NEW BRUNSWICK POWER CORPORATION

Environmental Impact Assessment (EIA) Registration

Milltown Generating Station Decommissioning Project
Milltown, New Brunswick

December 2020 – 19-1594

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December 4, 2020

New Brunswick Department of Environment and Local Government
Environmental Impact Assessment Branch
P.O. Box 6000
20 McGloin Street, 3rd Floor
Fredericton, NB
E3B 5H1

Attention: Ms. Lee Swanson
Project Manager, Environmental Impact Assessment Branch

RE: Environmental Impact Assessment (EIA) Registration: Milltown Generating Station Decommissioning Project, Milltown, New Brunswick

Dear Ms. Swanson:

On behalf of the New Brunswick Power Corporation (NB Power), Dillon Consulting Limited (Dillon) is pleased to submit this environmental impact assessment (EIA) registration document for the proposed decommissioning of the Milltown Generating Station in Milltown, New Brunswick, for your review and consideration.

Dillon looks forward to your timely review of the documentation. Please contact the undersigned if you have any questions or require additional information.

Sincerely,

DILLON CONSULTING LIMITED

Denis L. Marquis, M.Sc.E., P.Eng.
Associate, Project Manager

Attachment: EIA Registration

cc. Matthew Gorman – NB Power

Our file: 19-1594

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List of Acronyms and Units

Acronym or Unit	Definition
a.m.	morning
AC CDC	Atlantic Canada Conservation Data Centre
AFRP	archaeological field research permit
AHB	Archaeology and Heritage Branch
AIA	archaeological impact assessment
ANB	Ambulance New Brunswick
ARD	acid rock drainage
Blvd.	boulevard
BMI	benthic macroinvertebrate
°C	degrees Celsius
C&D	construction and demolition
CAC	criteria air contaminant
CALA	Canadian Association for Laboratory Accreditation
CBSA	Canada Border Services Agency
CCME	Canadian Council of Ministers of the Environment
CEPA	*Canadian Environmental Protection Act*
cfs	cubic feet per second
CH_4	methane
CLC	Community Liaison Committee
cm	centimetre
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CRM Group	Cultural Resource Management Group Ltd.
CWQG	Canadian Water Quality Guidelines
CWS	Canadian Wildlife Service
dBA	A-weighted decibels
DFO	Department of Fisheries and Oceans Canada
DO	dissolved oxygen
e.g.,	*exempli gratia* (meaning “for example”)

Acronym or Unit	Definition
ECCC	Environment and Climate Change Canada
EIA	environmental impact assessment
ESA	Environmentally Sensitive Area
ESC	erosion and sedimentation control
et al.	*et alia* (meaning “and others”)
etc.	*et cetera* (meaning “and so forth”)
FAA	*Fisheries Act* authorization
FES	fabric encapsulated soil
FWAL	freshwater aquatic life
GCDWQ	Guidelines for Canadian Drinking Water Quality
GHG	greenhouse gas
GIS	geographic information system
GPS	global positioning system
H_2S	hydrogen sulphide
ha	hectare
HADD	harmful alteration, disruption, or destruction (of fish habitat)
i.e.,	*id* est (meaning “in other words” or “that is”)
IA	impact assessment
IAA	Impact Assessment Act
IBA	Important Bird Area
IBC	International Boundary Commission
IJC	International Joint Commission
IPCC	Intergovernmental Panel on Climate Change
ISCRWB	International St. Croix River Watershed Board
km	kilometre
km^2	square kilometre
km/h	kilometres per hour
kPa	kiloPascals
L	litre
L/min	litres per minute
LAA	local assessment area
Leq	equivalent sound pressure level
LLC	limited liability corporation
Lmax	maximum sound pressure level

Acronym or Unit	Definition
LSD	Local Service District
m	metre
m^2	square metre
m^3/s	cubic metres per second
m amsl	metres above mean sea level
MBBA	Maritimes Breeding Bird Atlas
MBCA	*Migratory Birds Convention Act*
m bgs	metres below ground surface
mg/L	milligrams per litre
ML	metal leaching
mm	millimetre
Mt	megatonne (metric)
MTI	Mi'gmawe'l Tplu'taqnn Incorporated
MW	megaWatt
N_2O	nitrous oxide
NAAQO	National Ambient Air Quality Objectives
NB	New Brunswick
NBDELG	New Brunswick Department of Environment and Local Government
NBDNRED	New Brunswick Department of Natural Resources and Energy Development
NBDTHC	New Brunswick Department of Tourism, Heritage and Culture
NBDTI	New Brunswick Department of Transportation and Infrastructure
NB Power	New Brunswick Power Corporation
NB SARA	New Brunswick *Species at Risk Act*
NBSR	New Brunswick Southern Railway
NO_x	nitrogen oxides
NTU	nephelometric turbidity unit
OINR	outside-to-inside noise reduction
OWLS	online well log system
p.m.	evening
PAH	polycyclic aromatic hydrocarbons
PCB	polychlorinated biphenyls
PDA	Project development area
pg.	page

Acronym or Unit	Definition
pH	A measure of the acidity or alkalinity of a substance
PID	parcel identifier
PM	total particulate matter
$PM_{2.5}$	particulate matter less than 2.5 microns
PM_{10}	particulate matter less than 10 microns
PNA	Protected Natural Area
pp.	pages
ppm	parts per million
PSEMP	Project-specific Environmental Management Plan
RCMP	Royal Canadian Mounted Police
RCNM	Roadway Construction Noise Model
RFA	recreational fishing area
RPC	Research and Productivity Council
RSC	Regional Service Commission
SAR	species at risk
SARA	*Species at Risk Act*
SCIWC	St. Croix International Waterway Commission
SO_2	sulphur dioxide
SOCC	species of conservation concern
t	tonne (metric)
TLRU	traditional land and resource use
TOC	total organic carbon
TRC	Technical Review Committee
TSP	total suspended particulate
TSS	total suspended sediments
µg/m^3	micrograms per cubic metre
UNFCCC	United Nations Framework Convention on Climate Change
µS/cm	microSiemens per centimetre
U.S.A.	United States of America
VC	valued component
WAWA	watercourse and wetland alteration
WHO	World Health Organization
WMZ	wildlife management zone
WNNB	Wolastoqey Nation in New Brunswick

1.0 Introduction

This document is an Environmental Impact Assessment (EIA) Registration document for the Milltown Generating Station Decommissioning Project (the Project) proposed by the New Brunswick Power Corporation (NB Power) in the neighbourhood of Milltown, in the Town of St. Stephen, Charlotte County, New Brunswick, Canada. The Milltown Generating Station is a 3 megaWatt (MW) hydroelectric generating station located on the St. Croix River, which straddles the Canada/United States international border between St. Stephen, New Brunswick, Canada and Calais, Maine, United States of America (U.S.A.).

The Project is an "undertaking" under item (b) of Schedule A of the New Brunswick *Environmental Impact Assessment Regulation – Clean Environment Act* (EIA Regulation) ["*(b) all electric power generating facilities with a production rating of three megawatts or more*"]. As such, the Project must be registered under Section 5(1) of the EIA Regulation, and at minimum a determination review will be conducted. Following the EIA review and approval, other permits and approvals at the federal and provincial levels in Canada will be required. Other permitting processes to meet the federal, state, and local requirements in the U.S.A. are beyond the scope of this EIA registration.

This EIA Registration document is submitted to the New Brunswick Department of Environment and Local Government (NBDELG) under Section 5(2) of the New Brunswick *Environmental Impact Assessment Regulation* 87-83 of the *Clean Environment Act*. It has been prepared by Dillon Consulting Limited (Dillon) on behalf of NB Power to provide information to the NBDELG and its associated Technical Review Committee (TRC) to assist in the EIA review of the Project.

1.1 Proponent Information

The Project may be identified as the "Milltown Generating Station Decommissioning Project". The proponent of the Project is the New Brunswick Power Corporation. The Proponent's contact information is provided in **Table 1.1.1** below.

Table 1.1.1: Proponent Information

Name of Project:	Milltown Generating Station Decommissioning Project
Name of Proponent:	New Brunswick Power Corporation (NB Power)
Mailing Address of Proponent:	P.O. Box 2000, 515 King Street Fredericton, NB, Canada E3B 4X1
President and Chief Executive Officer:	Keith Cronkhite

Proponent's Contact Person for the purposes of this EIA Registration:	Matthew Gorman, P.Eng. Corporate Environmental Services Tel: 506.458.6887 Mobile: 506.478.4475 Email: magorman@nbpower.com Website: www.nbpower.com/en/about-us/projects/milltown-decommissioning/ Project-specific Email Inbox: MilltownProject@nbpower.com
Environmental Consultant that led the preparation of this EIA Registration:	Denis L. Marquis, M.Sc.E., P.Eng. Associate, Project Manager Dillon Consulting Limited 1149 Smythe Street, Suite 200 Fredericton, NB, Canada E3B 3H4 Tel.: 506.444.8820 ext. 5119 Mobile: 506.454.8846 Email: dmarquis@dillon.ca

1.2 About the Milltown Generating Station

The Milltown Generating Station (hereinafter referred to as "the Milltown Station") is a run-of-the-river hydroelectric generating station owned and operated by NB Power. Construction of the Milltown Station began in 1881, and it began operation in 1882, currently making it the oldest operating hydroelectric generating station in Canada. It is situated on the lower reaches of the St. Croix River, which at this location forms the international border between St. Stephen, New Brunswick, Canada and Calais, Maine, U.S.A. (**Figure 1.2.1**). On the Canadian side of the Canada/U.S.A. international boundary, the Milltown Station is located along Mill Lane in the community of Milltown (a neighbourhood within the Town of St. Stephen), which is approximately 3 km southwest of downtown St. Stephen, New Brunswick. On the U.S.A. side of the international boundary, the facility is located within the City of Calais, Maine, approximately 2 km southwest of downtown Calais. The Milltown Station was reportedly built atop a natural waterfall, known as Salmon Falls.

The Milltown Station is located adjacent to the former site of the historic St. Croix Cotton Mill, which operated from at least the early 1880s until 1957, in its early days producing mechanical power for the adjacent cotton mill. Following closure of the cotton mill in 1957, NB Power purchased the Milltown Station in 1958 and later added additional turbines for hydroelectricity generation for input to the Province's electrical grid.

At its peak operation, the Milltown Station generated a maximum of 4 MW of electricity, but with only four of seven turbine-generator units presently remaining at the facility, it is currently operating at a production capacity of approximately 3 MW, constituting approximately 0.8% of NB Power's overall hydroelectric power generation capacity within the province of New Brunswick.

Énergie NB Power

MILLTOWN GENERATING STATION DECOMMISSIONING PROJECT

ENVIRONMENTAL IMPACT ASSESSMENT REGISTRATION

PROJECT LOCATION

FIGURE 1.2.1

Project Location

Canada-USA Border

SCALE 1:3,000

0 50 100 200 km

N W E S

MAP DRAWING INFORMATION: ESRI, DIGITALGLOBE, GEOEYE, EATHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS,AEROGRID, IGN, AND THE GIS USER COMMUNITY
DATA PROVIDED BY: DILLON CONSULTING & NB DEPARTMENT OF NATURAL RESOURCES, INTERNATIONAL BOUNDARY COMMISSION

MAP CREATED BY: SCM
MAP CHECKED BY: JAB
MAP PROJECTION: NAD 1983 CSRS NEW BRUNSWICK STEREOGRAPHIC

DILLON CONSULTING

PROJECT: 19-1594

DATE: 2020-01-27

As shown in **Figure 1.3.1**, the existing Milltown Station consists of:

- Three adjoining powerhouses containing four active turbine-generators (i.e., Units #1, 2, 3, and 7) and associated electrical generating equipment;
- A dam, consisting of:
    - A gated spillway with gate house;
    - Rollway with flashboards;
    - A spillway with stop logs; and
    - Other water retaining structures that form part of the dam, built of concrete.
- A pool-and-weir fishway (sometimes referred to as a fish ladder) to facilitate upstream fish passage during key migration periods;
- Downstream fish passage facilities; and
- Associated electrical terminal and transmission facilities.

With only four of seven units remaining in operation, the Milltown Station has reached the end of its service life and is no longer practicable (or feasible) repair.

