Symphyotrichum novi-belgii var. crenifolium*	New York Aster				S2?	5 Undetermined	2	2.7 ± 0.0
P	*Epilobium coloratum*	Purple-veined Willowherb				S2?	3 Sensitive	1	3.5 ± 1.0
P	*Geranium robertianum*	Herb Robert				S2S3	4 Secure	2	3.6 ± 1.0
P	*Listera auriculata*	Auricled Twayblade				S2S3	3 Sensitive	1	4.5 ± 1.0
P	*Potamogeton praelongus*	White-stemmed Pondweed				S2S3	4 Secure	2	1.6 ± 1.0
P	*Ophioglossum pusillum*	Northern Adder's-tongue				S2S3	3 Sensitive	1	2.2 ± 1.0
P	*Prenanthes racemosa*	Glaucous Rattlesnakeroot				S3	4 Secure	2	2.5 ± 0.0
P	*Arabis hirsuta var. pycnocarpa*	Western Hairy Rockcress				S3	4 Secure	5	0.6 ± 0.0
P	*Rhodiola rosea*	Roseroot				S3	4 Secure	1	1.7 ± 5.0
P	*Gentianella amarella ssp. acuta*	Northern Gentian				S3	4 Secure	3	0.7 ± 0.0
P	*Nuphar lutea ssp. pumila*	Small Yellow Pond-lily				S3	4 Secure	1	1.6 ± 0.0
P	*Epilobium strictum*	Downy Willowherb				S3	4 Secure	2	3.8 ± 5.0
P	*Agrimonia gryposepala*	Hooked Agrimony				S3	4 Secure	1	1.6 ± 17.0
P	*Rosa palustris*	Swamp Rose				S3	4 Secure	1	3.7 ± 1.0
P	*Viola nephrophylla*	Northern Bog Violet				S3	4 Secure	1	3.1 ± 0.0
P	*Carex atratiformis*	Scabrous Black Sedge				S3	4 Secure	1	1.6 ± 0.0
P	*Carex capillaris*	Hairlike Sedge				S3	4 Secure	1	1.6 ± 2.0
P	*Carex michauxiana*	Michaux's Sedge				S3	4 Secure	2	4.3 ± 1.0
P	*Triglochin gaspensis*	Gasp ├⌐ Arrowgrass				S3	4 Secure	1	4.4 ± 1.0

	Scientific *Name*	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)
P	*Liparis loeselii*	Loesel's Twayblade				S3	4 Secure	1	4.3 ± 0.0
P	*Poa glauca*	Glaucous Blue Grass				S3	4 Secure	1	1.6 ± 2.0
P	*Heteranthera dubia*	Water Stargrass				S3	4 Secure	1	1.1 ± 0.0
P	*Xyris montana*	Northern Yellow-Eyed-Grass				S3	4 Secure	3	1.6 ± 8.0
P	*Asplenium trichomanes-ramosum*	Green Spleenwort				S3	4 Secure	2	3.4 ± 0.0
P	*Huperzia appalachiana*	Appalachian Fir-Clubmoss				S3	3 Sensitive	1	3.8 ± 1.0
P	*Botrychium dissectum*	Cut-leaved Moonwort				S3	4 Secure	1	2.6 ± 0.0
P	*Botrychium lanceolatum var. angustisegmentum*	Lance-Leaf Grape-Fern				S3	3 Sensitive	1	3.1 ± 0.0
P	*Polypodium appalachianum*	Appalachian Polypody				S3	4 Secure	1	4.2 ± 1.0
P	*Crataegus submollis*	Quebec Hawthorn				S3?	3 Sensitive	1	3.2 ± 1.0
P	*Lobelia kalmii*	Brook Lobelia				S3S4	4 Secure	1	3.6 ± 1.0
P	*Corallorhiza maculata*	Spotted Coralroot				S3S4	3 Sensitive	2	2.5 ± 1.0
P	*Stuckenia pectinata*	Sago Pondweed				S3S4	4 Secure	5	1.6 ± 4.0
P	*Solidago caesia*	Blue-stemmed Goldenrod				SX	0.1 Extirpated	2	3.6 ± 1.0

4.2 FAUNA

	Scientific *Name*	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)
A	*Morone saxatilis*	Striped Bass	Endangered			S2	2 May Be At Risk	1	2.7 ± 10.0
A	*Charadrius melodus melodus*	Piping Plover melodus ssp	Endangered	Endangered	Endangered	S2B	1 At Risk	4	4.2 ± 0.0
A	*Calidris canutus rufa*	Red Knot rufa ssp	Endangered		Endangered	S3M	1 At Risk	11	4.2 ± 0.0
A	*Ixobrychus exilis*	Least Bittern	Threatened	Threatened	Threatened	S1S2B	1 At Risk	2	4.8 ± 5.0
A	*Chaetura pelagica*	Chimney Swift	Threatened	Threatened	Threatened	S2S3B	1 At Risk	1	4.2 ± 0.0
A	*Chordeiles minor*	Common Nighthawk	Threatened	Threatened	Threatened	S3B	1 At Risk	4	2.0 ± 2.0
A	*Hirundo rustica*	Barn Swallow	Threatened		Threatened	S3B	3 Sensitive	14	1.6 ± 0.0
A	*Riparia riparia*	Bank Swallow	Threatened			S3B	3 Sensitive	14	1.6 ± 5.0
A	*Contopus cooperi*	Olive-sided Flycatcher	Threatened	Threatened	Threatened	S3S4B	1 At Risk	1	1.6 ± 2.0
A	*Wilsonia canadensis*	Canada Warbler	Threatened	Threatened	Threatened	S3S4B	1 At Risk	1	3.2 ± 7.0
A	*Dolichonyx oryzivorus*	Bobolink	Threatened		Threatened	S3S4B	3 Sensitive	4	2.4 ± 0.0
A	*Bucephala islandica (Eastern pop.)*	Barrow's Goldeneye - Eastern pop.	Special Concern	Special Concern	Special Concern	S2N	3 Sensitive	18	0.8 ± 0.0
A	*Euphagus carolinus*	Rusty Blackbird	Special Concern	Special Concern	Special Concern	S3B	2 May Be At Risk	1	2.1 ± 1.0
A	*Phalaropus lobatus*	Red-necked Phalarope	Special Concern			S3M	3 Sensitive	1	4.6 ± 0.0
A	*Phocoena phocoena (NW Atlantic pop.)*	Harbour Porpoise - Northwest Atlantic pop.	Special Concern	Threatened		S4		2	3.5 ± 0.0
A	*Podiceps auritus*	Horned Grebe	Special Concern		Special Concern	S4M,S4N	4 Secure	11	1.6 ± 2.0
A	*Tryngites subruficollis*	Buff-breasted Sandpiper	Special Concern			SNA	8 Accidental	14	4.1 ± 1.0
A	*Falco rusticolus*	Gyrfalcon	Not At Risk			S1N	5 Undetermined	2	2.0 ± 0.0
A	*Sterna hirundo*	Common Tern	Not At Risk			S3B	3 Sensitive	3	1.1 ± 1.0
A	*Podiceps grisegena*	Red-necked Grebe	Not At Risk			S3M,S2N	3 Sensitive	4	1.6 ± 2.0
A	*Protonotaria citrea*	Prothonotary Warbler	Endangered	Endangered		SNA	8 Accidental	1	1.6 ± 2.0
A	*Canis lupus*	Gray Wolf	Not At Risk		Extirpated	SX	0.1 Extirpated	1	3.5 ± 1.0
A	*Phalaropus tricolor*	Wilson's Phalarope				S1B	3 Sensitive	20	2.0 ± 7.0
A	*Troglodytes aedon*	House Wren				S1B	5 Undetermined	4	2.0 ± 7.0
A	*Aythya marila*	Greater Scaup				S1B,S2N	4 Secure	2	2.8 ± 0.0
A	*Oxyura jamaicensis*	Ruddy Duck				S1B,S4N	4 Secure	32	1.6 ± 3.0
A	*Butorides virescens*	Green Heron				S1S2B	3 Sensitive	3	4.8 ± 5.0
A	*Nycticorax nycticorax*	Black-crowned Night-heron				S1S2B	3 Sensitive	3	2.0 ± 7.0
A	*Empidonax traillii*	Willow Flycatcher				S1S2B	3 Sensitive	2	2.0 ± 7.0
A	*Anas clypeata*	Northern Shoveler				S2B	4 Secure	12	2.7 ± 0.0
A	*Anas strepera*	Gadwall				S2B	4 Secure	34	1.6 ± 5.0
A	*Eremophila alpestris*	Horned Lark				S2B	2 May Be At Risk	4	1.6 ± 5.0
A	*Cistothorus palustris*	Marsh Wren				S2B	3 Sensitive	3	4.8 ± 5.0
A	*Toxostoma rufum*	Brown Thrasher				S2B	3 Sensitive	1	3.2 ± 7.0
A	*Tringa solitaria*	Solitary Sandpiper				S2B,S5M	4 Secure	23	1.6 ± 2.0

	Scientific *Name*	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)
A	*Chroicocephalus ridibundus*	Black-headed Gull				S2M,S1N	3 Sensitive	1	4.3 ± 0.0
A	*Asio otus*	Long-eared Owl				S2S3	5 Undetermined	1	3.2 ± 7.0
A	*Tringa semipalmata*	Willet				S2S3B	3 Sensitive	8	4.6 ± 0.0
A	*Branta bernicla*	Brant				S2S3M,S2S3N	4 Secure	4	2.8 ± 0.0
A	*Cepphus grylle*	Black Guillemot				S3	4 Secure	3	1.6 ± 20.0
A	*Loxia curvirostra*	Red Crossbill				S3	4 Secure	5	1.6 ± 0.0
A	*Anas acuta*	Northern Pintail				S3B	3 Sensitive	2	3.2 ± 7.0
A	*Anas americana*	American Wigeon				S3B	4 Secure	51	1.4 ± 0.0
A	*Cathartes aura*	Turkey Vulture				S3B	4 Secure	7	1.6 ± 20.0
A	*Charadrius vociferus*	Killdeer				S3B	3 Sensitive	99	1.6 ± 2.0
A	*Larus delawarensis*	Ring-billed Gull				S3B	4 Secure	39	0.8 ± 0.0
A	*Myiarchus crinitus*	Great Crested Flycatcher				S3B	3 Sensitive	1	4.8 ± 5.0
A	*Mimus polyglottos*	Northern Mockingbird				S3B	3 Sensitive	13	1.5 ± 0.0
A	*Molothrus ater*	Brown-headed Cowbird				S3B	2 May Be At Risk	2	1.4 ± 0.0
A	*Mergus serrator*	Red-breasted Merganser				S3B,S4S5N	4 Secure	5	4.4 ± 1.0
A	*Pluvialis dominica*	American Golden-Plover				S3M	3 Sensitive	32	1.6 ± 4.0
A	*Melanitta nigra*	Black Scoter				S3M,S2S3N	3 Sensitive	7	1.6 ± 3.0
A	*Calidris maritima*	Purple Sandpiper				S3M,S3N	4 Secure	2	4.6 ± 0.0
A	*Bucephala albeola*	Bufflehead				S3N	3 Sensitive	345	0.7 ± 0.0
A	*Petrochelidon pyrrhonota*	Cliff Swallow				S3S4B	3 Sensitive	4	3.2 ± 7.0
A	*Coccothraustes vespertinus*	Evening Grosbeak				S3S4B,S4S5N	3 Sensitive	1	3.2 ± 7.0
I	*Coccinella transversoguttata richardsoni*	Transverse Lady Beetle				S1S2	2 May Be At Risk	1	4.3 ± 1.0
I	*Aeshna clepsydra*	Mottled Darner				S2	3 Sensitive	1	3.6 ± 1.0
I	*Satyrium acadica*	Acadian Hairstreak				S3	4 Secure	1	4.3 ± 1.0
I	*Callophrys polios*	Hoary Elfin				S3	4 Secure	2	4.3 ± 1.0
I	*Speyeria aphrodite*	Aphrodite Fritillary				S3	4 Secure	1	4.3 ± 1.0
I	*Nymphalis l-album*	Compton Tortoiseshell				S3	4 Secure	3	4.3 ± 1.0
I	*Danaus plexippus*	Monarch	Special Concern	Special Concern	Special Concern	S3B	3 Sensitive	1	4.3 ± 1.0

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 a 5 km buffer of your study area are indicated below with "YES".

New Brunswick

Scientific *Name*	Common Name	SARA	Prov Legal Prot	Known within 5 km of Study Site?
Chrysemys picta picta	Eastern Painted Turtle			No
Chelydra serpentina	Snapping Turtle	Special Concern	Special Concern	No
Glyptemys insculpta	**Wood Turtle**	**Threatened**	**Threatened**	**YES**
Haliaeetus leucocephalus	**Bald Eagle**		**Endangered**	**YES**
Falco peregrinus pop. 1	**Peregrine Falcon - anatum/tundrius pop.**	**Special Concern**	**Endangered**	**YES**
Cicindela marginipennis	Cobblestone Tiger Beetle	Endangered	Endangered	No
Coenonympha nipisiquit	Maritime Ringlet	Endangered	Endangered	No
Bat Hibernaculum		**[Endangered][1]**	**[Endangered][1]**	**YES**

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

4.4 SOURCE BIBLIOGRAPHY

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

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5.0 RARE SPECIES WITHIN 100 KM

A 100 km buffer around the study area contains 22770 records of 129 vertebrate and 1015 records of 56 invertebrate fauna; 5996 records of 352 vascular, 678 records of 198 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. 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	Prov GS Rank	# recs	Distance (km)	Prov
Bird	*Chaetura pelagica*	Chimney Swift	Threatened	Threatened	Endangered	S2S3B	1 At Risk	15	3.5 ± 7.07	
A	*Myotis septentrionalis*	Northern Long-eared Myotis	Endangered	Endangered	Endangered	S1	1 At Risk	18	3.6 ± 0.0	NB
A	*Perimyotis subflavus*	Eastern Pipistrelle	Endangered	Endangered	Endangered	S1	1 At Risk	8	3.6 ± 0.0	NB
A	*Eubalaena glacialis*	North Atlantic Right Whale	Endangered	Endangered	Endangered	S1		7	71.9 ± 5.0	NB
A	*Sterna dougallii*	Roseate Tern	Endangered	Endangered	Endangered	S1B	1 At Risk	3	53.9 ± 0.0	NB
A	*Dermochelys coriacea (Atlantic pop.)*	Leatherback Sea Turtle - Atlantic pop.	Endangered	Endangered	Endangered	S1S2N	1 At Risk	4	6.7 ± 50.0	NB
A	*Morone saxatilis*	Striped Bass	Endangered			S2	2 May Be At Risk	10	2.7 ± 10.0	NB
A	*Salmo salar pop. 1*	Atlantic Salmon - Inner Bay of Fundy pop.	Endangered	Endangered	Endangered	S2	2 May Be At Risk	54	21.8 ± 1.0	NB
A	*Charadrius melodus melodus*	Piping Plover melodus ssp	Endangered	Endangered	Endangered	S2B	1 At Risk	23	4.2 ± 0.0	NB
A	*Calidris canutus rufa*	Red Knot rufa ssp	Endangered		Endangered	S3M	1 At Risk	242	4.2 ± 0.0	NB
A	*Rangifer tarandus pop. 2*	Woodland Caribou (Atlantic-Gasp ├⌐sie pop.)	Endangered	Endangered	Extirpated	SX	0.1 Extirpated	4	20.7 ± 5.0	NB
A	*Ixobrychus exilis*	Least Bittern	Threatened	Threatened	Threatened	S1S2B	1 At Risk	28	4.8 ± 5.0	NB
A	*Hylocichla mustelina*	Wood Thrush	Threatened		Threatened	S1S2B	2 May Be At Risk	179	6.3 ± 1.0	NB
A	*Sturnella magna*	Eastern Meadowlark	Threatened		Threatened	S1S2B	2 May Be At Risk	44	27.7 ± 7.0	NB
A	*Caprimulgus vociferus*	Whip-Poor-Will	Threatened	Threatened	Threatened	S2B	1 At Risk	79	5.1 ± 7.0	NB
A	*Glyptemys insculpta*	Wood Turtle	Threatened	Threatened	Threatened	S2S3	1 At Risk	93	3.5 ± 1.0	NB
A	*Chaetura pelagica*	Chimney Swift	Threatened	Threatened	Threatened	S2S3B	1 At Risk	324	4.2 ± 0.0	NB
A	*Catharus bicknelli*	Bicknell's Thrush	Threatened	Special Concern	Threatened	S2S3B	1 At Risk	28	6.3 ± 1.0	NB
A	*Acipenser oxyrinchus*	Atlantic Sturgeon	Threatened		Threatened	S3	4 Secure	1	48.8 ± 1.0	NB
A	*Chordeiles minor*	Common Nighthawk	Threatened	Threatened	Threatened	S3B	1 At Risk	285	2.0 ± 2.0	NB
A	*Hirundo rustica*	Barn Swallow	Threatened		Threatened	S3B	3 Sensitive	1381	1.6 ± 20.0	NB
A	*Riparia riparia*	Bank Swallow	Threatened			S3B	3 Sensitive	419	1.6 ± 5.0	NB
A	*Contopus cooperi*	Olive-sided Flycatcher	Threatened	Threatened	Threatened	S3S4B	1 At Risk	335	1.6 ± 2.0	NB
A	*Wilsonia canadensis*	Canada Warbler	Threatened	Threatened	Threatened	S3S4B	1 At Risk	742	3.2 ± 7.0	NB
A	*Dolichonyx oryzivorus*	Bobolink	Threatened		Threatened	S3S4B	3 Sensitive	829	2.4 ± 0.0	NB
A	*Anguilla rostrata*	American Eel	Threatened		Threatened	S5	4 Secure	40	11.4 ± 0.0	NB
A	*Osmerus mordax pop. 2*	Lake Utopia Smelt large-bodied pop.	Threatened		Threatened			2	55.1 ± 10.0	NB
A	*Coturnicops noveboracensis*	Yellow Rail	Special Concern	Special Concern	Special Concern	S1?B	2 May Be At Risk	3	59.1 ± 7.0	NB
A	*Falco peregrinus pop. 1*	Peregrine Falcon - anatum/tundrius	Special Concern	Special Concern	Endangered	S1B	1 At Risk	654	0.5 ± 0.0	NB
A	*Histrionicus histrionicus pop. 1*	Harlequin Duck - Eastern pop.	Special Concern	Special Concern	Endangered	S1B,S1N	1 At Risk	160	28.7 ± 17.0	NB
A	*Acipenser brevirostrum*	Shortnose Sturgeon	Special Concern	Special Concern	Special Concern	S2	3 Sensitive	7	6.7 ± 10.0	NB
A	*Bucephala islandica (Eastern pop.)*	Barrow's Goldeneye - Eastern pop.	Special Concern	Special Concern	Special Concern	S2N	3 Sensitive	56	0.8 ± 0.0	NB
A	*Balaenoptera physalus*	Fin Whale - Atlantic pop.	Special Concern	Special Concern	Special Concern	S2S3		5	16.3 ± 1.0	NB
A	*Chelydra serpentina*	Snapping Turtle	Special Concern	Special Concern	Special Concern	S3	3 Sensitive	31	20.4 ± 0.0	NB
A	*Asio flammeus*	Short-eared Owl	Special Concern	Special Concern	Special Concern	S3B	3 Sensitive	17	43.7 ± 0.0	NB
A	*Euphagus carolinus*	Rusty Blackbird	Special Concern	Special Concern	Special Concern	S3B	2 May Be At Risk	120	2.1 ± 1.0	NB
A	*Phalaropus lobatus*	Red-necked Phalarope	Special Concern			S3M	3 Sensitive	211	4.6 ± 0.0	NB