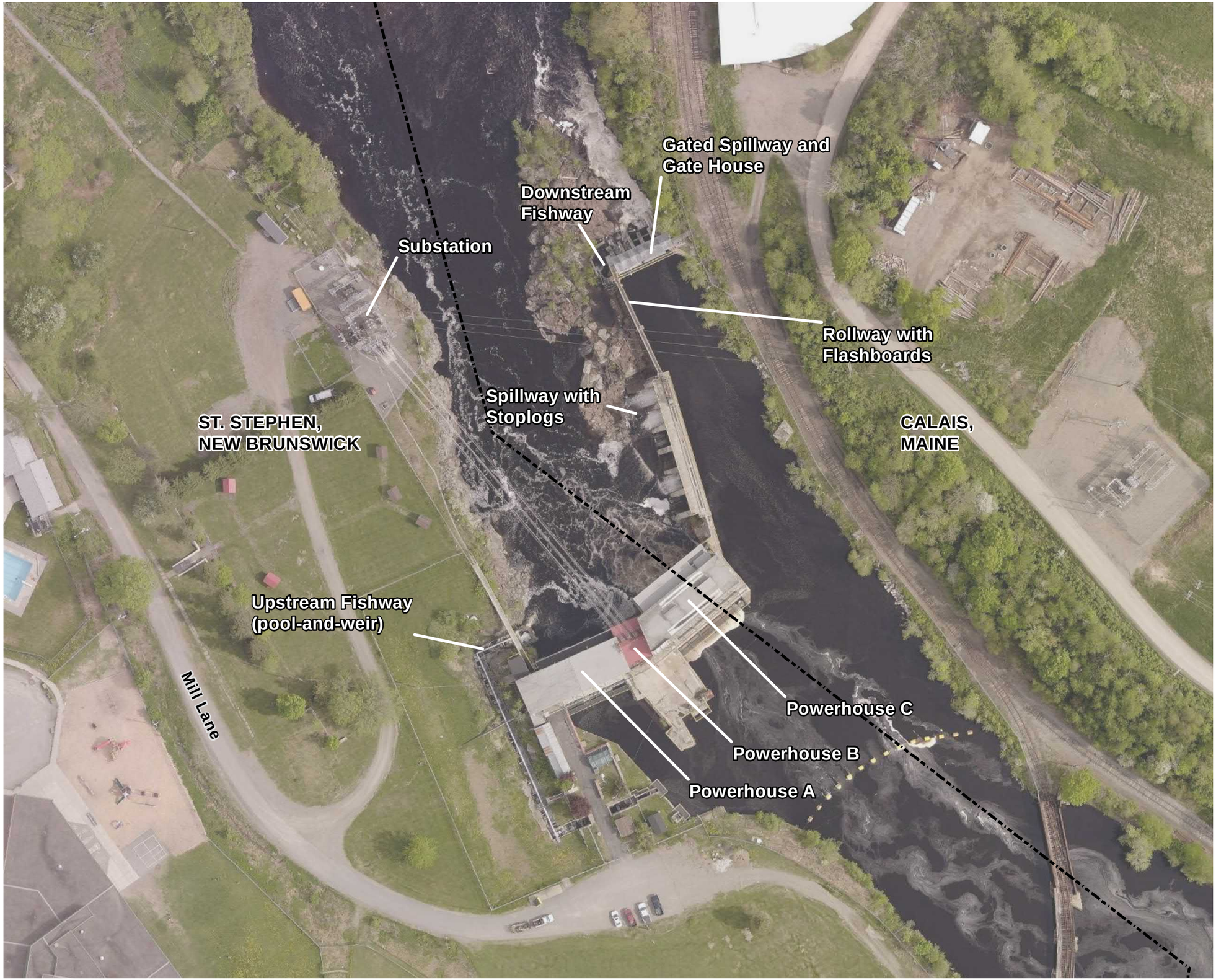
1.3 The Undertaking

A high-level description of the undertaking is presented in this section.

1.3.1 Project Overview (Nature of the Undertaking)

As envisioned by NB Power, decommissioning of the Milltown Station will involve the full dismantling and removal of all equipment, buildings, and structures associated with the existing Milltown Station in both Canada and the United States (except for the on-site electrical substation which will remain in place), including a full bank-to-bank decommissioning of all structures within the St. Croix River. All structures and mechanical and electrical components associated with the powerhouses, gate house, gated spillway, rollway, stop log spillway, dam, fishways, and other structures will be dismantled, demolished, and removed. Following the removal of these structures, limited restoration of the site and the river at the location of the Milltown Station will be conducted, with the ultimate goal to remove all human-made structures that obstruct fish passage so as to allow fish to naturally access the upstream reaches of the St. Croix River.

While the Milltown Station was reportedly built atop a natural waterfall (Salmon Falls), the removal of the Milltown Station, dam, and associated components will be carried out with the intention to allow the unimpeded ability for diadromous (migrating) fish that are able to ascend the falls to volitionally access a further 16 kilometres (km) of the St. Croix River and its tributaries (i.e., up to the next upstream natural or human-made obstruction) in order to carry out their lifecycle processes.



MILLTOWN GENERATING STATION DECOMMISSIONING PROJECT

ENVIRONMENTAL IMPACT ASSESSMENT REGISTRATION

MILLTOWN STATION FACILTIES

FIGURE 1.3.1

★ Project Location

Canada-USA Border

0 7.5 15 30 m

SCALE 1:1,000

N W E S

MAP DRAWING INFORMATION: CANVEC
SERVICE LAYER CREDITS: ESRI, HERE, GARMIN, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), SWISS TOPO, OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY
DATA PROVIDED BY: DILLON CONSULTING LIMITED, NB DEPARTMENT OF NATURAL RESOURCES

MAP CREATED BY: SCM
MAP CHECKED BY: JAB
MAP PROJECTION: NAD_1983_CSRS_New_Brunswick_Stereographic

DILLON CONSULTING

PROJECT: 19-1594

DATE: 2020-01-15

Following the completion of the required EIA review and obtaining all applicable permits, it is projected that the decommissioning work would begin in the summer of 2022 (assuming that the EIA review process is completed by then), and that decommissioning would be completed by the spring of 2023 such that multi-species volitional fish passage may occur during the 2023 fish migration period (generally May to November each year).

1.3.2 Purpose/Rationale/Need for the Project

The Milltown Station began operation in 1882, and while it has been operated and maintained over the years and decades, it has reached the end of its service life and is no longer practicable (or feasible) to repair. At its peak operation, the Milltown Station consisted of seven turbine-generator units, generating up to 4 MW of hydroelectric power. Today, only four of formerly seven generating units remain operational, generating approximately 3 MW of electricity, which represents less than 0.8% of NB Power's overall hydroelectric power generation capacity.

Over the years, NB Power has been carrying out various preventative maintenance and repair activities on the Milltown Station's units and equipment in order to keep them operational; however, even with the best maintenance and repair programs, as they age, without intervention the units and systems at the Milltown Station will ultimately fail at some point in time as they approach the end of their service life. For example, the former Units #4, 5, and 6 at the facility were operated by NB Power until they failed or until it became uneconomical to repair them, at which time they were taken out of service (note: the generator associated with Unit #4 has been physically removed from the Station, and while Units #5 and 6 physically remain in place, they are inoperable). Without significant and timely intervention and ongoing repair and maintenance, it is expected that the remaining operational units at the Milltown Station will ultimately suffer the same fate as those other defunct units at some time in the future, at which time they too would need to be taken out of service, removed, or replaced. In addition, the Department of Fisheries and Oceans Canada (DFO) has expressed noteworthy concerns in past years about the adequacy and fish passage efficiency of the existing fish passage facilities at the Station, and to meet the DFO's requirements in this regard would require considerable engineering and modification, at substantial cost.

In 2017-2018, NB Power considered a refurbishment/modernization project at the Milltown Station to replace some turbine-generator units and upgrade the fish passage facilities as a means to extend the Station's service life. With only four of the original seven units remaining in operation, and with DFO wishing to improve the operation of the existing upstream and downstream fishways at the Milltown Station, the refurbishment project would have been intended to address these operational issues while extending the service life of the Milltown Station by approximately 50 years. The refurbishment would have replaced three existing aging turbines (i.e., Units #5, 6, and 7) with modern DIVE turbines, and a new Hydroconnect fish passage system would have been installed to supplement the existing fishway at the facility.

As preliminary design was undertaken, however, it became apparent that the planned refurbishment was cost-prohibitive, given the relatively small amount of power the Milltown Station generates. The required investment to refurbish the Station in order to enable it to continue operations for another 50 years was simply not feasible to provide a suitable payback period for the investment, in addition to the need to ultimately decommission the facilities at the end of that extended service life. This is because with such a small generating capacity that is generally limited by the flows of the river system (which are generally controlled by other dams located further upstream in the St. Croix River system), it would have been difficult to realize the economies of scale that would render the cost of generation feasible from the perspective of station longevity and generation capacity. As such, NB Power continued evaluating various options to address the future of the Milltown Station, including: doing nothing, operating and maintaining units until they fail, proactive partial or full refurbishment of some or all units, and decommissioning of the Milltown Station.

Ultimately, following significant research and assessment work in consideration of other options aimed at continuing operations at the Milltown Station, NB Power has decided to decommission the Station due to significant continued upkeep related to the aging facility. Given its age and condition and the projected high costs of upgrading the facility to meet current guidelines/requirements for energy generation and fish passage, continued operation or refurbishment of the facility to extend its service life has been determined to be uneconomical; thus, NB Power has made the decision to decommission the Milltown Station and to restore Salmon Falls to as near natural conditions as possible so as to enable fish to naturally ascend the river at this location.

As discussed briefly in **Section 1.3.1** above, the removal of this human-made barrier to fish passage will allow the unimpeded ability for diadromous (migrating) fish that are able to ascend the falls to access a further 16 km of the St. Croix River and its tributaries (i.e., up to the next upstream natural or human-made obstruction; in this case, the dam at the Woodland pulp mill, located in Woodland, Maine, approximately 9 km west-southwest [straight line distance] of the Milltown Station) in order to carry out their lifecycle processes—a concept known as “volitional” fish passage. This will provide an estimated 5 million square metres (m^2) of fish habitat upstream of the Milltown Station (on the Canadian side of the international border) that will be opened up to allow fish to access. This area of fish habitat opened up by the removal which can (subject to regulatory approval) be used to “offset” for the loss of fish and fish habitat at other NB Power facilities elsewhere. (Note: a similar amount of habitat is expected on the U.S.A. side of the international boundary, but credit for the habitat made available there is not being sought to satisfy Canadian requirements). It is expected that the removal of this important barrier to fish passage will improve the productivity of fish populations in the St. Croix River system, including providing the opportunity for improved species richness and diversity upstream of the Milltown Station, with associated benefits to the fishery as well as the First Nations that depend on the fishery in this important part of their traditional territory.

1.3.2.1 Project Purpose

In consideration of the above, the purpose of the Project is to permanently decommission the Milltown Station, to remove the human-made structures associated with the Milltown Station, and to restore

Salmon Falls in order to provide multi-species volitional fish passage at Salmon Falls for fish species that wish to access the upstream reaches of the St. Croix River and its tributaries in order to carry out their lifecycle processes.

1.3.2.2 Alternatives to the Project

Alternatives to the Project will be discussed later in **Section 2.6.1**. However, in consideration of the Project purpose as stated in **Section 1.3.2.1** above, there are no alternatives to the Project that would meet the Project purpose.

1.4 Regulatory Context

The potential environmental regulatory frameworks that may apply to the Project at the federal, provincial, and local levels in Canada are discussed at a high level below.

Note that there are also a number of regulatory and permitting requirements that will be required at the federal, state, and local levels in the United States, as well as some permits potentially required from international agencies (e.g., the International Joint Commission), but these are beyond the scope of this EIA Registration.

1.4.1 Environmental Impact Assessment Legislation

The potential regulatory frameworks relating to potential provincial environmental impact assessment or a federal impact assessment requirements that might apply to the Milltown Project are discussed below.

1.4.1.1 New Brunswick *Environmental Impact Assessment Regulation – Clean Environment Act*

The New Brunswick *Environmental Impact Assessment Regulation – Clean Environment Act*, administered by the New Brunswick Department of Environment and Local Government (NBDELG), establishes the EIA process in New Brunswick. The EIA Regulation requires that all "undertakings" listed on Schedule A of the EIA Regulation (including their proposed construction, operation, modification, extension, abandonment, demolition, or rehabilitation) require registration. Schedule "A" of the Regulation defines 24 categories of undertakings that may trigger the need for an EIA Registration, and the following category listed in Schedule "A" applies to the Project:

- *"(b) all electric power generating facilities with a production rating of three megawatts or more"* (for the physical decommissioning, demolition, abandonment, and rehabilitation work associated with the decommissioning and removal of the Milltown Station).

The requirements for EIA review of a registration document are described in the document titled "A Guide to Environmental Impact Assessment in New Brunswick" (referred to herein as the "EIA Guide"; NBDELG 2018). Following submission of a complete EIA Registration document, the TRC will review the submitted information and may require additional information or response to questions arising from their review.

At the conclusion of the determination review, the TRC will make a recommendation to the New Brunswick Minister of Environment and Climate Change (the Minister) as to whether a proposed undertaking can proceed, with or without conditions, or whether it requires a more formal EIA (referred to as a "comprehensive review"). The Minister's decision is at his/her sole discretion in view of the environmental features of the area, the nature and extent of the anticipated environmental effects of the Project, proposed mitigation, and/or other factors.

In the unlikely event that the Minister determines, in his/her sole discretion, that a comprehensive review is required, a more formal process is initiated, as described in the EIA Guide (NBDELG 2018).

Given that the majority of registered projects under the New Brunswick EIA Regulation typically require only a determination review and not the more detailed comprehensive review, and given that the Project is intended as an ecological restoration project to return the St. Croix River to near natural conditions, a comprehensive review of the Project is unlikely to be required (although the Minister in his/her complete discretion could require one to be conducted). The comprehensive review process is therefore not discussed further in this document.

1.4.1.2 Government of Canada's *Impact Assessment Act*

The Government of Canada enacted the *Impact Assessment Act* (IAA) in August 2019 to supersede the former *Canadian Environmental Assessment Act, 2012* (CEAA 2012) that was previously in force to govern federal environmental assessments in Canada. The IAA, as administered by the Impact Assessment Agency of Canada (the Agency), defines the federal impact assessment (IA) process for projects that encompass "Designated Physical Activities" and projects carried out on federal land. Designated Physical Activities are those listed in the *Physical Activities Regulations* under the IAA, which includes 61 types of activities under 10 project categories. The construction, operation, decommissioning and abandonment of a hydroelectric generating station with a production capacity of 200 MW or more, or the expansion thereof by more than 50%, are listed on the *Physical Activities Regulations*, and any facility exceeding these thresholds would be a Designated Physical Activity under the IAA that would require a federal IA.

Based on the *Physical Activities Regulations*, the nature of the Milltown Station itself, and the Project activities as they are currently conceived, there are no features of the Project that are considered a Designated Physical Activity under the IAA. Furthermore, the threshold for the decommissioning of a hydroelectric generating facility under the *Physical Activities Regulations* is substantial in comparison to the Project, as it includes generating stations with a production capacity of 200 MW or more. Additionally, although within an international boundary, the Project is not located on federal land, and is not receiving federal funding for its completion; therefore, it will not be triggered into the IAA process from these mechanisms. Therefore, an impact assessment under the IAA is not required for the Project.

Nevertheless, importantly, even if there are no "triggers" for a federal IA to be required (i.e., a project is not on the *Physical Activities Regulations*, is not located on federal land, and is not receiving federal funding), the Minister of Environment and Climate Change Canada (ECCC) may, by order under Section 9(1) of the IAA, designate any project or activity that is not under the *Physical Activities*

Regulations if, in his or her opinion, it may cause adverse effects within federal jurisdiction or adverse direct or incidental effects, or if public concerns related to those effects warrant the designation. Therefore, even though there are no formal requirements for a federal IA under the IAA for the Project, the Minister of ECCC could, in his or her sole discretion, require one to be conducted.

1.4.2 Other Potential Canadian, New Brunswick, and Local Legislation

In addition, there may be a number of permits, approvals, licenses, or other forms of authorization at the federal, provincial, and local levels in Canada that may be required in order to carry out the Project. The potential Canadian (provincial, federal, and local) environmental permitting requirements that may apply to the Project are summarized in **Table 1.4.1**.

Table 1.4.1: Potential Canadian (Provincial, Federal, and Local) Environmental Permitting Requirements

Legislation	Nature of Permit/Approval/ License/Authorization	Required for the Project?	Applicability/Relevance to the Project
Provincial			
Clean Environment Act	EIA Registration.	Yes.	EIA registration (likely limited to the determination review level) is required, since the Project involves the decommissioning of a generating station with a production capacity of 3 MW or more. While at the Minister's sole discretion, a comprehensive review is unlikely to be required.
Clean Environment Act	Petroleum Storage License.	No.	With decommissioning, there will not be any petroleum storage of more than 2,000 L of liquid petroleum products. As such, licences and requirements leading to the tank removals and site closure are not required.
Clean Environment Act	*Water Quality Regulation*: • Water Quality Approval to Construct; • Water Quality Approval to Operate).	No.	NBDELG confirmed on November 22, 2019 that an Approval under the *Water Quality Regulation* is not required.
Clean Water Act	Watercourse and Wetland Alteration (WAWA) Permit Application.	Yes.	WAWA permit for work within 30 m of a watercourse or wetland before commencement of the Project.
Clean Air Act	*Air Quality Regulation*: • Air Quality Approval to Construct; and • Air Quality Approval to Operate.	No.	NBDELG confirmed on November 22, 2019 that an Approval under the *Air Quality Regulation* is not required.
Clean Air Act	*Ozone Depleting Substances and* Other *Halocarbons Regulation.*	Yes.	The removal of refrigeration, air conditioning, and certain fire suppression systems that contain ozone depleting substances is subject to the *Ozone Depleting Substances and Other Halocarbons Regulation*.

Legislation	Nature of Permit/Approval/ License/Authorization	Required for the Project?	Applicability/Relevance to the Project
Crown Lands and Forests Act	Land use, ownership, commercial and industrials activities permit application(s).	No.	Since the submerged water lot underneath the St. Croix River is owned by NB Power, a License of Occupation (LOO) under the *Crown Lands and Forests Act* is not required.
Heritage Conservation Act	Archaeological Field Research Permit for carrying out archaeological investigations.	Yes.	A Professional Archaeologist must obtain an Archaeological Field Research Permit prior to carrying out archaeological investigations.
	Site Alteration Permit for any alteration of registered archaeological sites.	Possibly.	A Site Alteration Permit is required for any alterations within 100 m of registered archaeological sites.
Quarriable Substances Act	Permits for the extraction/processing of minerals in the Province.	No.	Should the Project involve excavation on-site or at unapproved borrow sources, a permit may be required before the commencement of that activity.
Federal			
Impact Assessment Act (IAA)	Impact Assessment.	No. Impact Assessment is not required since the Project is below the thresholds for a designated physical activity and is not located on federal land.	Although there are no triggers for a federal impact assessment for the Project, the Minister of Environment and Climate Change Canada may, in his/her discretion, designate any project under Section 9(1) of the Act to require an impact assessment.
Fisheries Act	*Fisheries Act* Authorization and Offsetting Plan.	Possibly. To be determined in consultation with Fisheries and Oceans Canada (DFO).	For temporary or permanent in-water works only that are determined by DFO result in harmful alteration, disruption or destruction of fish and fish habitat (DFO 2019a).
Canadian Navigable Waters Act	Permit Application.	Possibly. To be confirmed in consultation with Transport Canada.	For in-water works only that result in the disruption of navigation and related activities.
Species at Risk Act (SARA)	Authorization/additional protection measures outlined by Environment and Climate Change Canada (ECCC)/Canadian Wildlife Service (CWS).	Not likely.	For Project works that would cause the unavoidable destruction or harm to species at risk and/or their critical habitat.

Legislation	Nature of Permit/Approval/ License/Authorization	Required for the Project?	Applicability/Relevance to the Project
Migratory Birds Convention Act (MBCA)	Authorization/additional protection measures outlined by ECCC/CWS.	Not likely.	For Project works that would cause the unavoidable destruction or harm to migratory birds and/or their nests, or for work conducted between April 8 and August 28 that may disturb or harass migratory birds.
Local			
Town of St. Stephen	Building permits, demolition approval, heritage approval, possible other permits.	No.	As a provincial Crown corporation, NB Power is not subject to local requirements.

In addition to the above, there will be a number of permits, licenses, approvals, and other forms of authorization required at the federal, state, and local levels on the U.S.A. side of the international boundary, as well as potentially approvals and permits required from certain international bodies (e.g., International Joint Commission, International Boundary Commission). Those permits, licenses, approvals, and authorizations are outside the scope of this EIA Registration, and as such, they are not discussed further in this document.

1.5 Purpose and Organization of this Document

The purpose of this EIA Registration document is to provide information to the NBDELG and its TRC as part of its review of the environmental effects of the Project in accordance with the EIA Regulation. The EIA Registration document provides a description of the Project, describes existing environmental conditions, identifies mitigation to be employed to minimize the environmental effects of the Project, and characterizes residual environmental effects of the Project during and following decommissioning and removal of the Milltown Station after mitigation and best management practices have been applied.

This EIA Registration document is organized in 13 chapters, as follows:

- Chapter 1 provides an introduction to the Project, including proponent information, a Project overview, the purpose/rationale/need for the Project, and an overview of the applicable regulatory framework;
- Chapter 2 provides a high-level description of the Project as currently conceived, and describes how the Project will be decommissioned and how the site will be restored including the activities to be conducted. Alternatives to the Project and alternative means of carrying out the Project that are technically and economically feasible are discussed. Emissions and wastes from the Project are also described;
- Chapter 3 provides a summary of the environmental setting of the Project;
- Chapter 4 provides information on the methods that were used to evaluate the potential environmental effects of the Project, and the scope of the EIA;

- Chapter 5 provides the assessment of potential interactions between the Project and the environment, on various valued components (VCs) of the environment that are of relevance and importance to this EIA, for all Project phases;
- Chapter 6 provides an assessment of potential effects of the environment on the Project;
- Chapter 7 provides an assessment of accidents, malfunctions, and unplanned events;
- Chapter 8 describes planned Indigenous consultation activities in respect of the Project;
- Chapter 9 provides a description of planned public and stakeholder engagement activities in respect of the Project;
- Chapter 10 provides other information relevant to the EIA registration to meet the requirements of the NBDELG's EIA Guide (NBDELG 2018);
- Chapter 11 provides a summary of the EIA Registration, and resulting conclusions;
- Chapter 12 provides closing remarks; and
- Chapter 13 provides the references and personal communications cited in this EIA Registration document.

Additional supporting information is provided in the appendices to this EIA Registration document, including the results of field studies completed in support of the EIA.

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2.0 Project Description

This section provides a high-level description of the activities that will be required to complete the Project, as currently conceived and based on the available information at the time of writing. Engineering design for the Project is underway, and is likely to evolve as Project planning and engineering design is completed. So as to not understate the potential environmental consequences of the Project at this planning stage, the Project Description provided in this Section presents an "outer envelope", or conservative estimate, of the scope, footprint, and anticipated environmental effects of the Project. The Project will ultimately be decommissioned such that the resulting environmental effects remain within the outer envelope as presented in this EIA Registration.

The key aspects of the Project are described below, including:

- A brief description of the existing Milltown Station components that are planned to be decommissioned as part of the Project;
- The activities that will be carried out during decommissioning, demolition, and removal of the Project, and subsequent restoration of Salmon Falls;
- The planned Project schedule;
- Alternatives to the Project, and alternative means of carrying out the Project; and
- Project-related emissions and wastes.

2.1 Project Location

The Project will be carried out in the neighbourhood of Milltown, in the Town of St. Stephen, Charlotte County, New Brunswick. The parcel identifiers (PID) of the properties owned by NB Power and associated with the Milltown Station, as referenced by Service New Brunswick, are PID Nos. 01311208, 15043961, 15086127, 01310713, 01309988, and 15086119, as shown in **Figure 2.1.1**. The geographic coordinates for the Milltown Station (at the centroid of Powerhouse B) are approximately N 45.175345° and W 67.29303°. On the Canadian side of the Canada/U.S.A. international boundary, the land at the Milltown Station site has an area of approximately 5.86 hectares (ha). In addition, NB Power owns a submerged water lot of the Canadian portion of the St. Croix River bed, with an approximate area of 2.0 ha.

The subject and neighbouring properties on the Canadian side of the international boundary are shown on **Figure 2.1.1**. Other properties on the U.S.A. side of the international boundary are not relevant to this EIA Registration.

Énergie NB Power

MILLTOWN GENERATING STATION DECOMMISSIONING PROJECT

ENVIRONMENTAL IMPACT ASSESSMENT REGISTRATION

MILLTOWN GENERATING STATION PROPERTIES

FIGURE 2.1.1

- New Brunswick Power Owned Property
- Flowage Privileges
- Canada-USA Border
- Project Location

0 10 20 40 m

SCALE 1:2,000

N W E S

MAP DRAWING INFORMATION: CANVEC
SERVICE LAYER CREDITS: ESRI, HERE, GARMIN, INTERMAP, INCREMENT P CORP, GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), SWISS TOPO, OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY
DATA PROVIDED BY: DILLON CONSULTING LIMITED, NB DEPARTMENT OF NATURAL RESOURCES, INTERNATIONAL BOUNDARY COMMISSION

MAP CREATED BY: SCM
MAP CHECKED BY: JAB
MAP PROJECTION: NAD 1983 CSRS New Brunswick Stereographic

DILLON CONSULTING

PROJECT: 19-1594

DATE: 2020-01-27

2.1.1 Project Development Area

The Project Development Area (PDA) is defined as the area of physical disturbance (or physical footprint) associated with the Project. Although the total land area of the properties associated with the Milltown Station on the Canadian side of the Canada/U.S.A. international boundary is approximately 5.86 ha, the entirety of that area will not be disturbed by the Project, with only a portion of these properties that will be physically used or disturbed to carry out the Project. Therefore, specifically, on the Canadian side of the international boundary, the PDA on land consists of an area of approximately 1.4 ha (i.e., a portion of the Milltown site within the larger 5.86 ha properties associated with the Milltown Station) that will be directly affected by Project activities, and includes all Milltown Station-related facilities that will be decommissioned and removed as well as areas to be used as laydown/temporary storage for the decommissioning activities. In addition, the portion of the PDA located within the St. Croix River itself (Canadian side of the international boundary only) that will be directly affected by Project activities is approximately 0.54 ha. The portion of the PDA that is subject to this EIA Registration on the Canadian side of the international boundary is shown in **Figure 2.1.2**.

The area that will be affected by the Project on the U.S.A. side of the international boundary is not relevant to this EIA Registration. Physical infrastructure on the U.S.A. side of the international boundary will be managed separately through the applicable U.S.A./State permitting processes. The area of physical disturbance associated with the Project on the U.S.A. side of the international boundary is shown for illustrative purposes in **Figure 2.1.3**.