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)	Prov
A	*Phocoena phocoena (NW Atlantic pop.)*	Harbour Porpoise - Northwest Atlantic pop.	Special Concern	Threatened		S4		231	3.5 ± 0.0	NB
A	*Contopus virens*	Eastern Wood-Pewee	Special Concern		Special Concern	S4B	4 Secure	627	6.4 ± 4.0	NB
A	*Podiceps auritus*	Horned Grebe	Special Concern		Special Concern	S4M,S4N	4 Secure	271	1.6 ± 6.0	NB
A	*Odobenus rosmarus rosmarus*	Atlantic Walrus	Special Concern		Extirpated	SX		1	72.1 ± 5.0	NS
A	*Hemidactylium scutatum*	Four-toed Salamander	Not At Risk			S1?	5 Undetermined	13	74.6 ± 0.0	NS
A	*Cistothorus platensis*	Sedge Wren	Not At Risk			S1B	5 Undetermined	9	66.2 ± 0.0	NB
A	*Falco rusticolus*	Gyrfalcon	Not At Risk			S1N	5 Undetermined	15	2.0 ± 0.0	NB
A	*Accipiter cooperii*	Cooper's Hawk	Not At Risk			S1S2B	2 May Be At Risk	17	38.7 ± 7.0	NB
A	*Aegolius funereus*	Boreal Owl	Not At Risk			S1S2B	2 May Be At Risk	5	27.8 ± 7.0	NB
A	*Sorex dispar*	Long-tailed Shrew	Not At Risk	Special Concern		S2	3 Sensitive	2	28.5 ± 1.0	NB
A	*Buteo lineatus*	Red-shouldered Hawk	Not At Risk	Special Concern		S2B	2 May Be At Risk	46	25.0 ± 0.0	NB
A	*Fulica americana*	American Coot	Not At Risk			S2B	3 Sensitive	8	41.1 ± 7.0	NB
A	*Chlidonias niger*	Black Tern	Not At Risk			S2B	3 Sensitive	106	29.3 ± 7.0	NB
A	*Globicephala melas*	Long-finned Pilot Whale	Not At Risk			S2S3		3	6.2 ± 1.0	NB
A	*Lynx canadensis*	Canadian Lynx	Not At Risk		Endangered	S3	1 At Risk	10	20.4 ± 1.0	NB
A	*Desmognathus fuscus (QC/NB pop.)*	Northern Dusky Salamander - QC/NB pop.	Not At Risk			S3	3 Sensitive	51	8.6 ± 1.0	NB
A	*Megaptera novaeangliae*	Humpback Whale (NW Atlantic pop.)	Not At Risk	Special Concern		S3		4	73.8 ± 5.0	NB
A	*Haliaeetus leucocephalus*	Bald Eagle	Not At Risk		Endangered	S3B	1 At Risk	1424	0.5 ± 0.0	NB
A	*Sterna hirundo*	Common Tern	Not At Risk			S3B	3 Sensitive	264	1.1 ± 1.0	NB
A	*Podiceps grisegena*	Red-necked Grebe	Not At Risk			S3M,S2N	3 Sensitive	678	1.6 ± 2.0	NB
A	*Lagenorhynchus acutus*	Atlantic White-sided Dolphin	Not At Risk			S3S4		1	6.2 ± 1.0	NB
A	*Canis lupus*	Gray Wolf	Not At Risk		Extirpated	SX	0.1 Extirpated	4	3.5 ± 1.0	NB
A	*Lepomis auritus*	Redbreast Sunfish	Data Deficient	Special Concern		S3?	4 Secure	25	6.7 ± 10.0	NB
A	*Puma concolor pop. 1*	Cougar - Eastern pop.	Data Deficient		Endangered	SU	5 Undetermined	95	19.3 ± 1.0	NB
A	*Salvelinus alpinus*	Arctic Char				S1	3 Sensitive	3	71.7 ± 0.0	NB
A	*Lasionycteris noctivagans*	Silver-haired Bat				S1?	5 Undetermined	1	4.4 ± 1.0	NB
A	*Bartramia longicauda*	Upland Sandpiper				S1B	3 Sensitive	45	40.9 ± 0.0	NB
A	*Phalaropus tricolor*	Wilson's Phalarope				S1B	3 Sensitive	58	2.0 ± 7.0	NB
A	*Leucophaeus atricilla*	Laughing Gull				S1B	3 Sensitive	83	5.0 ± 0.0	NB
A	*Sterna paradisaea*	Arctic Tern				S1B	2 May Be At Risk	124	24.3 ± 16.0	NB
A	*Troglodytes aedon*	House Wren				S1B	5 Undetermined	31	2.0 ± 7.0	NB
A	*Aythya marila*	Greater Scaup				S1B,S2N	4 Secure	37	2.8 ± 0.0	NB
A	*Uria aalge*	Common Murre				S1B,S3N	4 Secure	119	18.5 ± 15.0	NB
A	*Alca torda*	Razorbill				S1B,S3N	4 Secure	143	18.5 ± 15.0	NB
A	*Oxyura jamaicensis*	Ruddy Duck				S1B,S4N	4 Secure	52	1.6 ± 3.0	NB
A	*Rissa tridactyla*	Black-legged Kittiwake				S1B,S4N	4 Secure	48	39.1 ± 7.0	NB
A	*Butorides virescens*	Green Heron				S1S2B	3 Sensitive	23	4.8 ± 5.0	NB
A	*Nycticorax nycticorax*	Black-crowned Night-heron				S1S2B	3 Sensitive	62	2.0 ± 7.0	NB
A	*Gallinula chloropus*	Common Moorhen				S1S2B	3 Sensitive	24	6.1 ± 1.0	NB
A	*Fratercula arctica*	Atlantic Puffin				S1S2B	3 Sensitive	154	18.5 ± 15.0	NB
A	*Empidonax traillii*	Willow Flycatcher				S1S2B	3 Sensitive	100	2.0 ± 7.0	NB
A	*Progne subis*	Purple Martin				S1S2B	2 May Be At Risk	221	15.8 ± 7.0	NB
A	*Stelgidopteryx serripennis*	Northern Rough-winged Swallow				S1S2B	2 May Be At Risk	20	10.3 ± 7.0	NB
A	*Prosopium cylindraceum*	Round Whitefish				S2	4 Secure	1	76.8 ± 0.0	NB
A	*Salmo salar*	Atlantic Salmon				S2	2 May Be At Risk	51	17.6 ± 1.0	NB
A	*Lasiurus borealis*	Eastern Red Bat				S2?	5 Undetermined	9	3.5 ± 1.0	NB
A	*Lasiurus cinereus*	Hoary Bat				S2?	5 Undetermined	9	3.5 ± 1.0	NB

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A	*Oceanodroma leucorhoa*	Leach's Storm-Petrel				S2B	3 Sensitive	121	34.9 ± 0.0	NB
A	*Anas clypeata*	Northern Shoveler				S2B	4 Secure	82	2.7 ± 0.0	NB
A	*Anas strepera*	Gadwall				S2B	4 Secure	108	1.6 ± 5.0	NB
A	*Eremophila alpestris*	Horned Lark				S2B	2 May Be At Risk	31	1.6 ± 5.0	NB
A	*Cistothorus palustris*	Marsh Wren				S2B	3 Sensitive	66	4.8 ± 5.0	NB
A	*Toxostoma rufum*	Brown Thrasher				S2B	3 Sensitive	91	3.2 ± 7.0	NB
A	*Pooecetes gramineus*	Vesper Sparrow				S2B	2 May Be At Risk	81	20.8 ± 0.0	NB
A	*Tringa solitaria*	Solitary Sandpiper				S2B,S5M	4 Secure	258	1.6 ± 2.0	NB
A	*Chroicocephalus ridibundus*	Black-headed Gull				S2M,S1N	3 Sensitive	42	4.3 ± 0.0	NB
A	*Somateria spectabilis*	King Eider				S2N	4 Secure	56	44.3 ± 0.0	NB
A	*Asio otus*	Long-eared Owl				S2S3	5 Undetermined	19	3.2 ± 7.0	NB
A	*Tringa semipalmata*	Willet				S2S3B	3 Sensitive	177	4.6 ± 0.0	NB
A	*Pinicola enucleator*	Pine Grosbeak				S2S3B,S4S5N	3 Sensitive	34	44.0 ± 7.0	NB
A	*Branta bernicla*	Brant				S2S3M,S2S3N	4 Secure	544	2.8 ± 0.0	NB
A	*Uria lomvia*	Thick-billed Murre				S2S3N	5 Undetermined	67	15.4 ± 8.0	NB
A	*Cepphus grylle*	Black Guillemot				S3	4 Secure	772	1.6 ± 20.0	NB
A	*Loxia curvirostra*	Red Crossbill				S3	4 Secure	132	1.6 ± 0.0	NB
A	*Coregonus clupeaformis*	Lake Whitefish				S3	4 Secure	12	22.7 ± 0.0	NB
A	*Salvelinus namaycush*	Lake Trout				S3	3 Sensitive	4	18.3 ± 0.0	NB
A	*Sorex maritimensis*	Maritime Shrew				S3	4 Secure	1	75.5 ± 0.0	NS
A	*Eptesicus fuscus*	Big Brown Bat				S3	3 Sensitive	49	3.0 ± 1.0	NB
A	*Picoides dorsalis*	American Three-toed Woodpecker				S3?	3 Sensitive	12	53.4 ± 7.0	NB
A	*Anas acuta*	Northern Pintail				S3B	3 Sensitive	54	3.2 ± 7.0	NB
A	*Anas americana*	American Wigeon				S3B	4 Secure	553	1.4 ± 0.0	NB
A	*Cathartes aura*	Turkey Vulture				S3B	4 Secure	294	1.6 ± 20.0	NB
A	*Rallus limicola*	Virginia Rail				S3B	3 Sensitive	109	5.1 ± 7.0	NB
A	*Charadrius vociferus*	Killdeer				S3B	3 Sensitive	820	1.6 ± 2.0	NB
A	*Larus delawarensis*	Ring-billed Gull				S3B	4 Secure	239	0.8 ± 0.0	NB
A	*Myiarchus crinitus*	Great Crested Flycatcher				S3B	3 Sensitive	222	4.8 ± 5.0	NB
A	*Mimus polyglottos*	Northern Mockingbird				S3B	3 Sensitive	149	1.5 ± 0.0	NB
A	*Passerina cyanea*	Indigo Bunting				S3B	4 Secure	103	10.5 ± 7.0	NB
A	*Molothrus ater*	Brown-headed Cowbird				S3B	2 May Be At Risk	295	1.4 ± 0.0	NB
A	*Mergus serrator*	Red-breasted Merganser				S3B,S4S5N	4 Secure	385	4.4 ± 1.0	NB
A	*Pluvialis dominica*	American Golden-Plover				S3M	3 Sensitive	265	1.6 ± 4.0	NB
A	*Phalaropus fulicarius*	Red Phalarope				S3M	3 Sensitive	119	34.9 ± 0.0	NB
A	*Melanitta nigra*	Black Scoter				S3M,S2S3N	3 Sensitive	814	1.6 ± 4.0	NB
A	*Calidris maritima*	Purple Sandpiper				S3M,S3N	4 Secure	254	4.6 ± 0.0	NB
A	*Bucephala albeola*	Bufflehead				S3N	3 Sensitive	1126	0.7 ± 1.0	NB
A	*Synaptomys cooperi*	Southern Bog Lemming				S3S4	4 Secure	79	32.2 ± 1.0	NB
A	*Tyrannus tyrannus*	Eastern Kingbird				S3S4B	3 Sensitive	500	5.1 ± 1.0	NB
A	*Petrochelidon pyrrhonota*	Cliff Swallow				S3S4B	3 Sensitive	562	3.2 ± 7.0	NB
A	*Piranga olivacea*	Scarlet Tanager				S3S4B	4 Secure	115	15.8 ± 7.0	NB
A	*Coccothraustes vespertinus*	Evening Grosbeak				S3S4B,S4S5N	3 Sensitive	295	3.2 ± 7.0	NB
A	*Morus bassanus*	Northern Gannet				SHB,S5M,S5N	4 Secure	824	5.2 ± 0.0	NB
A	*Lanius ludovicianus*	Loggerhead Shrike				SXB,SNAN	1 At Risk	1	88.7 ± 1.0	NB
C	*Quercus macrocarpa - Acer rubrum / Onoclea sensibilis - Carex arcta Forest*	Bur Oak - Red Maple / Sensitive Fern - Northern Clustered Sedge Forest				S2		1	69.0 ± 0.0	NB
C	*Acer saccharinum / Onoclea sensibilis - Lysimachia terrestris*	Silver Maple / Sensitive Fern - Swamp Yellow Loosestrife Forest				S3		1	59.7 ± 0.0	NB