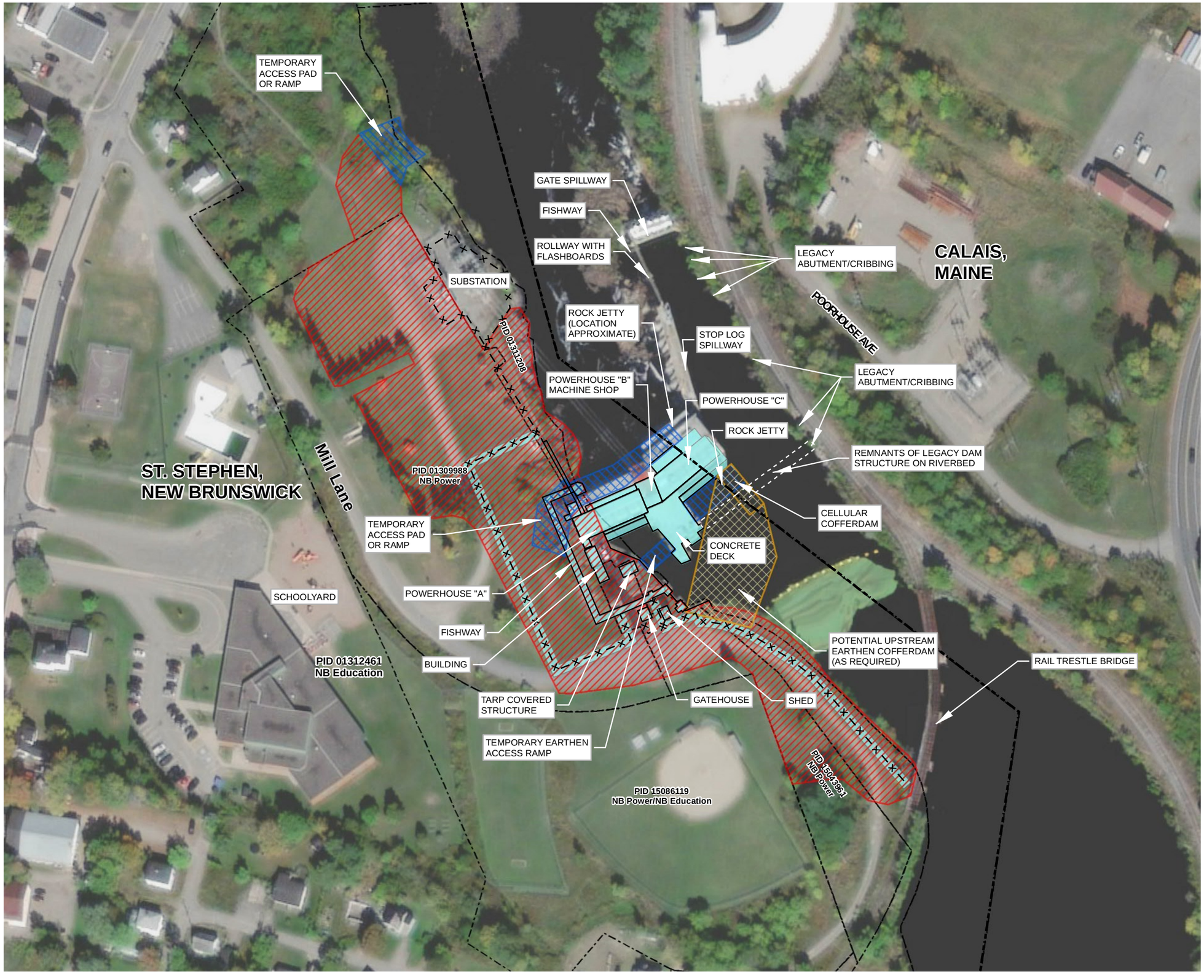
2.1.2 Property Ownership and Site Descriptions

The Milltown Station is located adjacent to the former site of the historic St. Croix Cotton Mill, which operated from at least the early 1880s until 1957, in its early days producing mechanical power for the adjacent cotton mill. NB Power purchased the Milltown Station in 1958 and later added additional turbines for hydroelectricity generation for input to the Province's electrical grid.

The subject properties on the Canadian side of the international boundary, as shown in **Figure 2.1.1**, are owned by the New Brunswick Power Corporation. Parcel identifier (PID) Nos. 01311208 and 15043961 are directly associated with the Milltown Station and remain in active use by NB Power. NB Power also retains ownership of PID Nos. 15086127 and 01310713, but they are not in active use currently.

In addition, PID No. 01309988, owned by NB Power, is the former Cotton Mill site and is currently leased as parkland to the Town of St. Stephen. Finally, PID No. 15086119, owned by NB Power, is leased to the Government of New Brunswick for recreational purposes (i.e., a baseball field).

Within the St. Croix River itself, NB Power owns the submerged water lot within the St. Croix River on the Canadian side of the international boundary.



Énergie NB Power

F

- Fence
- Canada-USA Border
- Laydown/Access
- Earthen Structures
- Infrastructure to be Decomissioned/Removed
- Potential Cofferdam
- Property Parcels

* Project components on the US side of the International Boundary are not included in the scope of this EIA, but will be subject to applicable US permitting.

0 12.5 25 50 Metres

SCALE 1:1,500

N W E S

MAP DRAWING INFORMATION: ESRI, DIGITALGLOBE, GEOEYE, EATHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS,AEROGRID, IGN, AND THE GIS USER COMMUNITY
DATA PROVIDED BY: NEW BRUNSWICK POWER, DILLON CONSULTING, NB DEPARTMENT OF NATURAL RESOURCES, INTERNATIONAL BOUNDARY COMMISSION

MAP CREATED BY: SCM
MAP CHECKED BY: JAB
MAP PROJECTION: NAD 1983 CSRS NEW BRUNSWICK STEREOGRAPHIC

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PROJECT: 19-1594

DATE: 2020-11-26

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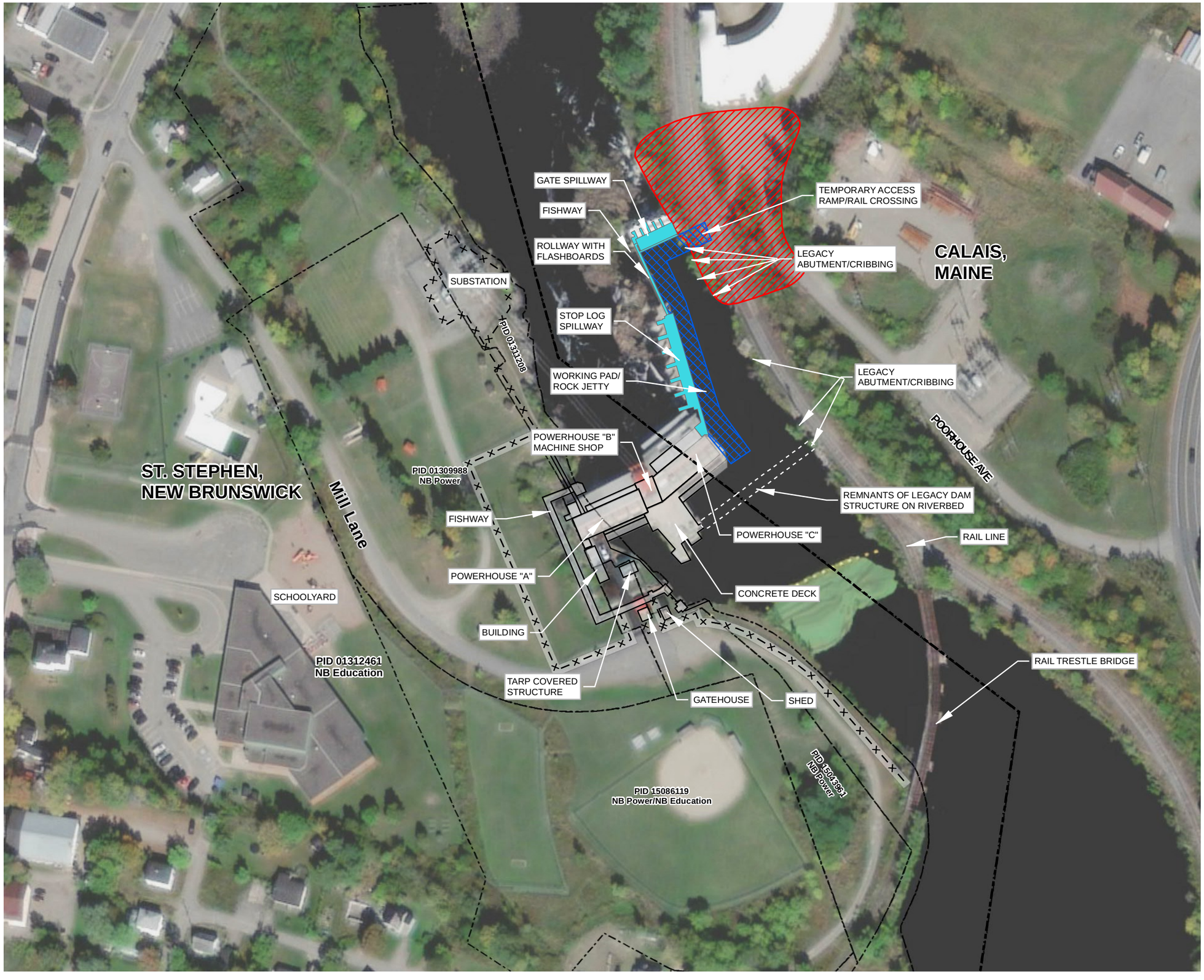

Énergie NB Power

- Fence
- Canada-USA Border
- Laydown/Access Area
- Earthen Structures
- Infrastructure to be Decomissioned/Removed
- Property Parcels

* Project components on the US side of the International Boundary are not included in the scope of this EIA, but will be subject to applicable US permitting.

0 12.5 25 50 Metres

SCALE 1:1,500

N W E S

MAP DRAWING INFORMATION: ESRI, DIGITALGLOBE, GEOEYE, EATHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS,AEROGRID, IGN, AND THE GIS USER COMMUNITY
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PROJECT: 19-1594
DATE: 2020-11-26

2.2 Overview of the Existing Facilities at the Milltown Station

A brief overview of the existing facilities currently in place at the Milltown Station is provided below.

2.2.1 Powerhouses and Related Equipment

As was shown in **Figure 1.3.1**, there are three adjoining powerhouses at the Milltown Station, as follows:

- Powerhouse A, located on and nearest to the Canadian shore of the St. Croix River, is the oldest powerhouse at the Station (constructed in 1881) and houses three turbine-generator assemblies (known as Units #5, 6, and 7, of which only Unit #7 remains in operation);
- Powerhouse B, nestled between Powerhouse A and Powerhouse C, formerly housed one turbine-generator assembly (previously known as Unit #4). The turbine associated with the former Unit #4 remains in place but is not operational since the associated generator was decommissioned and removed approximately five years ago; and
- Powerhouse C, located in the middle of the St. Croix River nearest to the U.S.A. shore of the River, is the newest powerhouse at the Milltown Station and houses three turbine generator-assemblies (known as Units #1, 2, and 3), all of which remain operational today.

The powerhouses also contain other mechanical and electrical systems and instrumentation associated with the operation of a hydroelectric generating station, including a control room, motor control centres, various instrumentation, and related systems. Office space, a lunch room, washrooms, and related amenities are also provided.

2.2.2 Dam and Related Structures

As was shown in **Figure 1.3.1**, the dam is the main water retaining structure within the St. Croix River at the Milltown Station location. Along with its main components, the dam retains water in a relatively small impoundment that is later used to generate electricity in the turbine-generator units. The dam consists of several components, which include:

- A gated spillway with gate house, located within the river channel on the U.S.A. side of the international boundary, provides the Station's main ability to spill excess water during periods of high flow or reduced electricity generation. The spillway is constructed of concrete that was poured atop the existing bedrock that appears to have once formed Salmon Falls itself. The gates are mechanically controlled remotely from the Station's main control room, and can also be opened manually within the gate house in the event that communication with the control room cannot be established;
- A rollway with flashboards, installed between the gated spillway and the stop log spillway, to increase retention capacity in the impoundment and maintain suitable water elevations during operations;
- A spillway equipped with stop logs, located between the rollway and the powerhouses, which enables the manual opening of additional gates in the event that the gated spillway is unable to

spill the required water during high flow periods or during periods of maintenance and/or impoundment drawdown. The spillway is constructed of concrete poured over bedrock, while the stop logs are made of creosote-treated wood. The stop logs must be manually removed using a crane or boom truck when additional spilling capacity is required; and

- An impoundment (sometimes referred to as a headpond), created by the retention of water by the dam and its related components, that provides the hydraulic head for generating hydroelectricity through the turbine-generator units. Generally, flows at Milltown are largely controlled by other water-retaining structures located further upstream in the St. Croix River, whose purposes are either to maintain higher water elevations in some of the upstream lakes (e.g., dams at Grand Lake and Vanceboro) or to provide an industrial water supply (e.g., the dam at the Woodland pulp mill). Thus, the size of the impoundment at the Milltown Station is relatively small in comparison to other hydroelectric generating stations elsewhere, and as such the Station can be considered largely a run-of-the-river generating station. The impoundment extends approximately 450-500 m upstream of the Milltown Station (i.e., the head of the impoundment is at the nearest upstream rapids located near some small islands in the river, known locally as Milltown Rapids), and has a surface area of approximately 6 ha. The impoundment is normally drawn down every year or two in order to be able to carry out preventative maintenance activities at the Milltown Station.