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C	*Acer saccharum - Fraxinus americana / Polystichum acrostichoides Forest*	Sugar Maple - White Ash / Christmas Fern Forest				S3S4		1	27.5 ± 0.0	NB
I	*Cicindela marginipennis*	Cobblestone Tiger Beetle	Endangered	Endangered	Endangered	S1?	1 At Risk	16	71.7 ± 0.0	NB
I	*Gomphus ventricosus*	Skillet Clubtail	Endangered		Endangered	S1S2	2 May Be At Risk	49	56.7 ± 0.0	NB
I	*Alasmidonta varicosa*	Brook Floater	Special Concern		Special Concern	S1S2	3 Sensitive	1	92.6 ± 0.0	NB
I	*Ophiogomphus howei*	Pygmy Snaketail	Special Concern	Special Concern	Special Concern	S2	2 May Be At Risk	3	58.9 ± 0.0	NB
I	*Lampsilis cariosa*	Yellow Lampmussel	Special Concern	Special Concern	Special Concern	S2	3 Sensitive	99	32.1 ± 0.0	NB
I	*Danaus plexippus*	Monarch	Special Concern	Special Concern	Special Concern	S3B	3 Sensitive	97	4.3 ± 1.0	NB
I	*Bombus terricola*	Yellow-banded Bumblebee	Special Concern			SU	3 Sensitive	7	42.2 ± 0.0	NB
I	*Lyogyrus granum*	Squat Duskysnail	Data Deficient			S2		33	17.3 ± 0.0	NB
I	*Lycaena dorcas*	Dorcas Copper				S1	2 May Be At Risk	1	76.3 ± 0.0	NB
I	*Erora laeta*	Early Hairstreak				S1	2 May Be At Risk	1	72.6 ± 1.0	NS
I	*Celithemis martha*	Martha's Pennant				S1	5 Undetermined	1	12.1 ± 0.0	NB
I	*Arigomphus furcifer*	Lilypad Clubtail				S1	5 Undetermined	6	62.8 ± 0.0	NB
I	*Polites origenes*	Crossline Skipper				S1?	5 Undetermined	5	50.4 ± 0.0	NB
I	*Coccinella transversoguttata richardsoni*	Transverse Lady Beetle				S1S2	2 May Be At Risk	2	4.3 ± 1.0	NB
I	*Plebejus saepiolus*	Greenish Blue				S1S2	4 Secure	3	53.2 ± 0.0	NB
I	*Ophiogomphus colubrinus*	Boreal Snaketail				S1S2	2 May Be At Risk	36	31.8 ± 1.0	NB
I	*Satyrium calanus*	Banded Hairstreak				S2	3 Sensitive	14	72.7 ± 1.0	NS
I	*Satyrium calanus falacer*	Banded Hairstreak				S2	4 Secure	4	86.6 ± 1.0	NB
I	*Strymon melinus*	Grey Hairstreak				S2	4 Secure	6	19.2 ± 0.0	NB
I	*Aeshna clepsydra*	Mottled Darner				S2	3 Sensitive	15	3.6 ± 1.0	NB
I	*Somatochlora tenebrosa*	Clamp-Tipped Emerald				S2	5 Undetermined	7	84.7 ± 0.0	NB
I	*Ladona exusta*	White Corporal				S2	5 Undetermined	11	73.6 ± 1.0	NB
I	*Hetaerina americana*	American Rubyspot				S2	3 Sensitive	2	91.9 ± 0.0	NB
I	*Ischnura posita*	Fragile Forktail				S2	2 May Be At Risk	23	59.6 ± 0.0	NB
I	*Alasmidonta undulata*	Triangle Floater				S2	3 Sensitive	43	17.3 ± 1.0	NB
I	*Anatis labiculata*	Fifteen-spotted Lady Beetle				S2S3	3 Sensitive	1	10.6 ± 0.0	NB
I	*Callophrys henrici*	Henry's Elfin				S2S3	4 Secure	14	72.6 ± 1.0	NS
I	*Hesperia sassacus*	Indian Skipper				S3	4 Secure	4	81.6 ± 0.0	NB
I	*Euphyes bimacula*	Two-spotted Skipper				S3	4 Secure	9	49.7 ± 0.0	NB
I	*Lycaena hyllus*	Bronze Copper				S3	3 Sensitive	4	20.4 ± 1.0	NB
I	*Satyrium acadica*	Acadian Hairstreak				S3	4 Secure	20	4.3 ± 1.0	NB
I	*Callophrys polios*	Hoary Elfin				S3	4 Secure	11	4.3 ± 1.0	NB
I	*Plebejus idas*	Northern Blue				S3	4 Secure	7	10.7 ± 1.0	NB
I	*Plebejus idas empetri*	Crowberry Blue				S3	4 Secure	8	7.7 ± 1.0	NB
I	*Speyeria aphrodite*	Aphrodite Fritillary				S3	4 Secure	22	4.3 ± 1.0	NB
I	*Boloria bellona*	Meadow Fritillary				S3	4 Secure	31	42.2 ± 0.0	NB
I	*Polygonia satyrus*	Satyr Comma				S3	4 Secure	10	21.7 ± 1.0	NB
I	*Polygonia gracilis*	Hoary Comma				S3	4 Secure	2	87.9 ± 1.0	NB
I	*Nymphalis l-album*	Compton Tortoiseshell				S3	4 Secure	21	4.3 ± 1.0	NB
I	*Gomphus vastus*	Cobra Clubtail				S3	3 Sensitive	57	37.1 ± 0.0	NB
I	*Gomphus abbreviatus*	Spine-crowned Clubtail				S3	4 Secure	22	17.4 ± 0.0	NB
I	*Gomphaeschna furcillata*	Harlequin Darner				S3	5 Undetermined	15	86.2 ± 1.0	NB
I	*Dorocordulia lepida*	Petite Emerald				S3	4 Secure	34	6.9 ± 0.0	NB
I	*Somatochlora cingulata*	Lake Emerald				S3	4 Secure	10	5.7 ± 0.0	NB

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I	*Somatochlora forcipata*	Forcipate Emerald				S3	4 Secure	19	75.0 ± 1.0	NB
I	*Williamsonia fletcheri*	Ebony Boghaunter				S3	4 Secure	7	64.5 ± 0.0	NB
I	*Lestes eurinus*	Amber-Winged Spreadwing				S3	4 Secure	6	13.3 ± 1.0	NB
I	*Lestes vigilax*	Swamp Spreadwing				S3	3 Sensitive	33	5.7 ± 0.0	NB
I	*Enallagma geminatum*	Skimming Bluet				S3	5 Undetermined	8	17.4 ± 0.0	NB
I	*Enallagma signatum*	Orange Bluet				S3	4 Secure	10	63.0 ± 0.0	NB
I	*Stylurus scudderi*	Zebra Clubtail				S3	4 Secure	71	37.1 ± 0.0	NB
I	*Leptodea ochracea*	Tidewater Mucket				S3	4 Secure	59	10.7 ± 1.0	NB
I	*Pantala hymenaea*	Spot-Winged Glider				S3B	4 Secure	4	10.3 ± 1.0	NB
I	*Satyrium liparops*	Striped Hairstreak				S3S4	4 Secure	2	83.8 ± 0.0	NB
I	*Satyrium liparops strigosum*	Striped Hairstreak				S3S4	4 Secure	1	90.2 ± 10.0	NB
I	*Cupido comyntas*	Eastern Tailed Blue				S3S4	4 Secure	8	17.4 ± 5.0	NB
N	*Erioderma mollissimum*	Graceful Felt Lichen	Endangered		Endangered	S1	2 May Be At Risk	1	87.2 ± 1.0	NB
N	*Erioderma pedicellatum (Atlantic pop.)*	Boreal Felt Lichen - Atlantic pop.	Endangered	Endangered	Endangered	SH	1 At Risk	3	77.8 ± 1.0	NB
N	*Peltigera hydrothyria*	Eastern Waterfan	Threatened			S1	5 Undetermined	4	87.3 ± 1.0	NB
N	*Anzia colpodes*	Black-foam Lichen	Threatened			S3	5 Undetermined	2	91.6 ± 1.0	NB
N	*Degelia plumbea*	Blue Felt Lichen	Special Concern	Special Concern	Special Concern	S1	2 May Be At Risk	4	76.7 ± 5.0	NB
N	*Pseudevernia cladonia*	Ghost Antler Lichen	Not At Risk			S3	5 Undetermined	23	16.2 ± 0.0	NB
N	*Anomodon viticulosus*	a Moss				S1	2 May Be At Risk	5	1.5 ± 1.0	NB
N	*Atrichum angustatum*	Lesser Smoothcap Moss				S1	2 May Be At Risk	1	86.1 ± 3.0	NS
N	*Bartramia ithyphylla*	Straight-leaved Apple Moss				S1	2 May Be At Risk	2	84.5 ± 0.0	NB
N	*Bryum muehlenbeckii*	Muehlenbeck's Bryum Moss				S1	2 May Be At Risk	1	9.9 ± 1.0	NB
N	*Bryum salinum*	a Moss				S1	2 May Be At Risk	1	90.3 ± 1.0	NB
N	*Calliergon trifarium*	Three-ranked Moss				S1	2 May Be At Risk	1	9.0 ± 0.0	NB
N	*Tortula obtusifolia*	a Moss				S1	2 May Be At Risk	1	46.1 ± 0.0	NB
N	*Dichelyma falcatum*	a Moss				S1	2 May Be At Risk	2	27.3 ± 1.0	NB
N	*Dicranoweisia crispula*	Mountain Thatch Moss				S1	2 May Be At Risk	1	95.3 ± 0.0	NB
N	*Dicranum bonjeanii*	Bonjean's Broom Moss				S1	2 May Be At Risk	1	88.1 ± 1.0	NB
N	*Dicranum condensatum*	Condensed Broom Moss				S1	2 May Be At Risk	1	95.1 ± 0.0	NB
N	*Didymodon rigidulus var. gracilis*	a moss				S1	2 May Be At Risk	1	90.2 ± 1.0	NB
N	*Distichium inclinatum*	Inclined Iris Moss				S1	2 May Be At Risk	5	90.0 ± 0.0	NB
N	*Ditrichum pallidum*	Pale Cow-hair Moss				S1	2 May Be At Risk	3	68.2 ± 3.0	NS
N	*Drummondia prorepens*	a Moss				S1	2 May Be At Risk	1	83.9 ± 0.0	NS
N	*Entodon brevisetus*	a Moss				S1	2 May Be At Risk	1	97.5 ± 10.0	NB
N	*Eurhynchium hians*	Light Beaked Moss				S1	2 May Be At Risk	3	67.7 ± 0.0	NB
N	*Homomallium adnatum*	Adnate Hairy-gray Moss				S1	2 May Be At Risk	2	97.5 ± 10.0	NB
N	*Meesia triquetra*	Three-ranked Cold Moss				S1	2 May Be At Risk	1	64.1 ± 100.0	NB
N	*Plagiothecium latebricola*	Alder Silk Moss				S1	2 May Be At Risk	2	5.9 ± 0.0	NB
N	*Racomitrium ericoides*	a Moss				S1	2 May Be At Risk	1	85.1 ± 3.0	NB
N	*Rhytidiadelphus loreus*	Lanky Moss				S1	2 May Be At Risk	2	90.2 ± 1.0	NB
N	*Rhytidium rugosum*	Wrinkle-leaved Moss				S1	2 May Be At Risk	2	69.4 ± 0.0	NB
N	*Sphagnum macrophyllum*	Sphagnum				S1	2 May Be At Risk	2	13.1 ± 0.0	NB
N	*Sphagnum strictum*	Atlantic Peat Moss				S1	2 May Be At Risk	4	96.8 ± 0.0	NB
N	*Sphagnum subfulvum*	a Peatmoss				S1	2 May Be At Risk	3	27.9 ± 1.0	NB
N	*Splachnum pennsylvanicum*	Southern Dung Moss				S1	2 May Be At Risk	1	87.9 ± 1.0	NB
N	*Timmia norvegica*	a moss				S1	2 May Be At Risk	3	55.9 ± 0.0	NB
N	*Tomentypnum falcifolium*	Sickle-leaved Golden Moss				S1	2 May Be At Risk	1	27.9 ± 1.0	NB

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N	*Tortella humilis*	Small Crisp Moss				S1	2 May Be At Risk	7	85.6 ± 0.0	NB
N	*Syntrichia ruralis*	a Moss				S1	2 May Be At Risk	1	70.8 ± 0.0	NB
N	*Pseudotaxiphyllum distichaceum*	a Moss				S1	2 May Be At Risk	2	89.4 ± 1.0	NB
N	*Hamatocaulis vernicosus*	a Moss				S1	2 May Be At Risk	1	26.6 ± 100.0	NB
N	*Coscinodon cribrosus*	Sieve-Toothed Moss				S1	2 May Be At Risk	1	1.6 ± 0.0	NB
N	*Bryohaplocladium microphyllum*	Tiny-leaved Haplocladium Moss				S1	2 May Be At Risk	1	68.2 ± 3.0	NS
N	*Cladonia metacorallifera*	Reptilian Pixie-cup Lichen				S1	5 Undetermined	5	84.4 ± 1.0	NB
N	*Fuscopannaria ahlneri*	Corrugated Shingles Lichen				S1	2 May Be At Risk	1	93.4 ± 0.0	NS
N	*Coccocarpia palmicola*	Salted Shell Lichen				S1	2 May Be At Risk	1	99.0 ± 1.0	NB
N	*Peltigera collina*	Tree Pelt Lichen				S1	2 May Be At Risk	1	84.6 ± 10.0	NB
N	*Peltigera malacea*	Veinless Pelt Lichen				S1	5 Undetermined	1	86.9 ± 1.0	NB
N	*Bryoria bicolor*	Electrified Horsehair Lichen				S1	2 May Be At Risk	1	86.9 ± 1.0	NB
N	*Pohlia filum*	a Moss				S1?	5 Undetermined	1	96.5 ± 7.0	NS
N	*Sphagnum platyphyllum*	Flat-leaved Peat Moss				S1?	5 Undetermined	1	98.4 ± 1.0	NB
N	*Anomobryum filiforme*	a moss				S1?	5 Undetermined	5	52.9 ± 0.0	NB
N	*Platylomella lescurii*	a Moss				S1?	5 Undetermined	1	77.7 ± 1.0	NB
N	*Andreaea rothii*	a Moss				S1S2	3 Sensitive	5	21.8 ± 0.0	NB
N	*Brachythecium digastrum*	a Moss				S1S2	3 Sensitive	2	58.2 ± 0.0	NB
N	*Bryum pallescens*	Pale Bryum Moss				S1S2	5 Undetermined	2	1.1 ± 1.0	NB
N	*Campylium radicale*	Long-stalked Fine Wet Moss				S1S2	5 Undetermined	1	89.7 ± 1.0	NB
N	*Cynodontium strumiferum*	Strumose Dogtooth Moss				S1S2	3 Sensitive	1	82.7 ± 8.0	NB
N	*Dichelyma capillaceum*	Hairlike Dichelyma Moss				S1S2	3 Sensitive	1	97.9 ± 3.0	NB
N	*Dicranum spurium*	Spurred Broom Moss				S1S2	3 Sensitive	1	75.0 ± 0.0	NB
N	*Didymodon ferrugineus*	a moss				S1S2	3 Sensitive	1	25.4 ± 1.0	NB
N	*Anomodon tristis*	a Moss				S1S2	2 May Be At Risk	4	83.2 ± 1.0	NB
N	*Hygrohypnum bestii*	Best's Brook Moss				S1S2	3 Sensitive	5	76.9 ± 0.0	NB
N	*Hygrohypnum montanum*	a Moss				S1S2	3 Sensitive	2	67.7 ± 1.0	NB
N	*Schistostega pennata*	Luminous Moss				S1S2	3 Sensitive	3	50.7 ± 100.0	NB
N	*Seligeria campylopoda*	a Moss				S1S2	3 Sensitive	1	26.6 ± 100.0	NB
N	*Seligeria diversifolia*	a Moss				S1S2	3 Sensitive	2	52.9 ± 0.0	NB
N	*Sphagnum angermanicum*	a Peatmoss				S1S2	3 Sensitive	2	25.6 ± 10.0	NB
N	*Tetrodontium brownianum*	Little Georgia				S1S2	3 Sensitive	7	89.6 ± 1.0	NB
N	*Tortula mucronifolia*	Mucronate Screw Moss				S1S2	3 Sensitive	1	0.7 ± 0.0	NB
N	*Plagiomnium rostratum*	Long-beaked Leafy Moss				S1S2	3 Sensitive	6	55.8 ± 0.0	NB
N	*Peltigera scabrosa*	Greater Toad Pelt Lichen				S1S2	2 May Be At Risk	4	96.4 ± 1.0	NB
N	*Calypogeia neesiana*	Nees' Pouchwort				S1S3	6 Not Assessed	1	26.8 ± 1.0	NB
N	*Cephaloziella elachista*	Spurred Threadwort				S1S3	6 Not Assessed	1	8.9 ± 5.0	NB
N	*Cladopodiella francisci*	Holt's Notchwort				S1S3	6 Not Assessed	3	90.2 ± 1.0	NB
N	*Harpanthus flotovianus*	Great Mountain Flapwort				S1S3	6 Not Assessed	2	86.8 ± 1.0	NB
N	*Hygrobiella laxifolia*	Lax Notchwort				S1S3	6 Not Assessed	1	84.5 ± 1.0	NB
N	*Jungermannia obovata*	Egg Flapwort				S1S3	6 Not Assessed	2	16.7 ± 0.0	NB
N	*Lophozia ascendens*	Small Notchwort				S1S3	6 Not Assessed	2	89.6 ± 1.0	NB
N	*Porella pinnata*	Pinnate Scalewort				S1S3	6 Not Assessed	2	33.6 ± 1.0	NB
N	*Radula tenax*	Tenacious Scalewort				S1S3	6 Not Assessed	1	95.3 ± 0.0	NB
N	*Reboulia hemisphaerica*	Purple-margined Liverwort				S1S3	6 Not Assessed	1	82.9 ± 1.0	NB
N	*Scapania*	Narrow-lobed Earwort				S1S3	6 Not Assessed	1	90.5 ± 1.0	NB