2.2.3 Fish Passage Facilities

The original construction of Powerhouse A in the early 1880s included the operation of a fishway underneath the powerhouse to enable upstream fish passage. That fishway was replaced in the 1980s by more contemporary upstream and downstream fish passage facilities that were shown in **Figure 1.3.1**, and which consist of the following:

- An upstream pool-and-weir fishway (sometimes referred to as a fish ladder), located on land adjacent to Powerhouse A, that provides upstream fish passage to migrating fish species during key migration periods. Attraction flows to the fishway are provided by a 457 mm (16 inch) diameter high-density polyethylene pipe that runs adjacent to the fishway, drawing a small amount of water (approximately 0.57 m^3/s or 20 cfs) from the impoundment and discharging at the bottom of the fishway. The fishway is operated from April 15 to November 15 each year to meet DFO requirements (Babcock, J., pers. comm., 2020. The St. Croix International Waterway Commission (SCIWC) carries out annual fish counts by priority species, between early May and mid-July each year to monitor the fish passage effectiveness of the fishway with a focus on the upstream gaspereau migration; and
- A downstream fishway, located at the gated spillway, which provides downstream fish passage for migrating fish, from April 15 to November 15 each year.

2.2.4 Electrical Substation

An electrical substation (terminal) is located on-site which connects the Milltown Station to the remainder of the New Brunswick electrical grid. The location of the substation was shown in **Figure 1.3.1** and is located near Powerhouse A. It also provides an electrical connection across the Canada/U.S.A. border to the City of Calais, and in order to maintain that cross-border connection to the New Brunswick electrical grid, the substation will remain in place and in service following the decommissioning of the Milltown Station.

2.2.5 Other Related Facilities and Infrastructure

Other related facilities and infrastructure normally associated with a hydroelectric generating station are present on the Milltown site, including security guard house, security gate, perimeter fencing, navigational safety buoys in the impoundment, retaining walls, parking and related facilities, and other facilities typical of industrial facilities.

2.3 Description of Project Phases and Activities

As noted previously, engineering design of the Project is underway, with the ultimate goal of the Project being to remove all human-made structures that obstruct fish passage so as to allow for multi-species volitional fish passage for fish that wish to naturally access the upstream reaches of the St. Croix River. The Project Description provided in this Section presents a high-level "outer envelope" or conservative estimate of the scope, footprint, and anticipated environmental effects of the Project. The Project will ultimately be decommissioned such that the resulting environmental effects remain within the outer envelope as presented in this EIA Registration. It is noted that the activities described below represent a simplified version of the complex engineering requirements and removal sequences being developed. The sequence of required activities may vary from that described below as engineering refinements are made and as the EIA review and related permitting processes are conducted.

2.3.1 Decommissioning, Demolition, and Removal of the Milltown Station

The Project will first see the decommissioning of the Milltown Station facilities, followed by their demolition and removal. The main activities associated with the decommissioning, demolition, and removal of the Milltown Station are described below. It is noted that these activities are presented in no particular order, and that the decommissioning activities or sequence may vary from that which is presented below for illustrative purposes. It is also noted that many activities can, and will likely, be carried out in parallel to each other. Regardless of activity or sequence, the decommissioning and demolition activities will be conducted in a manner that allows unimpeded flow of the river.

2.3.1.1 Site Preparation and Laydown Area Preparation

Preparation of the site for the subsequent decommissioning, demolition, and removal activities will first be carried out. This will first involve cordoning off sensitive areas that are not to be disturbed ("no-go zones") due to sensitive environmental, archaeological, or other features.

Then, areas that will be used as laydown areas, for temporary storage of equipment and materials, or for other purposes will be prepared. Areas proposed as laydown areas on the Canadian side were shown in **Figure 2.1.2**. Grassed areas that are to be used for this purpose will be covered with non-native gravel fill brought in from existing approved nearby borrow sources to develop laydown/storage pads in order to prevent undue disturbance of underlying soils. Active work areas will be fenced in, for safety and security purposes.

Though not relevant to this EIA Registration, potential laydown areas on the U.S.A. side of the international boundary were shown in **Figure 2.1.3**.

2.3.1.2 Removal of Hazardous Materials

Given that the Milltown Station is nearing 140 years old, it is likely that the buildings and/or equipment will contain some hazardous materials that will require some careful management and disposal. Examples of hazardous materials that may be encountered include lead-based or PCB-based paint, asbestos, mercury-containing equipment (e.g., light ballasts, switches), ozone depleting substances (e.g., coolants used in refrigeration or air conditioning equipment), and/or other liquid chemicals and supplies used during routine operation and maintenance of the Station that may be considered hazardous.

A hazardous materials survey will be conducted prior to conducting any decommissioning or demolition activities, and a hazardous materials inventory will be developed (including areas where heavy mould could require short-term mitigation/remediation, if present), and suitable recycling or disposal locations for each type of hazardous material will be identified. Then, once decommissioning activities begin to take place, these hazardous materials will be removed in accordance with safe industry practices and regulatory requirements by qualified personnel that are experienced and licensed (if applicable) to do so. They will then be transported safely off-site to their intended receiving location, and recycled or disposed of at approved facilities in accordance with local requirements and environmental regulations.

Though not related to hazardous materials, a wildlife “sweep” of the interior of the buildings will also be conducted at the same time as the hazardous material survey to identify birds, bats, or their nests that may have taken residence inside the buildings. Prior to initiating demolition activities, removal of any wildlife and their nests will be conducted by qualified personnel in accordance with the directions of the Canadian Wildlife Service (CWS) of ECCC. Removal of birds and their nests will be conducted outside the annual April 8-August 28 nesting window for migratory birds, where possible, to prevent a contravention of the MBCA.

2.3.1.3 Equipment Decommissioning, Dismantling, and Removal

All equipment, units, instrumentation, and mechanical and electrical components contained within the Milltown Station will be permanently shut down, decommissioned, dismantled, and removed from the Station. These components will be transported off-site using flatbed tractor-trailers or similar equipment. The removed equipment will be generally destined for salvage (i.e., recycled or sold) at approved salvage operations, or may be kept in inventory by NB Power for reuse at other facilities.

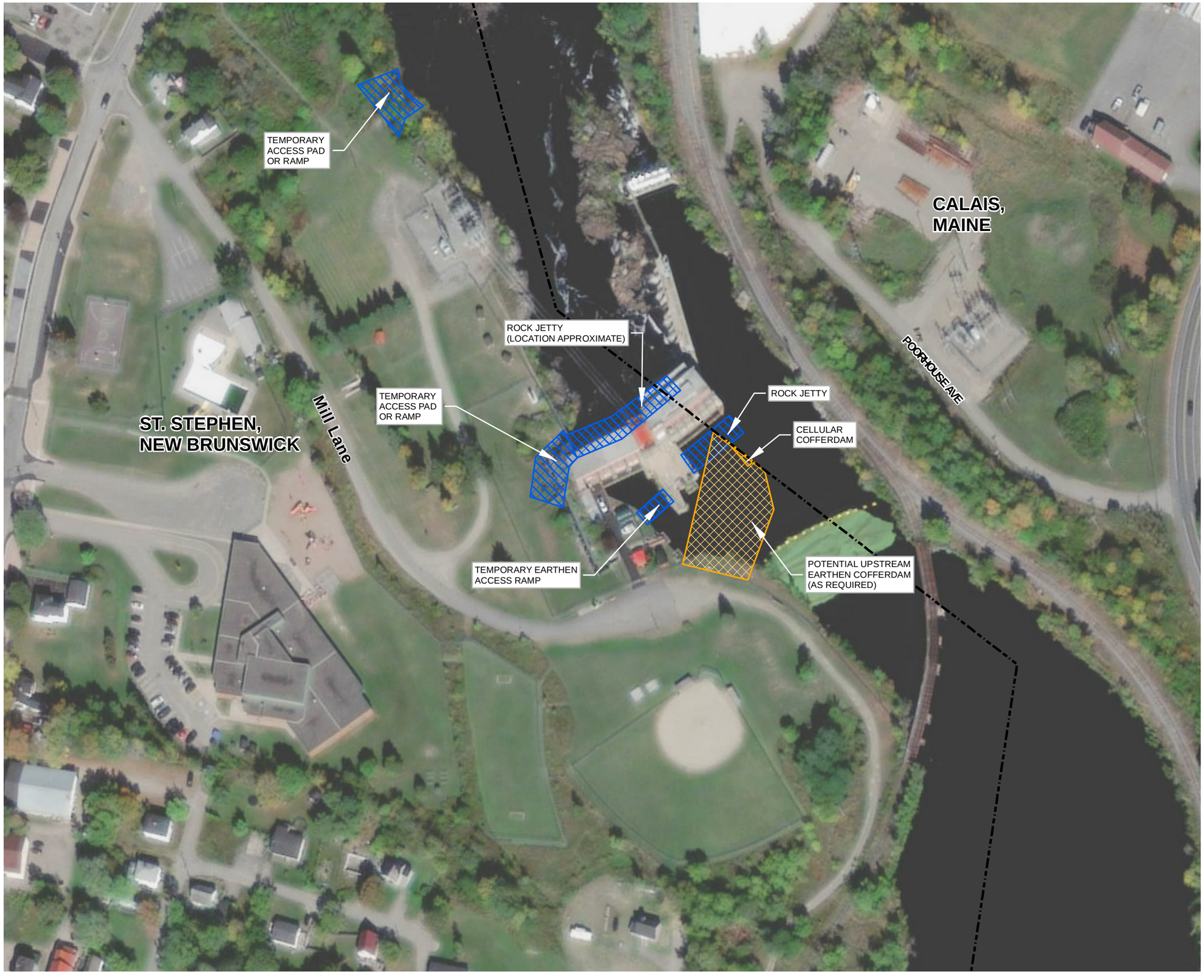
2.3.1.4 Construction of Cofferdams/Temporary Roads

Although engineering design is still progressing, several cofferdams or temporary roads (also referred to as rock jetties) will need to be constructed within portions of the river bed in order to access the various structures in the river that will be demolished. The design at this stage involves the installation of a cofferdam system upstream of the powerhouses from the Canadian shoreline. (Note: cofferdams and/or temporary roads are also required to access structures from the U.S.A. side of the international boundary, but those are not relevant to this EIA Registration and will be addressed by U.S.A. agencies in the course of state and federal permitting on the U.S.A. side of the international boundary). The cofferdam design assumes that a combination earthen (earth filled) and braced cofferdam will be constructed upstream of the powerhouses to allow for demolition and river restoration activities to be completed "in the dry" or under non-flowing conditions. Aggregate wearing courses using coarse rock and local fill material from approved borrow sources will be placed on the top of the cofferdam to allow for equipment traffic such as excavator(s)/rock breaker(s) that will be used to demolish these structures, and to remove the demolition materials, and a rip-rap cover will be installed on the water side to act as protection from erosion and adverse weather conditions during the work. The braced portion of the cofferdam will be constructed at the northeast corner of the earthen cofferdam to create a cut off wall with the corner of Powerhouse C, and it will be constructed of steel sheet piles, structural supports, and granular backfill and concrete filler for sealing the floor. As part of the works on the Canadian side of the international border, the river flow will be directed through the gated spillway, with use of the rollway and stop log spillway during high-flow conditions. In addition, a temporary earthen ramp will be constructed immediately downstream of the powerhouses to allow for equipment to access the tailrace area to complete the river restoration activities. Upon completion of the Canadian works, the upstream cofferdam and access ramps will be removed. However, the braced cofferdam will be left in place to provide an anchor point for the U.S.A. earthen cofferdam. Upon completion of the U.S.A. works, the braced cofferdam will be removed from the U.S.A. shoreline.

The conceptual locations of the temporary roads and/or cofferdams on the Canadian side of the international boundary are shown in **Figure 2.3.1**. Not all temporary roads or cofferdams shown in this figure will be constructed or used at the same time; once the structure that is intended to be accessed by the temporary road or cofferdam has been demolished and all associated material has been removed, the associated temporary road or cofferdam would be removed and the river bed and shoreline restored, prior to moving to another area to accomplish demolition of other structures.

Erosion and sedimentation control measures such as hay bales, check dams, and other similar devices will also be used as necessary during construction and removal of the temporary roads or cofferdams.

Once the temporary roads/cofferdams are built, a fish rescue operation would be carried out within the impounded areas within/behind the cofferdams so as to prevent undue harm or mortality to fish that might be trapped in the area.



Énergie NB Power

B B

- Canada-USA Border
- Potential Cofferdams
- Earthen Structures

0 12.5 25 50 Metres

SCALE 1:1,500

N W E S

MAP DRAWING INFORMATION: ESRI, DIGITALGLOBE, GEOEYE, EATHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS,AEROGRID, IGN, AND THE GIS USER COMMUNITY
DATA PROVIDED BY: NEW BRUNSWICK POWER, DILLON CONSULTING, NB DEPARTMENT OF NATURAL RESOURCES, INTERNATIONAL BOUNDARY COMMISSION

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MAP PROJECTION: NAD 1983 CSRS NEW BRUNSWICK STEREOGRAPHIC

DILLON CONSULTING

PROJECT: 19-1594

DATE: 2020-11-26

2.3.1.5 Powerhouse Demolition

Prior to powerhouse superstructure and substructure demolition, all equipment and parts located in the powerhouse buildings will be removed. Once the equipment within the buildings has been removed and the cofferdams/temporary roads are in place, the demolition of the powerhouses will be carried out. Most of the equipment and materials within the powerhouses will have been removed and hauled away for salvage, storage, or reuse by the time powerhouse demolition is initiated. It is expected that partial building demolition will likely be required to allow for removal of turbine-generator equipment located inside the powerhouse basements and pits.