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)	Prov
	gymnostomophila									
N	*Tritomaria scitula*	Mountain Notchwort				S1S3	6 Not Assessed	1	97.9 ± 1.0	NB
N	*Amphidium mougeotii*	a Moss				S2	3 Sensitive	12	82.7 ± 8.0	NB
N	*Bryum uliginosum*	a Moss				S2	3 Sensitive	2	24.1 ± 4.0	NB
N	*Buxbaumia aphylla*	Brown Shield Moss				S2	3 Sensitive	2	81.4 ± 15.0	NB
N	*Campylium polygamum*	a Moss				S2	3 Sensitive	1	88.2 ± 0.0	NB
N	*Cirriphyllum piliferum*	Hair-pointed Moss				S2	3 Sensitive	4	71.5 ± 0.0	NB
N	*Palustriella falcata*	a Moss				S2	3 Sensitive	2	84.7 ± 0.0	NB
N	*Cynodontium tenellum*	Delicate Dogtooth Moss				S2	3 Sensitive	1	36.9 ± 1.0	NB
N	*Dicranella palustris*	Drooping-Leaved Fork Moss				S2	3 Sensitive	10	50.7 ± 100.0	NB
N	*Fissidens bushii*	Bush's Pocket Moss				S2	3 Sensitive	1	86.1 ± 3.0	NS
N	*Hypnum pratense*	Meadow Plait Moss				S2	3 Sensitive	1	5.7 ± 0.0	NB
N	*Isopterygiopsis pulchella*	Neat Silk Moss				S2	3 Sensitive	7	89.3 ± 0.0	NB
N	*Orthotrichum speciosum*	Showy Bristle Moss				S2	4 Secure	2	67.6 ± 2.0	NB
N	*Physcomitrium immersum*	a Moss				S2	3 Sensitive	6	33.6 ± 1.0	NB
N	*Physcomitrium pyriforme*	Pear-shaped Urn Moss				S2	3 Sensitive	5	67.9 ± 0.0	NB
N	*Platydictya jungermannioides*	False Willow Moss				S2	3 Sensitive	3	86.8 ± 0.0	NB
N	*Pohlia elongata*	Long-necked Nodding Moss				S2	3 Sensitive	10	85.6 ± 0.0	NB
N	*Pohlia proligera*	Cottony Nodding Moss				S2	3 Sensitive	4	89.7 ± 1.0	NB
N	*Racomitrium fasciculare*	a Moss				S2	3 Sensitive	4	75.4 ± 0.0	NB
N	*Racomitrium affine*	a Moss				S2	3 Sensitive	1	95.8 ± 1.0	NB
N	*Saelania glaucescens*	Blue Dew Moss				S2	3 Sensitive	2	95.3 ± 0.0	NB
N	*Scorpidium scorpioides*	Hooked Scorpion Moss				S2	3 Sensitive	4	4.9 ± 1.0	NB
N	*Seligeria calcarea*	Chalk Brittle Moss				S2	3 Sensitive	2	96.4 ± 0.0	NB
N	*Sphagnum centrale*	Central Peat Moss				S2	3 Sensitive	7	74.9 ± 5.0	NS
N	*Sphagnum lindbergii*	Lindberg's Peat Moss				S2	3 Sensitive	6	16.0 ± 1.0	NB
N	*Sphagnum flexuosum*	Flexuous Peatmoss				S2	3 Sensitive	2	93.2 ± 0.0	NB
N	*Taxiphyllum deplanatum*	Imbricate Yew-leaved Moss				S2	3 Sensitive	3	36.9 ± 1.0	NB
N	*Tayloria serrata*	Serrate Trumpet Moss				S2	3 Sensitive	6	33.9 ± 1.0	NB
N	*Tetraplodon mnioides*	Entire-leaved Nitrogen Moss				S2	3 Sensitive	3	30.7 ± 0.0	NB
N	*Thamnobryum alleghaniense*	a Moss				S2	3 Sensitive	5	55.8 ± 0.0	NB
N	*Ulota phyllantha*	a Moss				S2	3 Sensitive	5	36.9 ± 1.0	NB
N	*Zygodon viridissimus*	a Moss				S2	2 May Be At Risk	4	74.9 ± 5.0	NS
N	*Schistidium agassizii*	Elf Bloom Moss				S2	3 Sensitive	5	67.6 ± 2.0	NB
N	*Loeskeobryum brevirostre*	a Moss				S2	3 Sensitive	15	77.5 ± 2.0	NB
N	*Ramalina pollinaria*	Chalky Ramalina Lichen				S2	5 Undetermined	1	93.4 ± 1.0	NB
N	*Umbilicaria vellea*	Grizzled Rocktripe Lichen				S2	5 Undetermined	1	90.2 ± 1.0	NB
N	*Cladonia macrophylla*	Fig-leaved Lichen				S2	5 Undetermined	3	93.6 ± 1.0	NB
N	*Nephroma arcticum*	Arctic Kidney Lichen				S2	3 Sensitive	1	87.7 ± 1.0	NB
N	*Nephroma laevigatum*	Mustard Kidney Lichen				S2	2 May Be At Risk	1	84.6 ± 10.0	NB
N	*Calliergonella cuspidata*	Common Large Wetland Moss				S2S3	3 Sensitive	5	1.5 ± 1.0	NB
N	*Didymodon rigidulus*	Rigid Screw Moss				S2S3	3 Sensitive	9	90.0 ± 0.0	NB
N	*Didymodon fallax*	False Beard Moss				S2S3	3 Sensitive	2	90.0 ± 0.0	NB
N	*Ephemerum serratum*	a Moss				S2S3	3 Sensitive	2	70.4 ± 0.0	NB
N	*Cyrtomnium hymenophylloides*	Short-pointed Lantern Moss				S2S3	3 Sensitive	6	84.7 ± 0.0	NB
N	*Nephroma bellum*	Naked Kidney Lichen				S2S3	4 Secure	3	86.9 ± 1.0	NB

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)	Prov
N	*Sphaerophorus globosus*	Northern Coral Lichen				S2S3	3 Sensitive	5	83.5 ± 1.0	NB
N	*Cephaloziella divaricata*	Common Threadwort				S2S4	6 Not Assessed	3	82.9 ± 1.0	NB
N	*Riccia fluitans*	Floating Crystalwort				S2S4	6 Not Assessed	4	30.7 ± 10.0	NB
N	*Anomodon rugelii*	Rugel's Anomodon Moss				S3	3 Sensitive	2	86.1 ± 3.0	NS
N	*Aulacomnium androgynum*	Little Groove Moss				S3	4 Secure	7	68.2 ± 3.0	NS
N	*Dicranella cerviculata*	a Moss				S3	3 Sensitive	5	36.9 ± 1.0	NB
N	*Dicranum majus*	Greater Broom Moss				S3	4 Secure	19	30.7 ± 0.0	NB
N	*Encalypta ciliata*	Fringed Extinquisher Moss				S3	3 Sensitive	1	90.3 ± 0.0	NB
N	*Heterocladium dimorphum*	Dimorphous Tangle Moss				S3	4 Secure	4	67.6 ± 2.0	NB
N	*Hypnum curvifolium*	Curved-leaved Plait Moss				S3	3 Sensitive	11	72.7 ± 3.0	NS
N	*Pleuridium subulatum*	a Moss				S3	3 Sensitive	3	68.2 ± 3.0	NS
N	*Pogonatum dentatum*	Mountain Hair Moss				S3	4 Secure	2	36.9 ± 1.0	NB
N	*Sphagnum torreyanum*	a Peatmoss				S3	4 Secure	5	12.8 ± 0.0	NB
N	*Sphagnum austinii*	Austin's Peat Moss				S3	4 Secure	1	12.8 ± 1.0	NB
N	*Splachnum rubrum*	Red Collar Moss				S3	4 Secure	1	28.3 ± 1.0	NB
N	*Tetraphis geniculata*	Geniculate Four-tooth Moss				S3	4 Secure	11	8.5 ± 0.0	NB
N	*Tortella fragilis*	Fragile Twisted Moss				S3	3 Sensitive	1	90.0 ± 0.0	NB
N	*Weissia controversa*	Green-Cushioned Weissia				S3	4 Secure	1	89.7 ± 1.0	NB
N	*Trichostomum tenuirostre*	Acid-Soil Moss				S3	4 Secure	6	68.1 ± 3.0	NS
N	*Schistidium maritimum*	a Moss				S3	4 Secure	7	36.9 ± 1.0	NB
N	*Hymenostylium recurvirostre*	Hymenostylium Moss				S3	3 Sensitive	4	89.7 ± 1.0	NB
N	*Solorina saccata*	Woodland Owl Lichen				S3	5 Undetermined	6	84.8 ± 1.0	NB
N	*Leptogium lichenoides*	Tattered Jellyskin Lichen				S3	5 Undetermined	6	90.2 ± 1.0	NB
N	*Protopannaria pezizoides*	Brown-gray Moss-shingle Lichen				S3	4 Secure	11	84.8 ± 1.0	NB
N	*Usnea strigosa*	Bushy Beard Lichen				S3	5 Undetermined	1	96.4 ± 1.0	NB
N	*Leptogium laceroides*	Short-bearded Jellyskin Lichen				S3	3 Sensitive	2	92.8 ± 1.0	NB
N	*Peltigera membranacea*	Membranous Pelt Lichen				S3	5 Undetermined	6	84.8 ± 1.0	NB
N	*Dicranella rufescens*	Red Forklet Moss				S3?	5 Undetermined	2	88.9 ± 4.0	NB
N	*Sphagnum contortum*	Twisted Peat Moss				S3?	4 Secure	1	12.5 ± 0.0	NB
N	*Sphagnum lescurii*	a Peatmoss				S3?	5 Undetermined	3	15.9 ± 0.0	NB
N	*Cladonia farinacea*	Farinose Pixie Lichen				S3?	5 Undetermined	5	93.4 ± 1.0	NB
N	*Cladonia carneola*	Crowned Pixie-cup Lichen				S3?	5 Undetermined	1	93.6 ± 1.0	NB
N	*Dermatocarpon luridum*	Brookside Stippleback Lichen				S3?S4?	4 Secure	3	84.4 ± 1.0	NB
N	*Atrichum tenellum*	Slender Smoothcap Moss				S3S4	4 Secure	1	77.3 ± 6.0	NB
N	*Barbula convoluta*	Lesser Bird's-claw Beard Moss				S3S4	4 Secure	1	94.1 ± 8.0	NB
N	*Blindia acuta*	a Moss				S3S4	4 Secure	14	68.1 ± 3.0	NS
N	*Brachythecium campestre*	Field Ragged Moss				S3S4	4 Secure	1	94.8 ± 1.0	NB
N	*Brachythecium velutinum*	Velvet Ragged Moss				S3S4	4 Secure	3	76.3 ± 0.0	NB
N	*Dicranella schreberiana*	Schreber's Forklet Moss				S3S4	4 Secure	1	89.7 ± 1.0	NB
N	*Dicranella subulata*	Awl-leaved Forklet Moss				S3S4	4 Secure	7	87.8 ± 3.0	NB
N	*Dicranum leioneuron*	a Dicranum Moss				S3S4	4 Secure	1	90.2 ± 0.0	NB
N	*Distichium capillaceum*	Erect-fruited Iris Moss				S3S4	4 Secure	10	48.4 ± 0.0	NB
N	*Fissidens bryoides*	Lesser Pocket Moss				S3S4	4 Secure	2	25.9 ± 5.0	NB
N	*Hypnum fauriei*	a Moss				S3S4	4 Secure	6	30.7 ± 0.0	NB
N	*Isopterygiopsis*	a Moss				S3S4	4 Secure	18	76.3 ± 0.0	NB

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)	Prov
	muelleriana									
N	*Myurella julacea*	Small Mouse-tail Moss				S3S4	4 Secure	3	82.7 ± 8.0	NB
N	*Pohlia annotina*	a Moss				S3S4	4 Secure	7	67.6 ± 2.0	NB
N	*Pohlia andalusica*	a Moss				S3S4	4 Secure	1	90.3 ± 0.0	NB
N	*Tortula truncata*	a Moss				S3S4	4 Secure	3	28.4 ± 0.0	NB
N	*Racomitrium canescens*	Grey Rock Moss				S3S4	4 Secure	2	93.3 ± 0.0	NB
N	*Racomitrium microcarpon*	a Moss				S3S4	4 Secure	1	76.3 ± 0.0	NB
N	*Sphagnum majus*	Olive Peat Moss				S3S4	4 Secure	1	10.8 ± 5.0	NB
N	*Sphagnum quinquefarium*	Five-ranked Peat Moss				S3S4	4 Secure	1	90.4 ± 0.0	NB
N	*Tetraplodon angustatus*	Toothed-leaved Nitrogen Moss				S3S4	4 Secure	2	36.9 ± 1.0	NB
N	*Abietinella abietina*	Wiry Fern Moss				S3S4	4 Secure	1	90.0 ± 0.0	NB
N	*Pannaria rubiginosa*	Brown-eyed Shingle Lichen				S3S4	3 Sensitive	2	89.1 ± 1.0	NB
N	*Ramalina thrausta*	Angelhair Ramalina Lichen				S3S4	5 Undetermined	11	83.5 ± 1.0	NB
N	*Melanelia panniformis*	Shingled Camouflage Lichen				S3S4	5 Undetermined	4	86.9 ± 1.0	NB
N	*Nephroma parile*	Powdery Kidney Lichen				S3S4	4 Secure	6	90.2 ± 1.0	NB
N	*Peltigera degenii*	Lustrous Pelt Lichen				S3S4	5 Undetermined	3	87.3 ± 1.0	NB
N	*Pseudocyphellaria perpetua*	Gilded Specklebelly Lichen				S3S4	3 Sensitive	2	92.3 ± 1.0	NB
N	*Stereocaulon subcoralloides*	Coralloid Foam Lichen				S3S4	5 Undetermined	1	93.4 ± 1.0	NB
N	*Anaptychia palmulata*	Shaggy Fringed Lichen				S3S4	3 Sensitive	3	92.3 ± 1.0	NB
N	*Peltigera neopolydactyla*	Undulating Pelt Lichen				S3S4	5 Undetermined	8	84.8 ± 1.0	NB
N	*Cladonia cariosa*	Lesser Ribbed Pixie Lichen				S3S4	4 Secure	3	95.2 ± 1.0	NB
N	*Cladonia floerkeana*	Gritty British Soldiers Lichen				S3S4?	4 Secure	3	85.7 ± 1.0	NB
N	*Phaeophyscia sciastra*	Dark Shadow Lichen				S3S4?	5 Undetermined	2	90.2 ± 1.0	NB
N	*Cladonia deformis*	Lesser Sulphur-cup Lichen				S3S4?	4 Secure	5	84.4 ± 1.0	NB
N	*Grimmia anodon*	Toothless Grimmia Moss				SH	5 Undetermined	2	2.8 ± 10.0	NB
N	*Leucodon brachypus*	a Moss				SH	2 May Be At Risk	8	69.7 ± 100.0	NB
N	*Thelia hirtella*	a Moss				SH	2 May Be At Risk	2	64.1 ± 100.0	NB
N	*Cyrto-hypnum minutulum*	Tiny Cedar Moss				SH	2 May Be At Risk	3	93.7 ± 10.0	NB
P	*Juglans cinerea*	Butternut	Endangered	Endangered	Endangered	S1	1 At Risk	47	23.1 ± 1.0	NB
P	*Polemonium vanbruntiae*	Van Brunt's Jacob's-ladder	Threatened	Threatened	Threatened	S1	1 At Risk	72	32.0 ± 0.0	NB
P	*Symphyotrichum anticostense*	Anticosti Aster	Threatened	Threatened	Endangered	S1S3	1 At Risk	3	98.1 ± 0.0	NB
P	*Isoetes prototypus*	Prototype Quillwort	Special Concern	Special Concern	Endangered	S2	1 At Risk	28	27.6 ± 0.0	NB
P	*Pterospora andromedea*	Woodland Pinedrops			Endangered	S1	1 At Risk	11	95.5 ± 0.0	NB
P	*Cryptotaenia canadensis*	Canada Honewort				S1	2 May Be At Risk	1	69.0 ± 1.0	NB
P	*Sanicula trifoliata*	Large-Fruited Sanicle				S1	2 May Be At Risk	1	37.1 ± 5.0	NB
P	*Antennaria parlinii*	a Pussytoes				S1	2 May Be At Risk	7	56.3 ± 1.0	NB
P	*Antennaria howellii ssp. petaloidea*	Pussy-Toes				S1	2 May Be At Risk	4	2.5 ± 5.0	NB
P	*Bidens discoidea*	Swamp Beggarticks				S1	2 May Be At Risk	3	72.0 ± 0.0	NB
P	*Pseudognaphalium obtusifolium*	Eastern Cudweed				S1	2 May Be At Risk	5	88.8 ± 0.0	NB
P	*Helianthus decapetalus*	Ten-rayed Sunflower				S1	2 May Be At Risk	13	96.8 ± 0.0	NB
P	*Hieracium kalmii*	Kalm's Hawkweed				S1	2 May Be At Risk	5	24.1 ± 1.0	NB
P	*Hieracium kalmii var.*	Kalm's Hawkweed				S1	2 May Be At Risk	7	24.9 ± 1.0	NB

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)	Prov
	kalmii									
P	*Hieracium paniculatum*	Panicled Hawkweed				S1	2 May Be At Risk	8	47.7 ± 0.0	NB
P	*Hieracium robinsonii*	Robinson's Hawkweed				S1	3 Sensitive	5	84.8 ± 0.0	NB
P	*Senecio pseudoarnica*	Seabeach Ragwort				S1	2 May Be At Risk	14	84.0 ± 0.0	NB
P	*Solidago simplex var. monticola*	Sticky Goldenrod				S1	2 May Be At Risk	1	97.4 ± 0.0	NB
P	*Cardamine parviflora var. arenicola*	Small-flowered Bittercress				S1	2 May Be At Risk	14	31.4 ± 0.0	NB
P	*Draba arabisans*	Rock Whitlow-Grass				S1	2 May Be At Risk	19	15.8 ± 0.0	NB
P	*Draba breweri var. cana*	Brewer's Whitlow-grass				S1	2 May Be At Risk	10	96.6 ± 0.0	NB
P	*Draba glabella*	Rock Whitlow-Grass				S1	2 May Be At Risk	10	7.0 ± 1.0	NB
P	*Minuartia groenlandica*	Greenland Stitchwort				S1	2 May Be At Risk	4	21.8 ± 0.0	NB
P	*Chenopodium capitatum*	Strawberry-blite				S1	2 May Be At Risk	4	3.6 ± 1.0	NB
P	*Chenopodium simplex*	Maple-leaved Goosefoot				S1	2 May Be At Risk	9	73.8 ± 1.0	NB
P	*Triadenum virginicum*	Virginia St John's-wort				S1	2 May Be At Risk	3	16.8 ± 0.0	NB
P	*Cuscuta pentagona*	Five-angled Dodder				S1	2 May Be At Risk	3	72.1 ± 5.0	NB
P	*Corema conradii*	Broom Crowberry				S1	2 May Be At Risk	6	1.8 ± 10.0	NB
P	*Vaccinium boreale*	Northern Blueberry				S1	2 May Be At Risk	1	36.2 ± 0.0	NB
P	*Vaccinium corymbosum*	Highbush Blueberry				S1	3 Sensitive	1	86.3 ± 5.0	NB
P	*Chamaesyce polygonifolia*	Seaside Spurge				S1	2 May Be At Risk	8	79.8 ± 0.0	NB
P	*Lespedeza capitata*	Round-headed Bush-clover				S1	2 May Be At Risk	5	71.7 ± 0.0	NB
P	*Gentiana rubricaulis*	Purple-stemmed Gentian				S1	2 May Be At Risk	12	52.4 ± 0.0	NB
P	*Lomatogonium rotatum*	Marsh Felwort				S1	2 May Be At Risk	2	61.8 ± 0.0	NB
P	*Proserpinaca pectinata*	Comb-leaved Mermaidweed				S1	2 May Be At Risk	3	38.4 ± 0.0	NB
P	*Pycnanthemum virginianum*	Virginia Mountain Mint				S1	2 May Be At Risk	4	38.0 ± 0.0	NB
P	*Lysimachia hybrida*	Lowland Yellow Loosestrife				S1	2 May Be At Risk	13	97.0 ± 0.0	NB
P	*Lysimachia quadrifolia*	Whorled Yellow Loosestrife				S1	2 May Be At Risk	16	13.5 ± 1.0	NB
P	*Primula laurentiana*	Laurentian Primrose				S1	2 May Be At Risk	28	65.7 ± 2.0	NS
P	*Ranunculus sceleratus*	Cursed Buttercup				S1	2 May Be At Risk	6	4.4 ± 0.0	NB
P	*Crataegus jonesiae*	Jones' Hawthorn				S1	2 May Be At Risk	5	77.3 ± 0.0	NB
P	*Galium brevipes*	Limestone Swamp Bedstraw				S1	2 May Be At Risk	1	75.4 ± 5.0	NB
P	*Saxifraga paniculata ssp. neogaea*	White Mountain Saxifrage				S1	2 May Be At Risk	20	16.3 ± 10.0	NB
P	*Agalinis paupercula var. borealis*	Small-flowered Agalinis				S1	2 May Be At Risk	7	24.5 ± 1.0	NB
P	*Agalinis tenuifolia*	Slender Agalinis				S1	2 May Be At Risk	6	83.4 ± 0.0	NB
P	*Gratiola aurea*	Golden Hedge-Hyssop				S1	3 Sensitive	5	17.5 ± 5.0	NB
P	*Pedicularis canadensis*	Canada Lousewort				S1	2 May Be At Risk	3	61.0 ± 0.0	NB
P	*Viola sagittata var. ovata*	Arrow-Leaved Violet				S1	2 May Be At Risk	37	69.2 ± 0.0	NS
P	*Alisma subcordatum*	Southern Water Plantain				S1	5 Undetermined	4	32.0 ± 0.0	NB
P	*Carex atlantica ssp. atlantica*	Atlantic Sedge				S1	2 May Be At Risk	1	71.0 ± 0.0	NB
P	*Carex backii*	Rocky Mountain Sedge				S1	2 May Be At Risk	6	70.1 ± 0.0	NB
P	*Carex merritt-fernaldii*	Merritt Fernald's Sedge				S1	2 May Be At Risk	2	79.2 ± 0.0	NB
P	*Carex saxatilis*	Russet Sedge				S1	2 May Be At Risk	13	2.0 ± 10.0	NB
P	*Carex sterilis*	Sterile Sedge				S1	2 May Be At Risk	1	99.7 ± 0.0	NB
P	*Carex grisea*	Inflated Narrow-leaved Sedge				S1	2 May Be At Risk	10	42.3 ± 0.0	NB
P	*Cyperus diandrus*	Low Flatsedge				S1	2 May Be At Risk	7	83.4 ± 1.0	NB
P	*Cyperus lupulinus*	Hop Flatsedge				S1	2 May Be At Risk	5	68.6 ± 0.0	NB
P	*Cyperus lupulinus ssp. macilentus*	Hop Flatsedge				S1	2 May Be At Risk	16	66.7 ± 0.0	NB

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)	Prov
P	*Eleocharis olivacea*	Yellow Spikerush				S1	2 May Be At Risk	4	93.3 ± 1.0	NS
P	*Rhynchospora capillacea*	Slender Beakrush				S1	2 May Be At Risk	3	97.6 ± 0.0	NB
P	*Sisyrinchium angustifolium*	Narrow-leaved Blue-eyed-grass				S1	2 May Be At Risk	9	4.6 ± 1.0	NB
P	*Juncus greenei*	Greene's Rush				S1	2 May Be At Risk	1	47.6 ± 0.0	NB
P	*Juncus subtilis*	Creeping Rush				S1	2 May Be At Risk	1	47.7 ± 5.0	NB
P	*Allium canadense*	Canada Garlic				S1	2 May Be At Risk	11	38.3 ± 0.0	NB
P	*Goodyera pubescens*	Downy Rattlesnake-Plantain				S1	2 May Be At Risk	9	82.0 ± 0.0	NB
P	*Malaxis brachypoda*	White Adder's-Mouth				S1	2 May Be At Risk	3	83.6 ± 10.0	NB
P	*Platanthera flava var. herbiola*	Pale Green Orchid				S1	2 May Be At Risk	14	59.5 ± 0.0	NB
P	*Platanthera macrophylla*	Large Round-Leaved Orchid				S1	2 May Be At Risk	2	69.0 ± 1.0	NB
P	*Spiranthes casei*	Case's Ladies'-Tresses				S1	2 May Be At Risk	6	95.6 ± 0.0	NB
P	*Spiranthes ochroleuca*	Yellow Ladies'-tresses				S1	2 May Be At Risk	12	82.6 ± 0.0	NB
P	*Bromus pubescens*	Hairy Wood Brome Grass				S1	5 Undetermined	6	68.8 ± 0.0	NB
P	*Cinna arundinacea*	Sweet Wood Reed Grass				S1	2 May Be At Risk	22	46.8 ± 0.0	NB
P	*Danthonia compressa*	Flattened Oat Grass				S1	2 May Be At Risk	4	70.7 ± 1.0	NB
P	*Dichanthelium dichotomum*	Forked Panic Grass				S1	2 May Be At Risk	5	28.6 ± 1.0	NB
P	*Festuca subverticillata*	Nodding Fescue				S1	2 May Be At Risk	1	92.7 ± 1.0	NS
P	*Glyceria obtusa*	Atlantic Manna Grass				S1	2 May Be At Risk	7	43.1 ± 0.0	NB
P	*Sporobolus compositus*	Rough Dropseed				S1	2 May Be At Risk	17	97.0 ± 1.0	NB
P	*Potamogeton friesii*	Fries' Pondweed				S1	2 May Be At Risk	6	11.1 ± 5.0	NB
P	*Potamogeton nodosus*	Long-leaved Pondweed				S1	2 May Be At Risk	4	75.6 ± 0.0	NB
P	*Potamogeton strictifolius*	Straight-leaved Pondweed				S1	2 May Be At Risk	2	22.8 ± 0.0	NB
P	*Xyris difformis*	Bog Yellow-eyed-grass				S1	5 Undetermined	4	16.6 ± 0.0	NB
P	*Asplenium ruta-muraria var. cryptolepis*	Wallrue Spleenwort				S1	2 May Be At Risk	3	15.8 ± 0.0	NB
P	*Cystopteris laurentiana*	Laurentian Bladder Fern				S1	2 May Be At Risk	1	69.0 ± 1.0	NB
P	*Botrychium oneidense*	Blunt-lobed Moonwort				S1	2 May Be At Risk	4	58.2 ± 0.0	NB
P	*Botrychium rugulosum*	Rugulose Moonwort				S1	2 May Be At Risk	1	83.4 ± 1.0	NB
P	*Schizaea pusilla*	Little Curlygrass Fern				S1	2 May Be At Risk	27	12.5 ± 0.0	NB
P	*Hieracium kalmii var. fasciculatum*	Kalm's Hawkweed				S1?	5 Undetermined	6	75.9 ± 0.0	NB
P	*Cuscuta cephalanthi*	Buttonbush Dodder				S1?	2 May Be At Risk	2	1.8 ± 1.0	NB
P	*Drosera rotundifolia var. comosa*	Round-leaved Sundew				S1?	5 Undetermined	5	57.8 ± 1.0	NB
P	*Carex laxiflora*	Loose-Flowered Sedge				S1?	5 Undetermined	2	70.8 ± 5.0	NS
P	*Wolffia columbiana*	Columbian Watermeal				S1?	2 May Be At Risk	5	72.5 ± 0.0	NB
P	*Humulus lupulus var. lupuloides*	Common Hop				S1S2	3 Sensitive	4	84.8 ± 0.0	NB
P	*Rumex aquaticus var. fenestratus*	Western Dock				S1S2	2 May Be At Risk	1	83.1 ± 1.0	NB
P	*Saxifraga virginiensis*	Early Saxifrage				S1S2	2 May Be At Risk	10	95.4 ± 0.0	NB
P	*Carex rostrata*	Narrow-leaved Beaked Sedge				S1S2	3 Sensitive	2	80.3 ± 0.0	NB
P	*Potamogeton bicupulatus*	Snailseed Pondweed				S1S2	2 May Be At Risk	5	32.4 ± 0.0	NB
P	*Selaginella rupestris*	Rock Spikemoss				S1S2	2 May Be At Risk	26	69.1 ± 1.0	NB
P	*Thelypteris simulata*	Bog Fern				S1S2	2 May Be At Risk	7	73.5 ± 0.0	NB
P	*Listera australis*	Southern Twayblade			Endangered	S2	1 At Risk	15	84.7 ± 0.0	NB
P	*Pseudognaphalium macounii*	Macoun's Cudweed				S2	3 Sensitive	8	1.6 ± 0.0	NB
P	*Solidago altissima*	Tall Goldenrod				S2	4 Secure	5	24.9 ± 1.0	NB
P	*Solidago simplex var.*	Sticky Goldenrod				S2	2 May Be At Risk	7	96.7 ± 1.0	NB

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)	Prov
	racemosa									
P	*Solidago simplex ssp. randii*	Sticky Goldenrod				S2	2 May Be At Risk	2	96.4 ± 0.0	NB
P	*Solidago simplex*	Sticky Goldenrod				S2	2 May Be At Risk	2	96.5 ± 0.0	NB
P	*Ionactis linariifolius*	Stiff Aster				S2	3 Sensitive	1	93.9 ± 0.0	NB
P	*Symphyotrichum racemosum*	Small White Aster				S2	3 Sensitive	7	64.4 ± 1.0	NB
P	*Impatiens pallida*	Pale Jewelweed				S2	2 May Be At Risk	3	85.5 ± 0.0	NS
P	*Alnus serrulata*	Smooth Alder				S2	3 Sensitive	11	49.8 ± 0.0	NB
P	*Arabis drummondii*	Drummond's Rockcress				S2	3 Sensitive	16	0.6 ± 1.0	NB
P	*Barbarea orthoceras*	American Yellow Rocket				S2	3 Sensitive	6	24.9 ± 0.0	NB
P	*Cardamine concatenata*	Cut-leaved Toothwort				S2	2 May Be At Risk	1	95.8 ± 1.0	NB
P	*Sagina nodosa*	Knotted Pearlwort				S2	3 Sensitive	14	37.1 ± 1.0	NB
P	*Sagina nodosa ssp. borealis*	Knotted Pearlwort				S2	3 Sensitive	2	17.8 ± 0.0	NB
P	*Stellaria longifolia*	Long-leaved Starwort				S2	3 Sensitive	5	1.1 ± 10.0	NB
P	*Atriplex franktonii*	Frankton's Saltbush				S2	4 Secure	3	44.2 ± 1.0	NB
P	*Chenopodium rubrum*	Red Pigweed				S2	3 Sensitive	4	2.4 ± 1.0	NB
P	*Callitriche hermaphroditica*	Northern Water-starwort				S2	4 Secure	10	31.3 ± 1.0	NB
P	*Hypericum dissimulatum*	Disguised St John's-wort				S2	3 Sensitive	7	53.5 ± 1.0	NB
P	*Lonicera oblongifolia*	Swamp Fly Honeysuckle				S2	3 Sensitive	6	17.6 ± 6.0	NB
P	*Triosteum aurantiacum*	Orange-fruited Tinker's Weed				S2	3 Sensitive	5	97.8 ± 1.0	NB
P	*Viburnum lentago*	Nannyberry				S2	4 Secure	49	85.9 ± 0.0	NB
P	*Viburnum recognitum*	Northern Arrow-Wood				S2	4 Secure	96	59.1 ± 0.0	NB
P	*Astragalus eucosmus*	Elegant Milk-vetch				S2	2 May Be At Risk	10	25.6 ± 0.0	NB
P	*Oxytropis campestris var. johannensis*	Field Locoweed				S2	3 Sensitive	6	15.4 ± 50.0	NB
P	*Quercus macrocarpa*	Bur Oak				S2	2 May Be At Risk	41	7.9 ± 1.0	NB
P	*Gentiana linearis*	Narrow-Leaved Gentian				S2	3 Sensitive	5	89.3 ± 5.0	NB
P	*Myriophyllum humile*	Low Water Milfoil				S2	3 Sensitive	10	67.2 ± 0.0	NB
P	*Hedeoma pulegioides*	American False Pennyroyal				S2	4 Secure	60	3.4 ± 0.0	NB
P	*Nuphar lutea ssp. rubrodisca*	Red-disked Yellow Pond-lily				S2	3 Sensitive	9	17.1 ± 1.0	NB
P	*Orobanche uniflora*	One-Flowered Broomrape				S2	3 Sensitive	13	16.3 ± 2.0	NB
P	*Polygala paucifolia*	Fringed Milkwort				S2	3 Sensitive	16	60.0 ± 1.0	NB
P	*Polygala sanguinea*	Blood Milkwort				S2	3 Sensitive	14	56.8 ± 0.0	NB
P	*Polygonum amphibium var. emersum*	Water Smartweed				S2	3 Sensitive	24	36.8 ± 0.0	NB
P	*Polygonum careyi*	Carey's Smartweed				S2	3 Sensitive	15	28.2 ± 5.0	NB
P	*Podostemum ceratophyllum*	Horn-leaved Riverweed				S2	3 Sensitive	22	50.6 ± 0.0	NB
P	*Anemone multifida*	Cut-leaved Anemone				S2	3 Sensitive	1	98.0 ± 0.0	NB
P	*Hepatica nobilis var. obtusa*	Round-lobed Hepatica				S2	3 Sensitive	35	51.0 ± 1.0	NB
P	*Ranunculus flabellaris*	Yellow Water Buttercup				S2	4 Secure	14	46.0 ± 0.0	NB
P	*Ranunculus longirostris*	Eastern White Water-Crowfoot				S2	5 Undetermined	5	71.8 ± 1.0	NB
P	*Crataegus scabrida*	Rough Hawthorn				S2	3 Sensitive	9	15.7 ± 0.0	NB
P	*Crataegus succulenta*	Fleshy Hawthorn				S2	3 Sensitive	1	89.7 ± 5.0	NB
P	*Sanguisorba canadensis*	Canada Burnet				S2	4 Secure	15	93.2 ± 0.0	NB
P	*Cephalanthus occidentalis*	Common Buttonbush				S2	3 Sensitive	24	62.6 ± 0.0	NB
P	*Salix candida*	Sage Willow				S2	3 Sensitive	3	91.1 ± 1.0	NS