Demolition will commence once the structures have been abated, regulated materials and wastes have been removed, and decommissioning cleaning has been completed. Demolition will require the use of heavy equipment equipped with specialized demolition attachments, such as grapples, pulverizers, hydraulic hammers, and shears. Experienced equipment operators will remove the structures by progressive demolition of the structural components. Heavy equipment would then be utilized to remove debris. The removal of concrete footings, foundations, and pedestals in the river will occur to bedrock, to match the new riverbed elevation or to such elevations that do not impede river flow or volitional fish passage. During the period of Canadian works, a combination of an earthen and braced cofferdam system will be in place on the upstream side of the powerhouse structure to allow for powerhouse substructure removal to occur “in the dry” (or non-flowing conditions). The demolition of the powerhouses will occur through access from the Canadian shoreline, with demolition of the powerhouse substructures nearest to the U.S.A. side of the international boundary occurring first, and progressively moving back towards the Canadian side as structures are demolished and as demolition debris is removed, to be confirmed through design refinements.

Efforts will be made to ensure that as little demolition material falls into the river itself, and any materials that fall into the river will be subsequently removed. Erosion and sediment control structures such as hay bales and check dams will be used as necessary during the demolition activities to prevent the undue release of suspended sediments that could result from the demolition activities.

As part of mechanical demolition, demolition debris, concrete, cinderblock, brick, and ferrous and non-ferrous metals will be removed and segregated. The ferrous and non-ferrous metals (including structural and plate steel and copper) will be sized to either mill sizing or other shipment size depending on the salvage contract to achieve maximum asset value. Clean cinderblock, brick, and concrete will be processed to remove rebar, and will either be used as on-site fill (e.g., for eventually filling any depressions left in the land surface by the removal of structures) or hauled away using dump trucks for salvage (e.g., any equipment and metal) or disposal at approved construction and demolition debris (C&D) disposal sites or local sanitary landfill. Materials that are suspected of being contaminated (e.g., materials painted with lead-based paint) will be tested to determine their contaminant concentrations, and will either be disposed of at the local sanitary landfill (if the contaminant concentrations are below guidelines and thus suitable for such disposal), or alternatively directed to an approved hazardous waste disposal facility (if contaminant concentrations exceed disposal guidelines).

2.3.1.6 Impoundment Dewatering, and Dam and Spillway Demolition

In parallel to powerhouse decommissioning, abatement and interior equipment strip-out, and following the spring gaspereau migration period in mid-July 2022, the impoundment will be dewatered by opening the gates within the gated spillway. During the Station removal and river improvement construction period, it will be necessary to utilize different combinations of the existing spillways and flow conveyances to manipulate flow around the work area while maintaining headpond levels at or below current operating levels Any species at risk that may inhabit the impoundment (e.g., mussel species at risk such as brook floater or yellow lampmussel) will be safely relocated by trained biologists prior to dewatering. Given that there is little sediment accumulated behind the dam, it is not expected that the dewatering process will cause a water quality concern downstream. The dewatering process will be carried out under low flow conditions so as to provide for fish passage by key migrating species until mid-July 2022. With all gates permanently opened, the dewatered impoundment will essentially mimic a natural river system with flows and elevations likely similar to those that would be expected following the completion of decommissioning of the Station and restoration of Salmon Falls.

During the period of Canadian works, a cofferdam will be in place on the upstream side of the powerhouse structure to allow for powerhouse substructure removal and installation of river improvements in the tailrace area to occur in the dry (or non-flowing conditions). The intent during this portion of the Canadian works is for all of the flow to be directed through the gated spillway structure for as much of the period as is possible to direct water away from the work area. During high-flow conditions, the rollway and stop log spillway will be used to pass river flows as necessary. Flow over the rollway will be predominantly bypassed around the work area, and during periods when the stop log spillway is spilling, the spilled water would likely enter the tailrace river improvements zone of construction. However, the multiple stop log spillway bays would allow some control over the spill location relative to on-going work activities. NB Power will maintain operation and control of the water management infrastructure throughout the construction works.

Following completion of powerhouse demolition and river restoration works in the tailrace, the earthen cofferdam on the Canadian side of the river located upstream of the powerhouses will be removed. The St. Croix River will then flow through the former powerhouse footprint and tailrace area. An earthen cofferdam and earthen working pad will then be installed from the U.S.A. shoreline to provide access to the gate house, gated spillway, downstream fishway, rollway and flashboards, and stop log spillway. Demolition will require the use of heavy equipment equipped with specialized demolition attachments, such as grapples, pulverizers, hydraulic hammers, and shears. Experienced equipment operators will remove the structures by progressive demolition of the structural components while sitting atop the cofferdam/working pad. Heavy equipment would then be utilized to remove debris. This work will be conducted on the U.S.A. side of the international boundary and is beyond the scope of this EIA registration. Any work being conducted on the U.S.A. side of the international boundary is beyond the scope of this EIA Registration and will be addressed via U.S.A. permitting processes. Following removal of the gate house, gated spillway, downstream fishway, rollway and flashboards, and stop log spillway and completion of river restoration works, the cofferdams and working pad will be removed.

The demolition debris, consisting largely of broken concrete, some rock, brick, wood materials, and possibly some metal, will be removed from the demolition site using the cofferdam/temporary roads, and will either be used as on-site fill (e.g., for eventually filling any depressions left in the land surface by the removal of structures) or hauled away using dump trucks for salvage (e.g., any equipment and metal) or disposal at approved C&D disposal sites or local sanitary landfill.

Efforts will be made to ensure that as little demolition material falls into the river itself, and any materials that fall into the river will be subsequently removed. Erosion and sediment control structures such as hay bales and check dams will be used as necessary during the demolition activities to prevent the undue release of suspended sediments into water as a result of the demolition activities.

Similarly, the excavator, hydraulic jackhammer/rock breaker, and dump trucks used in the demolition process will need to access structures from the U.S.A. side of the border—any work required on the U.S.A. side of the border is beyond the scope of this EIA Registration and is therefore not discussed further in this document.

2.3.1.7 Fishway Demolition

The existing pool-and-weir fishway is generally operated from April to November each year, coinciding with the migration periods for key diadromous fish species such as gaspereau (i.e., alewife and blueback herring, sometimes called river herring) and other priority species. It is especially important for the fishway to be in operation from early May to approximately mid-July so as to coincide with the upstream migration period for gaspereau as they ascend the fishway in order to access the lake-like spawning habitat upstream. The fishway is not operated between November and April of each year due to low migration during those months.

Fish counts carried out annually by the St. Croix International Waterway Commission (SCIWC) generally indicate that tens of thousands of gaspereau are able to successfully ascend the fishway to access upstream habitats—other fish species that are routinely observed to pass at the fishway include brook trout, American eel, American shad, common shiner, smallmouth bass, and white sucker. Recent unofficial fish counts at the Station have observed approximately 611,000 gaspereau ascending the upstream fishway in 2020 (Babcock, J., pers. comm., 2020); finalized numbers will be made available following the publication of the annual report by the SCIWC. Other species that have been observed to pass at the fishway (though not routinely counted since their passage is infrequent) include sea lamprey, redbreast sunfish, rainbow smelt, golden shiner, and Atlantic salmon.

Operation of the Milltown Station is slated to cease at the end of March 2022, according to current plans and schedule. Once the key migration period for priority species concludes in 2022, the fishway will be permanently closed in mid-July 2022, and demolition will later occur. This will involve removing the piping supplying attraction water to the fishway as well as the fishway itself, by cutting them into sections and lifting those sections vertically out of the ground using a crane or boom truck. Some limited excavation adjacent to the fishway may be required. The metal components of the fishway will be destined for salvage or recycling, and other materials will be disposed of at a suitable C&D disposal site or at the local sanitary landfill.

The intention is that, beginning with the 2023 fish migration period, there would have been sufficient removal of in-water structures that currently impede fish passage by that time, such that multi-species volitional fish passage can occur without the need for a human-made fishway. While complete demolition, removal, or restoration may not have been completed by the time the 2023 gaspereau migration begins and some activities (mainly on land) may be ongoing by that time, there will have been sufficient demolition and restoration of the river bed and banks to enable volitional fish passage to occur unimpeded by the spring of 2023.

2.3.1.8 Site Restoration

Following the completion of required decommissioning, demolition, and removal activities, site restoration on land would be carried out. Removed granular materials and overburden will be reused as much as possible on-site to infill areas of excavation from the removal of structures. The remaining demolition debris and fill or overburden materials that are not used for site restoration activities will be trucked off-site and disposed of at acceptable locations. The site will then be graded and levelled, covered with topsoil brought to the site for use as a final cover, and hydroseeded with native species of grass.

2.3.2 River Improvements for Multi-Species Volitional Fish Passage

Once the removal of the required human-made buildings and structures is completed, the river improvements to allow for multi-species volitional fish passage at Salmon Falls (referred to in this EIA Registration document as “river restoration”) will be initiated. It is important to note that the term “restoration” in the context of this EIA Registration is limited to achieving the Project purpose; that is, for NB Power to provide unimpeded multi-species volitional fish passage at Salmon Falls for fish species that wish to access the upstream reaches of the St. Croix River and its tributaries in order to carry out their lifecycle processes.

Following the decommissioning of the Milltown Station, it is possible that other third parties may wish to take over the river restoration on a broader scale and carry out restoration and enhancement activities beyond providing volitional fish passage, but those other activities, that could be carried out by others following the completion of the Project, are beyond NB Power’s responsibilities and, thus, outside the scope of the Project as defined in this EIA Registration.

The main activities proposed by NB Power associated with the river improvements for volitional fish passage at Salmon Falls by NB Power are described below. Again, these activities are presented in no particular order, and the activities or sequence may vary from that which is presented below for illustrative purposes. It is also noted that many activities can, and will likely, be carried out in parallel to each other.

2.3.2.1 Debris Removal and River Improvements for Multi-Species Volitional Fish Passage

The remaining debris from the demolition activities of the Milltown Station will be removed. In addition, other debris remaining in the river from historical activities (e.g., some visible logs, old cribwork,

detritus, concrete, etc.) that may pose an impediment to fish passage will be removed and disposed of at appropriate facilities. The remnants of a historic rock/wooden dam in the impoundment are visible when the impoundment is dewatered for maintenance purposes, and this feature will need to be removed as well.

Following removal of debris, a hydrological and fish passage evaluation will be carried out at Salmon Falls to determine if fish are able to ascend Salmon Falls during key migration periods. Given that the Milltown Station was built nearly 140 years ago, it is not possible to determine to what extent the falls would have been altered to enable the construction of the Station, nor to determine if fish (or which species of fish) will be able to pass without further intervention following its demolition. Therefore, if the hydrological and fish passage evaluation indicates that fish passage for the target species cannot be reliably achieved, it is possible that some further intervention or modification of the river bed and/or falls may be required. The scope and extent of what, if anything, might be required to achieve volitional fish passage will be confirmed as part of the ongoing refinements to the design of the Project. Regardless, if further modifications are required, they would be carried out in this stage, with the understanding that volitional fish passage needs to be available by the time the gaspereau migration begins in the spring of 2023. Key regulatory agencies including the NBDELG, the New Brunswick Department of Natural Resources and Energy Development (NBDNRED), and DFO as a minimum, and their American counterparts, would be expected to be consulted on the findings and proposed scope of any modifications that might be required.

2.3.2.2 Shoreline Stabilization

Finally, the shorelines at the Milltown Station that are adversely affected by the decommissioning of the Station will be stabilized if they pose a risk to human or environmental health or safety. For example, there is some old wooden cribwork on the Canadian bank of the river upstream of the Station, adjacent to the baseball field, which is in poor condition and left unkempt, could cause a risk of the river bank eroding or slumping into the river if not addressed. Other shorelines may require stabilization as well, as will be determined by a shoreline condition assessment to be conducted by a qualified geotechnical engineer once decommissioning is complete.

At this time, it is generally expected that shoreline stabilization would be accomplished by grading to suitable a slope (approximately 1 vertical:2 horizontal). The lower bank will be stabilized with rip-rap up to the level of the 10-year flood event. The upper bank will be constructed with fabric-encapsulated soil (FES) lifts to allow for revegetation and stabilization along the riparian corridor. The re-grading activities will be completed to minimize the amount of fish habitat in the river that would be covered by the toe of slope balanced against minimizing the amount of soil disturbance on land in areas of high archaeological potential. Other slope stabilization methods including construction of retaining walls and similar structures would be considered as necessary.

A conceptual artists' rendering of what the restored Milltown site might look like following bank-to-bank decommissioning and removal) is provided in **Figures 2.3.2** to **2.3.4** below, for illustrative purposes. The actual conditions may vary from these renderings.