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P	*Agalinis neoscotica*	Nova Scotia Agalinis				S2	3 Sensitive	32	68.1 ± 1.0	NS
P	*Euphrasia randii*	Rand's Eyebright				S2	2 May Be At Risk	23	17.3 ± 0.0	NB
P	*Scrophularia lanceolata*	Lance-leaved Figwort				S2	3 Sensitive	5	21.8 ± 5.0	NB
P	*Dirca palustris*	Eastern Leatherwood				S2	2 May Be At Risk	3	95.6 ± 0.0	NB
P	*Verbena urticifolia*	White Vervain				S2	2 May Be At Risk	7	95.6 ± 1.0	NB
P	*Viola novae-angliae*	New England Violet				S2	3 Sensitive	4	31.6 ± 0.0	NB
P	*Symplocarpus foetidus*	Eastern Skunk Cabbage				S2	3 Sensitive	84	13.4 ± 1.0	NB
P	*Carex granularis*	Limestone Meadow Sedge				S2	3 Sensitive	7	68.9 ± 5.0	NB
P	*Carex gynocrates*	Northern Bog Sedge				S2	3 Sensitive	5	70.7 ± 1.0	NB
P	*Carex hirtifolia*	Pubescent Sedge				S2	3 Sensitive	3	45.3 ± 0.0	NB
P	*Carex livida var. radicaulis*	Livid Sedge				S2	3 Sensitive	1	1.6 ± 2.0	NB
P	*Carex prairea*	Prairie Sedge				S2	3 Sensitive	1	79.5 ± 5.0	NS
P	*Carex salina*	Saltmarsh Sedge				S2	3 Sensitive	2	1.2 ± 1.0	NB
P	*Carex sprengelii*	Longbeak Sedge				S2	3 Sensitive	3	64.7 ± 0.0	NB
P	*Carex tenuiflora*	Sparse-Flowered Sedge				S2	2 May Be At Risk	5	77.8 ± 0.0	NB
P	*Carex albicans var. emmonsii*	White-tinged Sedge				S2	3 Sensitive	5	10.6 ± 0.0	NB
P	*Carex vacillans*	Estuarine Sedge				S2	3 Sensitive	4	69.5 ± 1.0	NB
P	*Cyperus squarrosus*	Awned Flatsedge				S2	3 Sensitive	29	34.0 ± 0.0	NB
P	*Eriophorum gracile*	Slender Cottongrass				S2	2 May Be At Risk	5	68.7 ± 3.0	NS
P	*Blysmus rufus*	Red Bulrush				S2	3 Sensitive	3	79.0 ± 0.0	NB
P	*Elodea nuttallii*	Nuttall's Waterweed				S2	3 Sensitive	7	31.0 ± 0.0	NB
P	*Juncus vaseyi*	Vasey Rush				S2	3 Sensitive	3	97.2 ± 0.0	NB
P	*Lemna trisulca*	Star Duckweed				S2	4 Secure	17	15.8 ± 1.0	NB
P	*Allium tricoccum*	Wild Leek				S2	2 May Be At Risk	12	26.2 ± 0.0	NB
P	*Najas gracillima*	Thread-Like Naiad				S2	3 Sensitive	11	43.4 ± 0.0	NB
P	*Calypso bulbosa var. americana*	Calypso				S2	2 May Be At Risk	3	9.4 ± 0.0	NB
P	*Coeloglossum viride var. virescens*	Long-bracted Frog Orchid				S2	2 May Be At Risk	7	37.2 ± 5.0	NB
P	*Cypripedium parviflorum var. makasin*	Small Yellow Lady's-Slipper				S2	2 May Be At Risk	5	1.6 ± 2.0	NB
P	*Spiranthes cernua*	Nodding Ladies'-Tresses				S2	3 Sensitive	22	47.6 ± 0.0	NB
P	*Spiranthes lucida*	Shining Ladies'-Tresses				S2	3 Sensitive	13	25.4 ± 0.0	NB
P	*Dichanthelium linearifolium*	Narrow-leaved Panic Grass				S2	3 Sensitive	15	50.7 ± 0.0	NB
P	*Elymus canadensis*	Canada Wild Rye				S2	2 May Be At Risk	14	74.1 ± 1.0	NB
P	*Leersia virginica*	White Cut Grass				S2	2 May Be At Risk	42	45.7 ± 0.0	NB
P	*Piptatherum canadense*	Canada Rice Grass				S2	3 Sensitive	5	53.7 ± 0.0	NB
P	*Puccinellia phryganodes*	Creeping Alkali Grass				S2	3 Sensitive	15	31.6 ± 0.0	NB
P	*Schizachyrium scoparium*	Little Bluestem				S2	3 Sensitive	37	30.9 ± 0.0	NB
P	*Zizania aquatica var. aquatica*	Indian Wild Rice				S2	5 Undetermined	5	46.6 ± 0.0	NB
P	*Piptatherum pungens*	Slender Rice Grass				S2	2 May Be At Risk	3	97.2 ± 0.0	NB
P	*Stuckenia filiformis ssp. alpina*	Thread-leaved Pondweed				S2	3 Sensitive	7	1.6 ± 2.0	NB
P	*Potamogeton richardsonii*	Richardson's Pondweed				S2	3 Sensitive	16	1.6 ± 1.0	NB
P	*Potamogeton vaseyi*	Vasey's Pondweed				S2	3 Sensitive	4	11.1 ± 1.0	NB
P	*Asplenium trichomanes*	Maidenhair Spleenwort				S2	3 Sensitive	15	4.9 ± 0.0	NB
P	*Woodwardia virginica*	Virginia Chain Fern				S2	3 Sensitive	14	81.5 ± 1.0	NB

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P	*Woodsia alpina*	Alpine Cliff Fern				S2	3 Sensitive	7	16.3 ± 0.0	NB
P	*Selaginella selaginoides*	Low Spikemoss				S2	3 Sensitive	11	1.6 ± 6.0	NB
P	*Toxicodendron radicans*	Poison Ivy				S2?	3 Sensitive	16	30.6 ± 0.0	NB
P	*Osmorhiza longistylis*	Smooth Sweet Cicely				S2?	3 Sensitive	1	80.2 ± 0.0	NB
P	*Symphyotrichum novi-belgii var. crenifolium*	New York Aster				S2?	5 Undetermined	8	2.7 ± 0.0	NB
P	*Proserpinaca palustris var. crebra*	Marsh Mermaidweed				S2?	3 Sensitive	18	36.8 ± 0.0	NB
P	*Epilobium coloratum*	Purple-veined Willowherb				S2?	3 Sensitive	9	3.5 ± 1.0	NB
P	*Rubus pensilvanicus*	Pennsylvania Blackberry				S2?	4 Secure	19	7.8 ± 0.0	NB
P	*Rubus recurvicaulis*	Arching Dewberry				S2?	4 Secure	5	13.9 ± 5.0	NB
P	*Galium obtusum*	Blunt-leaved Bedstraw				S2?	4 Secure	5	46.8 ± 1.0	NB
P	*Salix myricoides*	Bayberry Willow				S2?	3 Sensitive	7	78.5 ± 0.0	NB
P	*Platanthera huronensis*	Fragrant Green Orchid				S2?	5 Undetermined	3	95.4 ± 0.0	NB
P	*Eragrostis pectinacea*	Tufted Love Grass				S2?	4 Secure	13	45.5 ± 1.0	NB
P	*Ceratophyllum echinatum*	Prickly Hornwort				S2S3	3 Sensitive	16	25.5 ± 0.0	NB
P	*Elatine americana*	American Waterwort				S2S3	3 Sensitive	7	14.7 ± 1.0	NB
P	*Bartonia paniculata*	Branched Bartonia				S2S3	3 Sensitive	5	18.9 ± 0.0	NB
P	*Bartonia paniculata ssp. iodandra*	Branched Bartonia				S2S3	3 Sensitive	37	12.7 ± 0.0	NB
P	*Geranium robertianum*	Herb Robert				S2S3	4 Secure	27	3.6 ± 1.0	NB
P	*Myriophyllum quitense*	Andean Water Milfoil				S2S3	4 Secure	71	5.4 ± 0.0	NB
P	*Rumex pallidus*	Seabeach Dock				S2S3	3 Sensitive	6	6.2 ± 0.0	NB
P	*Galium labradoricum*	Labrador Bedstraw				S2S3	3 Sensitive	4	57.5 ± 1.0	NB
P	*Valeriana uliginosa*	Swamp Valerian				S2S3	3 Sensitive	1	93.5 ± 1.0	NB
P	*Carex adusta*	Lesser Brown Sedge				S2S3	4 Secure	7	7.6 ± 1.0	NB
P	*Carex plantaginea*	Plantain-Leaved Sedge				S2S3	3 Sensitive	1	94.8 ± 1.0	NB
P	*Corallorhiza maculata var. occidentalis*	Spotted Coralroot				S2S3	3 Sensitive	4	79.2 ± 0.0	NB
P	*Corallorhiza maculata var. maculata*	Spotted Coralroot				S2S3	3 Sensitive	2	87.0 ± 1.0	NB
P	*Listera auriculata*	Auricled Twayblade				S2S3	3 Sensitive	9	4.5 ± 1.0	NB
P	*Potamogeton praelongus*	White-stemmed Pondweed				S2S3	4 Secure	12	1.6 ± 1.0	NB
P	*Isoetes acadiensis*	Acadian Quillwort				S2S3	3 Sensitive	9	46.5 ± 0.0	NB
P	*Ophioglossum pusillum*	Northern Adder's-tongue				S2S3	3 Sensitive	9	2.2 ± 1.0	NB
P	*Panax trifolius*	Dwarf Ginseng				S3	3 Sensitive	16	21.4 ± 0.0	NB
P	*Artemisia campestris*	Field Wormwood				S3	4 Secure	6	71.5 ± 0.0	NB
P	*Artemisia campestris ssp. caudata*	Field Wormwood				S3	4 Secure	77	62.9 ± 0.0	NB
P	*Erigeron hyssopifolius*	Hyssop-leaved Fleabane				S3	4 Secure	28	9.3 ± 0.0	NB
P	*Prenanthes racemosa*	Glaucous Rattlesnakeroot				S3	4 Secure	67	2.5 ± 0.0	NB
P	*Tanacetum bipinnatum ssp. huronense*	Lake Huron Tansy				S3	4 Secure	19	11.4 ± 1.0	NB
P	*Symphyotrichum boreale*	Boreal Aster				S3	3 Sensitive	8	25.3 ± 0.0	NB
P	*Betula pumila*	Bog Birch				S3	4 Secure	20	64.6 ± 1.0	NB
P	*Arabis glabra*	Tower Mustard				S3	5 Undetermined	1	75.4 ± 0.0	NB
P	*Arabis hirsuta var. pycnocarpa*	Western Hairy Rockcress				S3	4 Secure	17	0.6 ± 0.0	NB
P	*Cardamine maxima*	Large Toothwort				S3	4 Secure	26	6.6 ± 0.0	NB
P	*Subularia aquatica var. americana*	Water Awlwort				S3	4 Secure	14	33.8 ± 0.0	NB
P	*Lobelia cardinalis*	Cardinal Flower				S3	4 Secure	322	54.8 ± 0.0	NB

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P	*Stellaria humifusa*	Saltmarsh Starwort				S3	4 Secure	10	5.0 ± 0.0	NB
P	*Hudsonia tomentosa*	Woolly Beach-heath				S3	4 Secure	3	24.5 ± 0.0	NB
P	*Cornus amomum ssp. obliqua*	Pale Dogwood				S3	3 Sensitive	132	30.1 ± 0.0	NB
P	*Crassula aquatica*	Water Pygmyweed				S3	4 Secure	10	47.1 ± 0.0	NB
P	*Rhodiola rosea*	Roseroot				S3	4 Secure	48	1.7 ± 5.0	NB
P	*Penthorum sedoides*	Ditch Stonecrop				S3	4 Secure	60	34.8 ± 0.0	NB
P	*Elatine minima*	Small Waterwort				S3	4 Secure	28	19.6 ± 5.0	NB
P	*Astragalus alpinus var. brunetianus*	Alpine Milk-Vetch				S3	4 Secure	2	96.5 ± 0.0	NB
P	*Hedysarum alpinum*	Alpine Sweet-vetch				S3	4 Secure	2	25.6 ± 0.0	NB
P	*Gentianella amarella ssp. acuta*	Northern Gentian				S3	4 Secure	3	0.7 ± 0.0	NB
P	*Geranium bicknellii*	Bicknell's Crane's-bill				S3	4 Secure	8	9.4 ± 5.0	NB
P	*Myriophyllum farwellii*	Farwell's Water Milfoil				S3	4 Secure	16	6.5 ± 0.0	NB
P	*Myriophyllum heterophyllum*	Variable-leaved Water Milfoil				S3	4 Secure	49	18.2 ± 0.0	NB
P	*Myriophyllum verticillatum*	Whorled Water Milfoil				S3	4 Secure	19	6.3 ± 1.0	NB
P	*Myriophyllum sibiricum*	Siberian Water Milfoil				S3	4 Secure	28	6.6 ± 0.0	NB
P	*Stachys tenuifolia*	Smooth Hedge-Nettle				S3	3 Sensitive	12	28.5 ± 0.0	NB
P	*Teucrium canadense*	Canada Germander				S3	3 Sensitive	5	71.5 ± 1.0	NS
P	*Utricularia radiata*	Little Floating Bladderwort				S3	4 Secure	36	6.9 ± 0.0	NB
P	*Nuphar lutea ssp. pumila*	Small Yellow Pond-lily				S3	4 Secure	14	1.6 ± 0.0	NB
P	*Epilobium hornemannii*	Hornemann's Willowherb				S3	4 Secure	5	30.7 ± 0.0	NB
P	*Epilobium hornemannii ssp. hornemannii*	Hornemann's Willowherb				S3	4 Secure	1	87.0 ± 0.0	NB
P	*Epilobium strictum*	Downy Willowherb				S3	4 Secure	16	3.8 ± 5.0	NB
P	*Polygonum arifolium*	Halberd-leaved Tearthumb				S3	4 Secure	16	46.1 ± 0.0	NB
P	*Polygonum punctatum*	Dotted Smartweed				S3	4 Secure	2	72.3 ± 0.0	NB
P	*Polygonum punctatum var. confertiflorum*	Dotted Smartweed				S3	4 Secure	12	71.4 ± 2.0	NB
P	*Polygonum scandens*	Climbing False Buckwheat				S3	4 Secure	34	35.6 ± 0.0	NB
P	*Littorella uniflora*	American Shoreweed				S3	4 Secure	20	23.2 ± 0.0	NB
P	*Primula mistassinica*	Mistassini Primrose				S3	4 Secure	11	5.0 ± 0.0	NB
P	*Pyrola minor*	Lesser Pyrola				S3	4 Secure	5	33.0 ± 0.0	NB
P	*Clematis occidentalis*	Purple Clematis				S3	4 Secure	21	6.3 ± 5.0	NB
P	*Ranunculus gmelinii*	Gmelin's Water Buttercup				S3	4 Secure	6	46.7 ± 0.0	NB
P	*Thalictrum venulosum*	Northern Meadow-rue				S3	4 Secure	78	12.2 ± 5.0	NB
P	*Agrimonia gryposepala*	Hooked Agrimony				S3	4 Secure	26	1.6 ± 17.0	NB
P	*Amelanchier canadensis*	Canada Serviceberry				S3	4 Secure	16	15.5 ± 1.0	NB
P	*Rosa palustris*	Swamp Rose				S3	4 Secure	27	3.7 ± 1.0	NB
P	*Rubus chamaemorus*	Cloudberry				S3	4 Secure	55	10.9 ± 0.0	NB
P	*Rubus occidentalis*	Black Raspberry				S3	4 Secure	14	48.3 ± 0.0	NB
P	*Salix interior*	Sandbar Willow				S3	4 Secure	27	63.0 ± 0.0	NB
P	*Salix nigra*	Black Willow				S3	3 Sensitive	124	11.1 ± 1.0	NB
P	*Salix pedicellaris*	Bog Willow				S3	4 Secure	43	19.8 ± 1.0	NB
P	*Comandra umbellata*	Bastard's Toadflax				S3	4 Secure	1	75.6 ± 10.0	NB
P	*Geocaulon lividum*	Northern Comandra				S3	4 Secure	11	9.7 ± 0.0	NB
P	*Parnassia glauca*	Fen Grass-of-Parnassus				S3	4 Secure	1	95.2 ± 10.0	NB
P	*Limosella australis*	Southern Mudwort				S3	4 Secure	10	82.7 ± 0.0	NB
P	*Veronica serpyllifolia ssp. humifusa*	Thyme-Leaved Speedwell				S3	4 Secure	10	85.8 ± 1.0	NS
P	*Boehmeria cylindrica*	Small-spike False-nettle				S3	3 Sensitive	109	55.2 ± 0.0	NB
P	*Pilea pumila*	Dwarf Clearweed				S3	4 Secure	25	45.9 ± 0.0	NB