Figure 2.3.2: Conceptual Artists' Rendering Following the Completion of Bank-to-Bank Decommissioning and Removal – Plan View

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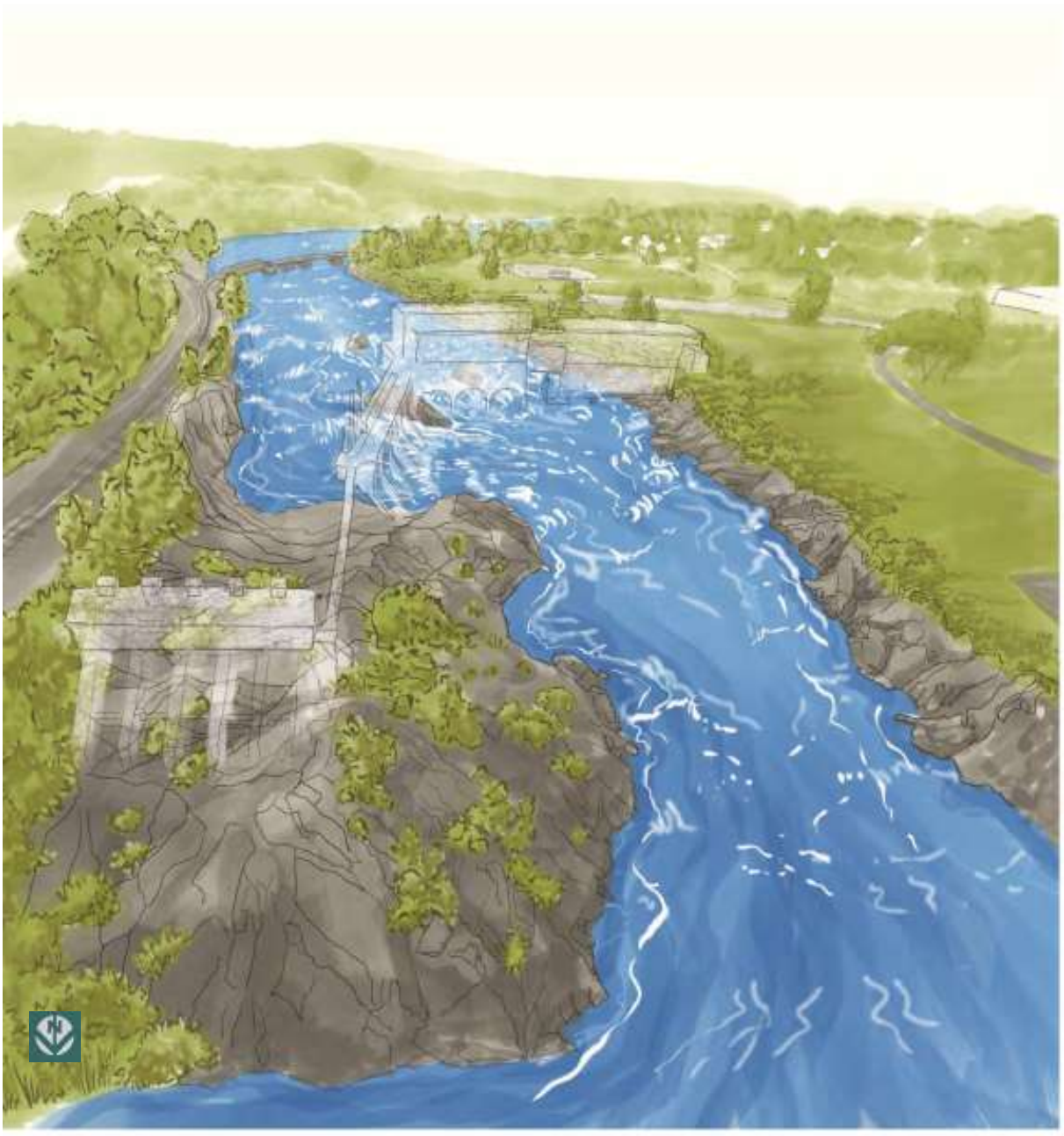

Figure 2.3.3: Conceptual Artists' Rendering Following the Completion of Bank-to-Bank Decommissioning and Removal – Oblique View with Outline of Former Structures

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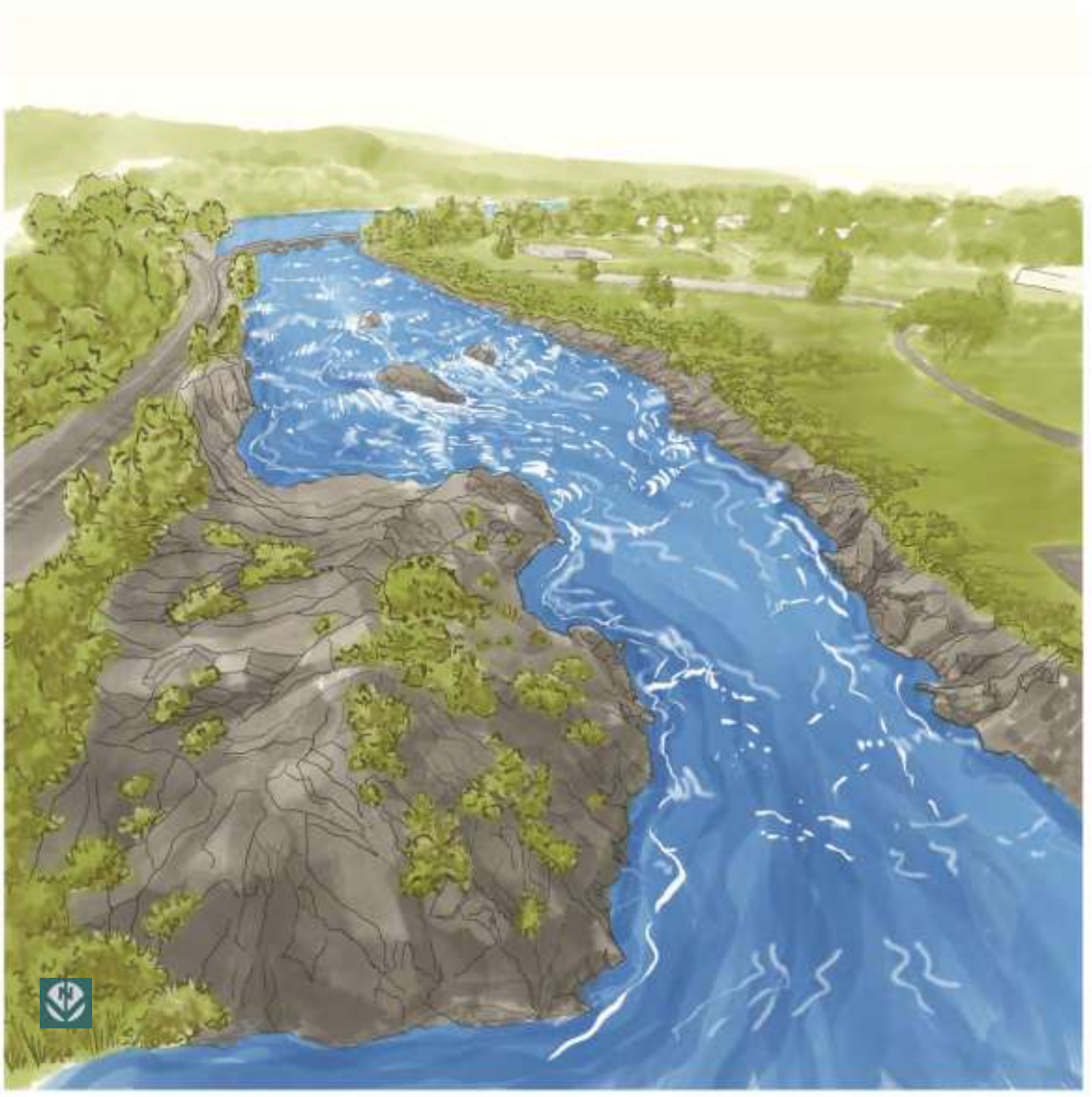

Figure 2.3.4: Conceptual Artists' Rendering Following the Completion of Bank-to-Bank Decommissioning and Removal – Oblique View without Outline of Former Structures

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2.4 Project Schedule

The Project schedule has not been fully defined at this planning stage, but based on experience with projects of a similar size and scope elsewhere, the entire decommissioning, dismantling, demolition, and removal of the Station is expected to take an estimated 10-16 months, depending on the timing of regulatory approvals required for the Project as well as other seasonal constraints that may limit decommissioning activities (e.g., restricting work during peak fish migration periods or breeding bird seasons).

The decommissioning activities would commence as soon as the EIA review has been completed and all the applicable permits, approvals or other forms of authorization have been obtained. For the purpose of this EIA Registration, it has been assumed that the requisite regulatory approvals would be received by the spring/summer of 2022, and that the Station would continue to generate electricity until the end of March 2022, after which it would cease operation and limited decommissioning would begin. Hazardous material removal and equipment dismantling and removal would be carried out first, for a period of up to 2-4 months. The upstream pool-and-weir fishway would be operated from April 2022 to approximately mid-July 2022, after which it would be permanently shut down. Dewatering of the impoundment would then be carried out, after which the demolition activities would be initiated at approximately the end of July 2022 for a further period of approximately 6 months. Site reclamation and river improvement activities would be completed over an assumed 2-4 month period following demolition, and largely completed by the spring of 2023. Again, it is possible that the sequence above may vary and that some activities may be conducted in parallel.

Conceptually at this planning stage, it is anticipated that sufficient decommissioning, demolition, removal and restoration activities in order to provide multi-species volitional fish passage would be completed by the spring of 2023, subject to the receipt of the required permits/approvals/ authorizations by the spring/summer of 2022.

2.5 Workforce

The workforce to carry out the Project is relatively modest, given the relatively simple nature and scope of the Project. While specific labour projections have not been completed at this time, projects of a similar scope and scale elsewhere would require a relatively modest contracted workforce of 4-8 labourers and 4-5 equipment operators carrying out activities associated with the decommissioning, demolition, and removal of the Station over an assumed period of approximately 10-16 months. In addition, approximately 5-6 existing NB Power employees (or designates) will be deployed from other NB Power assignments to assist in, support, or supervise the decommissioning and restoration activities.

As to the workforce of 3 full-time equivalent NB Power employees currently employed at the Milltown Station, it is expected that those employed will either choose to retire or will be offered alternative employment at another NB Power facility. Therefore, based on current information and plans, the Project is not expected to result in the direct loss of permanent employment to existing NB Power personnel (other than if retirement is chosen).

2.6 Project Alternatives

Alternatives to the Project, and alternative means of carrying out the Project, are briefly discussed below.

2.6.1 Alternatives to the Project

Given the stage of aging of the facility, NB Power considered three options for the Milltown Station:

- **Status Quo:** Continue operating the Milltown Station as presently, conducting minor maintenance of the facility and its components so as to enable their continued operation. When a turbine-generator unit reaches the end of its service life, it would be retired until all units at the Station are no longer operable, then decommissioning of the Station would occur;
- **Refurbishment:** Consider refurbishment of portions of the Milltown Station to extend its service life, including modifications or replacement of turbine-generator units, the fish passage facilities, and related systems; or
- **Decommissioning:** Decommission the Milltown Station and restore Salmon Falls to enable the unimpeded ability for diadromous (migrating) fish to ascend the falls if they are strong enough swimmers to do so (known as volitional fish passage) and to access areas of the St. Croix River and its tributaries upstream of Milltown in order to carry out their lifecycle processes.

The status quo option is not a viable option for NB Power over the long-term due to the potential operational, reliability, environmental, and safety concerns associated with the continued operation of the Milltown Station without substantive repair or modification. Unless units are modernized, they will eventually fail and the operation of the Milltown Station will become even less viable as generation capacity is lost. In addition, the Milltown Station would ultimately need to be decommissioned once operations cease, as with the current Project, thereby simply deferring decommissioning costs to a future time. As such, while NB Power currently continues to operate the Milltown Station under the status quo option, it is not a viable option over the long-term. DFO has identified the need for improvements to the current fish passage facilities to improve their effectiveness, which would require significant monetary contributions to meet their requirements that are cost-prohibitive and thus economically feasible at this time.

As for refurbishment, as mentioned previously, NB Power considered a modernization project at the Milltown Station during 2017-2018 to replace some turbine-generator units and to upgrade the fish passage facilities in order to extend the Station's service life. With only four of the original seven units remaining in operation, and with continued requests from DFO to improve the operation of the existing pool-and-weir fishway at the Milltown Station, the refurbishment project would have addressed operational issues while extending the service life of the Milltown Station by approximately 50 years. The refurbishment would have replaced three existing aging/defunct turbines (i.e., Units #5, 6, and 7) with modern DIVE turbines https://www.dive-turbine.de/ and a new Hydroconnect fish passage system (http://www.hydroconnect.at/en/) would have been installed to supplement the existing fishway at the facility. As preliminary design was undertaken, it became apparent that the planned refurbishment was

cost-prohibitive, given the relatively small amount of power the Milltown Station generates and the resulting lack of economies of scale. In addition, the Milltown Station would still ultimately need to be decommissioned once operations cease, as with the current Project, thereby simply deferring decommissioning costs to a future time. As such, while refurbishment is technically feasible, it is not economically feasible to do so, and is therefore not a viable option to address the current state of the Station.

Ultimately, in consideration of the costs and benefits associated with the Milltown Station and each option available, NB Power has therefore decided to decommission the Milltown Station and to restore the site and river at the Station location to an improved condition, as it announced via news release on June 27, 2019.