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)	Prov
P	*Viola adunca*	Hooked Violet				S3	4 Secure	8	64.3 ± 1.0	NB
P	*Viola nephrophylla*	Northern Bog Violet				S3	4 Secure	8	3.1 ± 0.0	NB
P	*Carex arcta*	Northern Clustered Sedge				S3	4 Secure	43	46.2 ± 0.0	NB
P	*Carex atratiformis*	Scabrous Black Sedge				S3	4 Secure	1	1.6 ± 0.0	NB
P	*Carex capillaris*	Hairlike Sedge				S3	4 Secure	9	1.6 ± 2.0	NB
P	*Carex chordorrhiza*	Creeping Sedge				S3	4 Secure	19	43.1 ± 1.0	NB
P	*Carex conoidea*	Field Sedge				S3	4 Secure	30	10.9 ± 1.0	NB
P	*Carex eburnea*	Bristle-leaved Sedge				S3	4 Secure	1	87.5 ± 0.0	NB
P	*Carex exilis*	Coastal Sedge				S3	4 Secure	85	7.0 ± 0.0	NB
P	*Carex garberi*	Garber's Sedge				S3	3 Sensitive	2	25.1 ± 0.0	NB
P	*Carex haydenii*	Hayden's Sedge				S3	4 Secure	34	13.3 ± 1.0	NB
P	*Carex lupulina*	Hop Sedge				S3	4 Secure	103	29.8 ± 0.0	NB
P	*Carex michauxiana*	Michaux's Sedge				S3	4 Secure	62	4.3 ± 1.0	NB
P	*Carex ormostachya*	Necklace Spike Sedge				S3	4 Secure	8	61.4 ± 1.0	NB
P	*Carex rosea*	Rosy Sedge				S3	4 Secure	23	24.9 ± 0.0	NB
P	*Carex tenera*	Tender Sedge				S3	4 Secure	41	30.1 ± 0.0	NB
P	*Carex tuckermanii*	Tuckerman's Sedge				S3	4 Secure	66	29.8 ± 0.0	NB
P	*Carex vaginata*	Sheathed Sedge				S3	3 Sensitive	7	87.7 ± 0.0	NB
P	*Carex wiegandii*	Wiegand's Sedge				S3	4 Secure	38	6.9 ± 0.0	NB
P	*Carex recta*	Estuary Sedge				S3	4 Secure	9	14.4 ± 0.0	NB
P	*Cyperus dentatus*	Toothed Flatsedge				S3	4 Secure	126	13.6 ± 5.0	NB
P	*Cyperus esculentus*	Perennial Yellow Nutsedge				S3	4 Secure	39	42.2 ± 0.0	NB
P	*Eleocharis intermedia*	Matted Spikerush				S3	4 Secure	2	82.7 ± 0.0	NB
P	*Eleocharis quinqueflora*	Few-flowered Spikerush				S3	4 Secure	5	12.7 ± 0.0	NB
P	*Eriophorum russeolum*	Russet Cottongrass				S3	4 Secure	5	9.2 ± 1.0	NB
P	*Rhynchospora capitellata*	Small-headed Beakrush				S3	4 Secure	9	51.5 ± 0.0	NB
P	*Rhynchospora fusca*	Brown Beakrush				S3	4 Secure	35	6.9 ± 0.0	NB
P	*Trichophorum clintonii*	Clinton's Clubrush				S3	4 Secure	21	9.2 ± 0.0	NB
P	*Schoenoplectus fluviatilis*	River Bulrush				S3	3 Sensitive	46	16.4 ± 0.0	NB
P	*Schoenoplectus torreyi*	Torrey's Bulrush				S3	4 Secure	30	9.4 ± 0.0	NB
P	*Triglochin gaspensis*	Gasp ├─ Arrowgrass				S3	4 Secure	18	4.4 ± 1.0	NB
P	*Triantha glutinosa*	Sticky False-Asphodel				S3	4 Secure	9	25.1 ± 0.0	NB
P	*Cypripedium reginae*	Showy Lady's-Slipper				S3	3 Sensitive	12	9.5 ± 1.0	NB
P	*Liparis loeselii*	Loesel's Twayblade				S3	4 Secure	15	4.3 ± 0.0	NB
P	*Platanthera blephariglottis*	White Fringed Orchid				S3	4 Secure	18	83.1 ± 0.0	NB
P	*Platanthera grandiflora*	Large Purple Fringed Orchid				S3	3 Sensitive	31	10.8 ± 1.0	NB
P	*Bromus latiglumis*	Broad-Glumed Brome				S3	3 Sensitive	2	52.7 ± 0.0	NB
P	*Calamagrostis pickeringii*	Pickering's Reed Grass				S3	4 Secure	106	10.5 ± 0.0	NB
P	*Dichanthelium depauperatum*	Starved Panic Grass				S3	4 Secure	16	52.0 ± 0.0	NB
P	*Muhlenbergia richardsonis*	Mat Muhly				S3	4 Secure	9	96.8 ± 0.0	NB
P	*Poa glauca*	Glaucous Blue Grass				S3	4 Secure	14	1.6 ± 2.0	NB
P	*Heteranthera dubia*	Water Stargrass				S3	4 Secure	55	1.1 ± 0.0	NB
P	*Potamogeton obtusifolius*	Blunt-leaved Pondweed				S3	4 Secure	12	21.0 ± 0.0	NB
P	*Xyris montana*	Northern Yellow-Eyed-Grass				S3	4 Secure	27	1.6 ± 8.0	NB
P	*Zannichellia palustris*	Horned Pondweed				S3	4 Secure	5	6.3 ± 1.0	NB
P	*Adiantum pedatum*	Northern Maidenhair Fern				S3	4 Secure	2	12.3 ± 1.0	NB
P	*Cryptogramma stelleri*	Steller's Rockbrake				S3	4 Secure	2	21.9 ± 1.0	NB
P	*Asplenium trichomanes-ramosum*	Green Spleenwort				S3	4 Secure	16	3.4 ± 0.0	NB

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)	Prov
P	*Dryopteris fragrans var. remotiuscula*	Fragrant Wood Fern				S3	4 Secure	27	5.0 ± 0.0	NB
P	*Woodsia glabella*	Smooth Cliff Fern				S3	4 Secure	23	31.0 ± 1.0	NB
P	*Equisetum palustre*	Marsh Horsetail				S3	4 Secure	6	78.1 ± 10.0	NB
P	*Isoetes tuckermanii*	Tuckerman's Quillwort				S3	4 Secure	29	28.8 ± 0.0	NB
P	*Lycopodium sabinifolium*	Ground-Fir				S3	4 Secure	11	11.2 ± 1.0	NB
P	*Huperzia appalachiana*	Appalachian Fir-Clubmoss				S3	3 Sensitive	16	3.8 ± 1.0	NB
P	*Botrychium dissectum*	Cut-leaved Moonwort				S3	4 Secure	27	2.6 ± 0.0	NB
P	*Botrychium lanceolatum var. angustisegmentum*	Lance-Leaf Grape-Fern				S3	3 Sensitive	7	3.1 ± 0.0	NB
P	*Botrychium simplex*	Least Moonwort				S3	4 Secure	8	75.6 ± 0.0	NB
P	*Polypodium appalachianum*	Appalachian Polypody				S3	4 Secure	14	4.2 ± 1.0	NB
P	*Utricularia resupinata*	Inverted Bladderwort				S3?	4 Secure	19	6.7 ± 0.0	NB
P	*Crataegus submollis*	Quebec Hawthorn				S3?	3 Sensitive	18	3.2 ± 1.0	NB
P	*Lobelia kalmii*	Brook Lobelia				S3S4	4 Secure	17	3.6 ± 1.0	NB
P	*Suaeda calceoliformis*	Horned Sea-blite				S3S4	4 Secure	6	8.7 ± 1.0	NB
P	*Utricularia gibba*	Humped Bladderwort				S3S4	4 Secure	32	6.9 ± 0.0	NB
P	*Rumex maritimus*	Sea-Side Dock				S3S4	4 Secure	1	76.4 ± 1.0	NB
P	*Potentilla arguta*	Tall Cinquefoil				S3S4	4 Secure	27	24.9 ± 0.0	NB
P	*Cladium mariscoides*	Smooth Twigrush				S3S4	4 Secure	34	10.4 ± 0.0	NB
P	*Spirodela polyrrhiza*	Great Duckweed				S3S4	4 Secure	33	35.4 ± 0.0	NB
P	*Corallorhiza maculata*	Spotted Coralroot				S3S4	3 Sensitive	15	2.5 ± 1.0	NB
P	*Distichlis spicata*	Salt Grass				S3S4	4 Secure	3	74.2 ± 0.0	NB
P	*Potamogeton oakesianus*	Oakes' Pondweed				S3S4	4 Secure	46	11.9 ± 0.0	NB
P	*Stuckenia pectinata*	Sago Pondweed				S3S4	4 Secure	66	1.6 ± 4.0	NB
P	*Montia fontana*	Water Blinks				SH	2 May Be At Risk	1	58.9 ± 1.0	NB
P	*Solidago caesia*	Blue-stemmed Goldenrod				SX	0.1 Extirpated	2	3.6 ± 1.0	NB
P	*Celastrus scandens*	Climbing Bittersweet				SX	0.1 Extirpated	2	94.8 ± 100.0	NB
P	*Carex swanii*	Swan's Sedge				SX	0.1 Extirpated	52	73.0 ± 0.0	NS

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

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

DATA REPORT 5129: Saint John, NB

Prepared 13 November, 2013
by J. Churchill, Data Manager

CONTENTS OF REPORT

1.0 PREFACE

The Atlantic Canada Conservation Data Centre (ACCDC) 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 ACCDC 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 ACCDC is supported by 6 federal agencies and 4 provincial governments, as well as through outside grants and data processing fees. URL: www.ACCDC.com.

Upon request and for a fee, the ACCDC 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 ACCDC includes locations of managed areas with some level of protection, and known sites of ecological interest or sensitivity.

1.1 DATA LIST

Included datasets:

Filename	Contents
StJohnNB-5129ob.xls	Rare and legally protected ***Flora and Fauna*** in your study area
StJohnNB-5129_bp.xls	Rare and common ***Pelagic Birds*** in your study area (CWS database)
StJohnNB-5129_ff.xls	Rare and common ***Freshwater Fish*** in your study area (DFO database)
StJohnNB-5129sa.xls	***Significant Natural Areas*** in your study area (CWS database)
StJohnNB-5129ma.xls	***Managed Areas*** in your study area (CWS database)

1.2 RESTRICTIONS

The ACCDC 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 ACCDC 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 ACCDC 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) ACCDC data responses are restricted to the data in our Data System at the time of the data request.
e) Locations given for rare species records may be deliberately imprecise. 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) ACCDC 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 ACCDC data response.

1.3 ADDITIONAL INFORMATION

The attached file DataDictionary 2.1.pdf provides metadata for the data provided.

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

Plants, Lichens, Ranking Methods
Sean Blaney, Botanist
Tel: (506) 364-2658
sblaney@mta.ca

Animals (Fauna)
John Klymko, Zoologist
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Plant Communities
Sarah Robinson , Community Ecologist
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Data Management, GIS
James Churchill, Data Manager
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Billing
Cindy Spicer
Tel: (506) 364-2665
cspicer@mta.ca

All other Inquiries
R.A. Lautenschlager
Tel: (506) 364-2661
rlautenschlager@mta.ca

Questions on the biology of Federal Species at Risk can be directed to ACCDC: (506) 364-2657, 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 Stewart Lusk, Natural Resources: (506) 453-7110.

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 Sherman Boates, NSDNR: (902) 679-6146.

For provincial information about rare taxa and protected areas, or information about game animals, fish habitat etc., in Prince Edward Island, please contact Rosemary Curley, PEI Dept. of Agriculture and Forestry: (902) 368-4807.

2.0 RARE AND ENDANGERED SPECIES

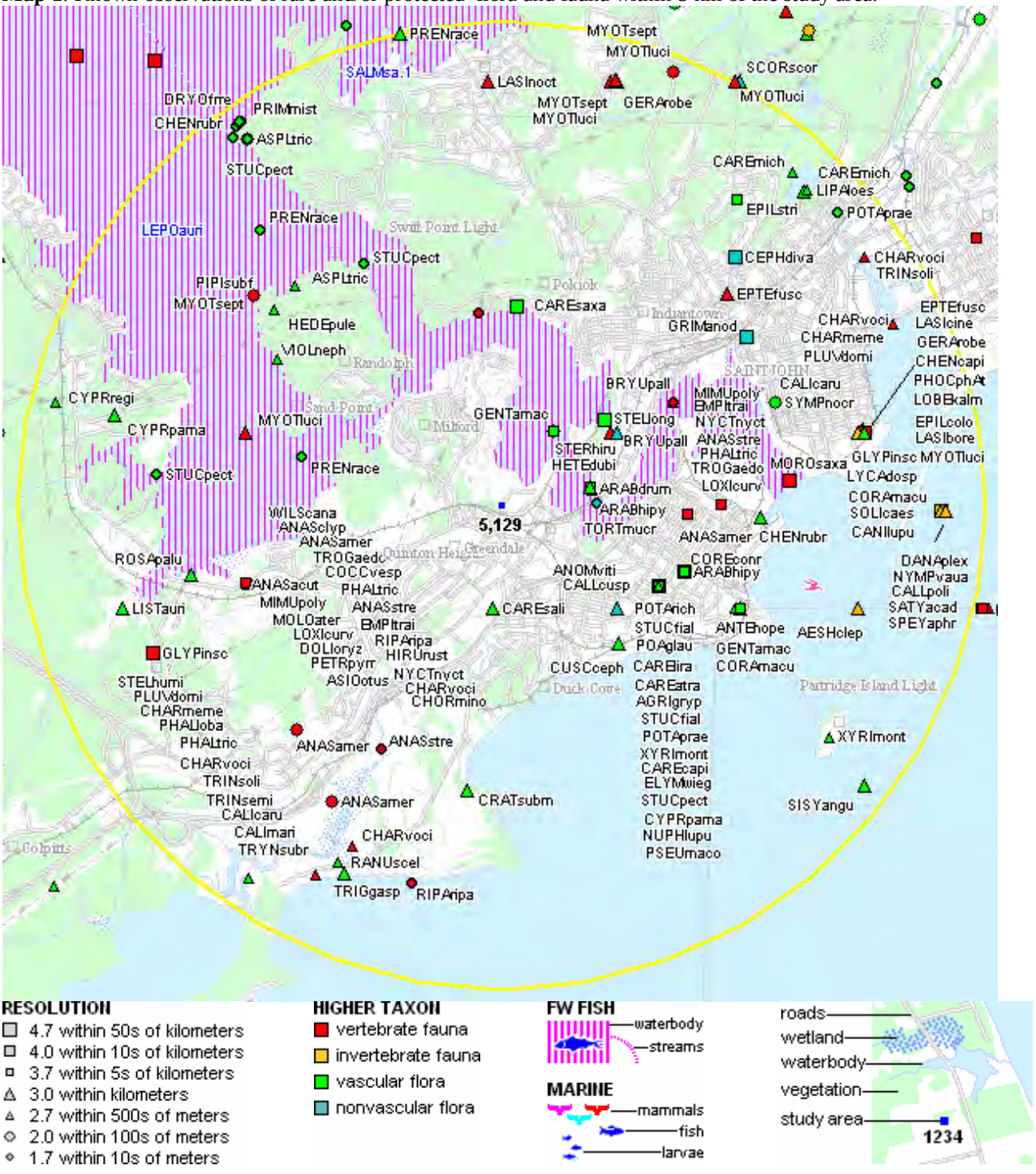
2.1 FLORA

A 5km buffer around the study area contains 86 records of 50 vascular flora 7 records of 6 nonvascular flora (attached: *ob.xls).

2.2 FAUNA

A 5km buffer around the study area contains 283 records of 47 vertebrate and 10 records of 7 invertebrate fauna (Map 1 and attached data files - see 1.1 Data List). Sensitive data: Records indicate Wood Turtle and Peregrine Falcon may be present in the study area but concerns about commercial exploitation preclude inclusion of relevant data in this report. See attached file WOTU.pdf, and PEFA.pdf for general species information.

Map 1: Known observations of rare and/or protected flora and fauna within 5 km of the study area.

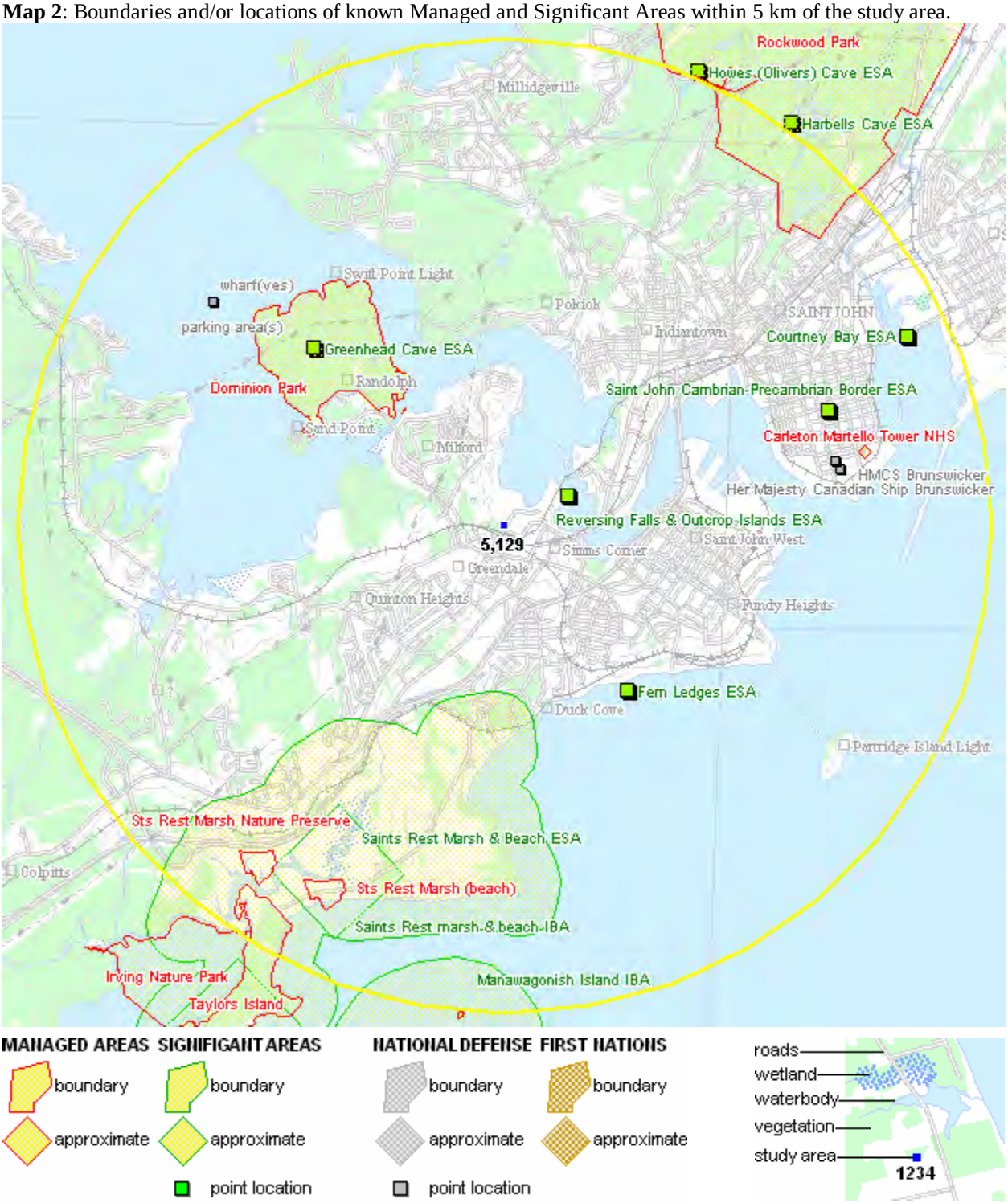


3.0 SPECIAL AREAS

3.1 MANAGED AREAS
The GIS scan identified 5 managed areas in the vicinity of the study area (Map 2 and attached *ma.xls).

3.2 SIGNIFICANT AREAS
The GIS scan identified 8 biologically significant sites in the vicinity of the study area (Map 2 and attached *sa.xls).

Map 2: Boundaries and/or locations of known Managed and Significant Areas within 5 km of the study area.



4.0 RARE SPECIES LISTS

Rare and/or endangered taxa within the buffered 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. [p] = vascular plant, [n] = nonvascular plant, [a] = vertebrate animal, [i] = invertebrate animal, [c] = community.

4.1 FLORA

	Scientific Name	Common Name	COSEWIC	Prov Legal Status	Prov Rarity Rank	Prov GS Rank	# recs	DISTkm
n	***Anomodon viticulosus***	a Moss			S1	May Be At Risk	1	2 ±1
p	***Elymus wiegandii***	Wiegand's Wild Rye			S1	Secure	1	2 ±0.5
p	***Sisyrinchium angustifolium***	Narrow-leaved Blue-eyed-grass			S1	May Be At Risk	1	5 ±1
p	***Carex saxatilis***	Russet Sedge			S1	May Be At Risk	2	2 ±10
p	***Ranunculus sceleratus***	Cursed Buttercup			S1	May Be At Risk	2	4 ±0.5
p	***Corema conradii***	Broom Crowberry			S1	May Be At Risk	1	2 ±10
p	***Chenopodium capitatum***	Strawberry-blite			S1	May Be At Risk	1	4 ±1
p	***Antennaria howellii ssp. petaloidea***	Pussy-Toes			S1	May Be At Risk	1	3 ±5
p	***Cuscuta cephalanthi***	Buttonbush Dodder			S1?	May Be At Risk	1	2 ±1
n	***Tortula mucronifolia***	Mucronate Screw Moss			S1S2	Sensitive	1	1 ±0
n	***Bryum pallescens***	Pale Bryum Moss			S1S2	Undetermined	1	1 ±1
p	***Asplenium trichomanes***	Maidenhair Spleenwort			S2	Sensitive	2	5 ±0.1
p	***Potamogeton richardsonii***	Richardson's Pondweed			S2	Sensitive	1	2 ±1
p	***Stuckenia filiformis ssp. alpina***	Thread-leaved Pondweed			S2	Sensitive	2	2 ±5
p	***Cypripedium parviflorum var. makasin***	Small Yellow Lady's-Slipper			S2	May Be At Risk	2	2 ±5
p	***Carex salina***	Saltmarsh Sedge			S2	Sensitive	2	1 ±1
p	***Carex livida var. radicaulis***	Livid Sedge			S2	Sensitive	1	2 ±5
p	***Hedeoma pulegioides***	American False Pennyroyal			S2	Secure	1	3 ±0.5
p	***Chenopodium rubrum***	Red Pigweed			S2	Sensitive	3	3 ±1
p	***Stellaria longifolia***	Long-leaved Starwort			S2	Sensitive	2	1 ±10
p	***Arabis drummondii***	Drummond's Rockcress			S2	Sensitive	3	1 ±1
p	***Pseudognaphalium macounii***	Macoun's Cudweed			S2	Sensitive	1	2 ±0.5
p	***Epilobium coloratum***	Purple-veined Willowherb			S2?	Sensitive	1	4 ±1
p	***Symphyotrichum novi-belgii var. crenifolium***	New York Aster			S2?	Undetermined	2	3 ±0.1
n	***Calliergonella cuspidata***	Common Large Wetland Moss			S2S3	Sensitive	1	2 ±1
p	***Potamogeton praelongus***	White-stemmed Pondweed			S2S3	Secure	2	2 ±1
p	***Listera auriculata***	Auricled Twayblade			S2S3	Sensitive	1	4 ±1
p	***Geranium robertianum***	Herb Robert			S2S3	Secure	2	4 ±1
n	***Cephaloziella divaricata***	Common Threadwort			S2S4	Not Assessed	1	4 ±10
p	***Dryopteris fragrans var. remotiuscula***	Fragrant Wood Fern			S3	Secure	2	5 ±0.1
p	***Asplenium trichomanes-ramosum***	Green Spleenwort			S3	Secure	2	3 ±0.5
p	***Xyris montana***	Northern Yellow-Eyed-Grass			S3	Secure	3	2 ±5
p	***Heteranthera dubia***	Water Stargrass			S3	Secure	1	1 ±0.5
p	***Poa glauca***	Glaucous Blue Grass			S3	Secure	1	2 ±5
p	***Liparis loeselii***	Loesel's Twayblade			S3	Secure	1	5 ±0.5
p	***Cypripedium reginae***	Showy Lady's-Slipper			S3	Sensitive	1	5 ±0.5
p	***Triglochin gaspensis***	Gaspé Arrowgrass			S3	Secure	1	4 ±1
p	***Carex michauxiana***	Michaux's Sedge			S3	Secure	2	5 ±0.5
p	***Carex capillaris***	Hairlike Sedge			S3	Secure	1	2 ±5
p	***Carex atratiformis***	Scabrous Black Sedge			S3	Secure	1	2 ±0.5
p	***Viola nephrophylla***	Northern Bog Violet			S3	Secure	1	3 ±0.5
p	***Rosa palustris***	Swamp Rose			S3	Secure	1	3 ±1
p	***Agrimonia gryposepala***	Hooked Agrimony			S3	Secure	1	2 ±10
p	***Primula mistassinica***	Mistassini Primrose			S3	Secure	1	5 ±0
p	***Epilobium strictum***	Downy Willowherb			S3	Secure	2	4 ±5
p	***Nuphar lutea ssp. pumila***	Small Yellow Pond-lily			S3	Secure	1	2 ±0.5
p	***Gentianella amarella ssp. acuta***	Northern Gentian			S3	Secure	3	1 ±0.1
p	***Stellaria humifusa***	Saltmarsh Starwort			S3	Secure	1	5 ±0.5
p	***Arabis hirsuta var. pycnocarpa***	Western Hairy Rockcress			S3	Secure	5	1 ±0.5
p	***Prenanthes racemosa***	Glaucous Rattlesnakeroot			S3	Secure	5	2 ±0

	Scientific Name	Common Name	COSEWIC	Prov Legal Status	Prov Rarity Rank	Prov GS Rank	# recs	DISTkm
p	***Crataegus submollis***	Quebec Hawthorn			S3?	Sensitive	1	3 ±1
p	***Stuckenia pectinata***	Sago Pondweed			S3S4	Secure	5	2 ±5
p	***Corallorhiza maculata***	Spotted Coralroot			S3S4	Sensitive	2	3 ±1
p	***Lobelia kalmii***	Brook Lobelia			S3S4	Secure	1	4 ±1
n	***Grimmia anodon***	Toothless Grimmia Moss			SH	Undetermined	2	3 ±10
p	***Solidago caesia***	Blue-stemmed Goldenrod			SX	Extirpated	2	4 ±1

4.2 FAUNA

	Scientific Name	Common Name	COSEWIC	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	DISTkm
a	***Charadrius melodus melodus***	Piping Plover melodus ssp	Endangered	Endangered	S2B	At Risk	4	4 ±0.5
a	***Myotis septentrionalis***	Northern Long-eared Myotis	Endangered		S1	At Risk	4	3 ±0.1
a	***Myotis lucifugus***	Little Brown Myotis	Endangered		S1	At Risk	12	3 ±1
a	***Morone saxatilis***	Striped Bass	Endangered		S2	May Be At Risk	1	3 ±10
a	***Salmo salar pop. 7***	Atlantic Salmon - Outer Bay of Fundy pop.	Endangered		S2	Sensitive	2	18 ±0
a	***Calidris canutus rufa***	Red Knot rufa ssp	Endangered		S3M	At Risk	11	4 ±0.5
a	***Morone saxatilis***	Striped Bass	Threatened		S2	May Be At Risk	1	42 ±0
a	***Glyptemys insculpta***	Wood Turtle	Threatened		S3	At Risk	3	4 ±10
a	***Hirundo rustica***	Barn Swallow	Threatened		S3B	Sensitive	3	3 ±5
a	***Riparia riparia***	Bank Swallow	Threatened		S3B	Sensitive	2	3 ±5
a	***Chordeiles minor***	Common Nighthawk	Threatened		S3B	At Risk	3	3 ±5
a	***Dolichonyx oryzivorus***	Bobolink	Threatened		S3S4B	Sensitive	2	3 ±5
a	***Wilsonia canadensis***	Canada Warbler	Threatened		S3S4B	At Risk	1	3 ±5
a	***Falco peregrinus pop. 1***	Peregrine Falcon - anatum/tundrius	Special Concern	Endangered	S1B	At Risk	18	2 ±0.5
a	***Acipenser brevirostrum***	Shortnose Sturgeon	Special Concern		S2	Sensitive	2	18 ±0
i	***Danaus plexippus***	Monarch	Special Concern		S3B	Sensitive	1	5 ±1
a	***Phocoena phocoena (NW Atlantic pop.)***	Harbour Porpoise - Northwest Atlantic pop.	Special Concern		S4		1	4 ±0.5
a	***Tryngites subruficollis***	Buff-breasted Sandpiper	Special Concern		SNA	Accidental	6	4 ±0.5
a	***Lepomis auritus***	Redbreast Sunfish	Data Deficient		S3?	Secure	2	18 ±0
a	***Haliaeetus leucocephalus***	Bald Eagle	Not At Risk	Reg.Endangered	S3B	At Risk	1	3 ±0
a	***Sterna hirundo***	Common Tern	Not At Risk		S3B	Sensitive	1	1 ±1
a	***Canis lupus***	Gray Wolf	Not At Risk		SX	Extirpated	1	4 ±1
a	***Perimyotis subflavus***	Eastern Pipistrelle			S1	At Risk	2	3 ±0.1
a	***Lasionycteris noctivagans***	Silver-haired Bat			S1?	Undetermined	1	4 ±1
a	***Troglodytes aedon***	House Wren			S1B	Undetermined	3	2 ±5
a	***Phalaropus tricolor***	Wilson's Phalarope			S1B	Sensitive	18	2 ±5
a	***Empidonax traillii***	Willow Flycatcher			S1S2B	Sensitive	2	2 ±5
a	***Nycticorax nycticorax***	Black-crowned Night-heron			S1S2B	Sensitive	2	2 ±5
i	***Aeshna clepsydra***	Mottled Darner			S2	Sensitive	1	4 ±1
a	***Lasiurus cinereus***	Hoary Bat			S2?	Undetermined	2	4 ±1
a	***Lasiurus borealis***	Eastern Red Bat			S2?	Undetermined	2	4 ±1
a	***Eptesicus fuscus***	Big Brown Bat			S2?	Sensitive	4	3 ±1
a	***Anas strepera***	Gadwall			S2B	Secure	4	2 ±5
a	***Anas clypeata***	Northern Shoveler			S2B	Secure	2	3 ±5
a	***Tringa solitaria***	Solitary Sandpiper			S2B,S5M	Secure	18	4 ±0.5
a	***Asio otus***	Long-eared Owl			S2S3	Undetermined	1	3 ±5
a	***Tringa semipalmata***	Willet			S2S3B	Sensitive	8	4 ±0.5
a	***Loxia curvirostra***	Red Crossbill			S3	Secure	3	2 ±5
i	***Nymphalis l-album***	Compton Tortoiseshell			S3	Secure	3	5 ±10
i	***Speyeria aphrodite***	Aphrodite Fritillary			S3	Secure	1	5 ±1
i	***Callophrys polios***	Hoary Elfin			S3	Secure	2	5 ±1
i	***Satyrium acadica***	Acadian Hairstreak			S3	Secure	1	5 ±1
i	***Lycaena dospassosi***	Salt Marsh Copper			S3	Secure	1	4 ±1
a	***Molothrus ater***	Brown-headed Cowbird			S3B	May Be At Risk	1	3 ±5
a	***Mimus polyglottos***	Northern Mockingbird			S3B	Sensitive	3	2 ±5
a	***Charadrius vociferus***	Killdeer			S3B	Sensitive	88	3 ±5

	Scientific Name	Common Name	COSEWIC	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	DISTkm
a	***Anas americana***	American Wigeon			S3B	Secure	8	2 ±5
a	***Anas acuta***	Northern Pintail			S3B	Sensitive	1	3 ±5
a	***Mergus serrator***	Red-breasted Merganser			S3B,S4S5N	Secure	1	3 ±0
a	***Phalaropus lobatus***	Red-necked Phalarope			S3M	Sensitive	1	4 ±0.5
a	***Pluvialis dominica***	American Golden-Plover			S3M	Sensitive	23	4 ±0.5
a	***Calidris maritima***	Purple Sandpiper			S3M,S3N	Secure	2	4 ±0.5
a	***Petrochelidon pyrrhonota***	Cliff Swallow			S3S4B	Sensitive	3	3 ±5
a	***Coccothraustes vespertinus***	Evening Grosbeak			S3S4B,S4S5N	Sensitive	1	3 ±5

5.0 SOURCE BIBLIOGRAPHY

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