2.6.2 Alternative Means of Carrying out the Project

As discussed previously, although refinements to the engineering design in support of the decommissioning of the Milltown Station remain underway at this time, three variations for the decommissioning of the Milltown Station were considered. The three variations, which in an EIA context are considered to be the alternative means of carrying out the Project, are as follows:

- **Bank-to-Bank Decommissioning and Removal:** This variation would see the full removal of all equipment, buildings, and structures associated with the Milltown Station in both Canada and the United States (except for the on-site electrical substation which will remain), including a full bank-to-bank decommissioning of all structures within the St. Croix River and limited restoration of the river to enable volitional fish passage;
- **Partial Decommissioning and Removal:** This variation would see a partial removal of some equipment, buildings, and structures associated with the Milltown Station, but would also retain some structures located on land to preserve the cultural/historical character of the area or to be redeveloped for other uses. Limited restoration of the river to enable volitional fish passage would also occur. All the electricity generating equipment would be removed as well as most or all infrastructure within the St. Croix River, with only a portion of the buildings located on land remaining; or
- **Fish Passage with Limited Decommissioning:** This variation would see a minimal amount of decommissioning taking place, with the sole objective of conducting limited river restoration to provide volitional fish passage at Salmon Falls. Some or all of the electricity generating equipment would likely be removed, but some structures would likely remain.

In consideration of the various ways that each of the above variations could be carried out, Bank-to-Bank Decommissioning and Removal has been selected by NB Power and is thus carried forward and assessed in this EIA Registration.

Other alternative means of carrying out the Project, as developed as part of engineering design for the Project (GHD and Inter-Fluve 2020), are detailed in **Table 2.6.1** below.

Table 2.6.1: Alternative Means of Carrying Out the Project (GHD and Inter-Fluve 2020)

Item	Options	Assessment of Viability	Preferred Alternative
Cessation of Gate Operations	Cease plant/gate operations in November 2021, leaving gates open at specified configuration as required to maintain fish passage in Spring/Summer of 2022.	Presents risk of uncontrolled water levels during flooding events.	To be determined. GHD recommends that NB Power further evaluate installation of temporary gate operation electrical/controls, as this option presents the maximum construction schedule flexibility.
	Continue to operate gates using existing electrical, controls, and remote water level monitoring systems until end of fish passage period in year 2022 (or at such point that an alternate temporary fish passage is constructed).	Viable, however Powerhouse decommissioning and demolition could likely not commence until gate operation is ceased at end of fish passage period in year 2022, shortening the construction period in warm-weather months and potentially causing schedule limitations. Construction of temporary fish passage at an alternate location unlikely to advance schedule due to permitting and construction period timelines.	
	Install temporary electrical feed and controls system for gate operation, with manual monitoring of water levels until end of fish passage period in year 2022.	Viable. Allows for Powerhouse decommissioning and superstructure demolition to commence prior to end of fish passage period in year 2022, allowing for longer construction period in warm-weather months. Potential limitations associated with construction of temporary control system and power supplies (i.e., obtaining power from United States).	
Equipment Removal Approach	Removal by manual means as a separate tender package.	Viable but costly due to manual means required to remove equipment without demolishing portions of superstructures. Increased costs associated with developing/administering multiple contracts.	Removal as part of overall demolition tender package.
	Removal as part of overall demolition tender package.	Viable. Allows for mechanical removal of equipment during demolition of superstructures.	

Item	Options	Assessment of Viability	Preferred Alternative
Temporary Fish Passage Period	As per existing DFO permit, which requires fish passage April 15th to November 15th.	Potential to significantly affect sequencing and demolition means/methods due to reduced construction window. More expensive methods could be required to meet demolition/fish passage milestones.	Assume Temporary Fish Passage required from April 15th to July 15th.
	During Gaspereau spawning season only, April 15th to July 15th.	Allows for longer construction window and allows greater flexibility of demolition means/methods.	
Demolition Approach for In-Water Infrastructure	Carry costs for working in the dry (i.e., substantial cofferdams).	Viable. More conservative option. Requires permitting through US Army Corps of Engineers if cofferdams placed on US riverbed.	Costs for each will be evaluated and the more conservative option will be carried in cost estimates. It is noted that specific means and methods will not be dictated in construction specifications.
	Carry costs for working in the wet (i.e., small cofferdams, barges, working on existing foundations).	Viable. May not require US Army Corps of Engineers permit.	
Disposal of concrete demolition debris (not containing leachable lead based paint)	On-site disposal in below-surface voids (e.g., upstream fishway gulley).	Viable.	Maximize on-site disposal in below-surface voids (e.g., upstream fishway gulley) according to type of waste, and dispose of excess concrete at a local C&D facility.
	Transport and dispose of all concrete demolition debris at a local C&D facility.	Viable but costly, as additional imported fill will be required to fill voids.	

Item	Options	Assessment of Viability	Preferred Alternative
Shoreline Slope Stabilization	Maintain existing vertical retaining walls, making repairs to existing failed slopes during construction works.	Viable. Presents long term liability for future erosion and health and safety risks.	Remove existing vertical granite block walls and excavate/pull back to re-grade slopes and vegetate.
	Maintain granite blocks and place fill to buttress slopes utilizing rip rap or vegetated soil.	Viable. Reduces long term liability risk of shoreline erosion. Returns shoreline to naturalized conditions. Subject to regulatory approval for infilling in the river. May affect hydraulic capacity of the river/potential to raise water levels by constricting flow.	
	Remove existing vertical granite block walls and excavate/pull back to re-grade slopes and vegetate.	Viable. Requires excavation/disturbance of existing ground of unknown soil quality. Potential for disturbance of archaeological artifacts due to potential presence of First Nations burial ground.	
Decommissioning approach for legacy concrete abutments/crib structures on United States shoreline adjacent to rail line	Abandon in place.	Viable. May present long-term liability if structures deteriorate in the future.	Abandon in place.
	Remove abutments/crib structures and restore shoreline using riprap or vegetated soil.	Viable but costly. Presents risk of undermining adjacent railroad during removals. Would require access from United States shoreline across active railroad, with limited laydown area available.	
Removal of legacy dam structure southeast of Powerhouse C	Complete removal.	It is located in the primary post-decommissioning river channel, accentuates the fish passage challenge, excavate in the wet.	Complete removal.
	Partial removal.	Leaves human-made impediment. It is a less costly alternative. Will make fish passage more challenging.	

Item	Options	Assessment of Viability	Preferred Alternative
Backfilling Powerhouse A	Backfill upstream side only.	Potentially Viable. Subject to regulatory approval for infilling portion of the river. Structural assessment required to evaluate if lateral pressures from backfill would affect foundation stability. Structural repairs on the downstream foundation likely still required for long term stability of structure.	Complete structural repairs to foundation with no backfill placed around Powerhouse A.
	Backfill upstream and downstream.	Viable. Subject to regulatory approval for infilling portion of the river. Creates additional access for equipment demolish Powerhouse B and C. Generates ability to leave foundation in place and backfill voids will fill/concrete.	
Temporary Fish Passage Location/Construction	Utilize existing upstream fishway.	Acceptable if impoundment maintained at full pool and the fishway entrance is not blocked by access provisions.	Seek approval for shorter required passage season, utilize existing to extent practical, endeavor to affect sequencing to the degree that if temporary measures required is a modification of existing fishway.
	Modify existing fish passage.	Access is maintained to fishway entrance, remove weirs at upstream end and extend exit channel, associated with need to have head pond at lower elevation during passage season.	
	New temporary fishway construction at alternate location.	Access is blocked to existing fishway entrance, new fishway construction using likely a range of construction techniques, which would be costly.	
Long-Term Fish Passage Design Species	Gaspereau.	Used as the weakest swimming likely present fish, sets controlling design criteria.	Gaspereau, blueback herring, eel, shad, salmon, sea lamprey, possibly striped bass.
	Sturgeon.	Not expected based on anticipation of where sturgeon typically present.	

Item	Options	Assessment of Viability	Preferred Alternative
Long-Term Fish Passage Location	In location of Powerhouse C and Stop log Spillway.	Interpreted to be the primary river channel alignment following decommissioning. Minimum actual sizing to be developed through hydraulic modelling.	In location of Powerhouse C and Stop log Spillway.
	Not Applicable - No Other Options Identified for Long-Term Fish Passage Location based on hydraulic analysis.	Limited space for the size of the river to construct a bypass channel, either with segments of the dam left in place of not. Technical fishway is unlikely to receive regulatory approval.	
Long-Term Fish Passage Construction	No additional channel construction.	Modelling and analysis to date suggest that this will not meet prevailing design criteria. Potential that bedrock may provide sufficient channel stability and fish passage without adding stone or other channel restoration treatments.	Assume supplemental effort will be required (with placement of fill likely required in the riverbed on the United States side of the international border).
	With supplemental effort.	May include combination of practices, which may range from installation of coarse river bed material downstream of dam location, or grading of riverbed upstream of dam locations. Includes placeholder for selective ledge removal. Some degree of uncertainty exists relative to bedrock elevations beneath structures. Placement of fill on United States portion of riverbed will likely trigger US Army Corps of Engineers permitting.	
River Restoration	Removal of dam and construction of a riffle-pool river sequence.	Similar to recommended fish passage assumption above, the river channel would be supplemented with rounded river boulders and stone, large wood structures, and other methods to define the channel bed and banks.	Proceed with proactive channel construction as necessary to effect fish passage, allow the upstream impounded river bed to evolve following decommissioning, address priority river bank areas upstream of the dam.
	Removal of dam and construction of a riffle-pool river sequence, with additional river bank restoration upstream of the dam.	Include biotechnical river bank naturalization techniques upstream of the dam, in particular in areas where human legacy requires management - either at retaining walls, or apparent solid waste disposal spots along the river bank.	

Item	Options	Assessment of Viability	Preferred Alternative
Access to Gate Spillway, Rollway and Spillway for removal	Access from United States shoreline (e.g., cranes, land-based equipment across rail line).	Viable. Requires access agreements from United States third party property owners and railway owner/operator. Decreased productivity due to active rail line, resulting in increased costs. May require a United States contractor to complete that portion of the work.	Assume access from the United States shoreline for conservative purposes. In addition, assume all works on the United States side of the river will be conducted in a separate contract package by a United States-based contractor.
	Access from Canadian shoreline (e.g., temporary modular bridge to rock island).	Viable, however unknown if would be permitted by United States/Canadian Border Patrol authorities (i.e., potential to be considered international crossing).	
	Access using a barge.	May not be viable due to low water and river flow conditions.	
	Care and Maintenance of infrastructure (i.e., complete required structural repairs during demolition and throughout 30 year life cycle, maintain heat and power, replace windows, etc.).	Viable. Requires caretaker and security. Future demolition required.	
	Do nothing.	Viable. Accelerated structure degradation. Potential for structural failures of infrastructure, potentially falling into the river presenting health and safety hazard. Will require demolition in the future (potentially more complex due to unstable structures).	

2.7 Emissions and Wastes

The anticipated emissions and wastes associated with the Project are discussed in this section. NB Power, through the conditions of the various permits and approvals it will receive to enable the decommissioning of the Project, will meet or exceed the compliance standards outlined in applicable regulations and guidelines with respect to waste, emissions, and discharges from the Project. Where no such standards exist, industry best practices will be adopted, where applicable. Emissions and wastes will be reduced through best management practices, following applicable legislation, and mitigation planning including the development of a Project-specific Environmental Management Plan (PSEMP).

2.7.1 Air Contaminant Emissions

Air contaminant emissions from the Project will occur primarily from dust generated from decommissioning, demolition, removal, and restoration activities as well as from fossil fuel combustion in trucks and mobile equipment used to accomplish those activities. Emissions of concern are generally classified as criteria air contaminants (CACs) and include carbon monoxide (CO), nitrogen oxides (NO_X), sulphur dioxide (SO_2), and total particulate matter (PM, including its size fractions PM_{10} and $PM_{2.5}$). Given the relatively straightforward nature of the Project, measurable emissions of other air contaminants (other than greenhouse gases, discussed below in **Section 2.7.2**) are not expected.

Emissions during the decommissioning, demolition, removal, and restoration activities are generally related to the generation of dust and routine emissions from construction equipment or other construction activities. Equipment used for construction will generally consist of trucks, excavators, rock breakers, cranes, boom trucks, bulldozers, backhoes, and other heavy equipment, similar to what may be seen on many industrial construction sites. Control measures such as use of dust suppression techniques will be used, as required, to reduce the fugitive dust, and routine inspection and maintenance of construction equipment will reduce exhaust fumes. Timing of activities to avoid undue nuisance to off-site receptors (e.g., limiting intrusive decommissioning/demolition/removal/restoration activities to between 7:00 a.m. and 7:00 p.m. [i.e., average daylight hours] on Monday to Saturday, excluding statutory holidays) will be important. The burning of waste brush/slash material will not be permitted.

An assessment of environmental interactions due to Project-related air contaminant emissions is provided in **Section 5.2**.

2.7.2 Greenhouse Gas (GHG) Emissions

Greenhouse gas (GHG) emissions from the Project, consisting of carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O), as carbon dioxide equivalents (CO_2e), will be generated from fossil fuel combustion in trucks and mobile equipment used to accomplish the decommissioning, demolition, removal, and restoration activities. Given the relatively straightforward nature of the Project, these emissions are not expected to be substantive.

The Project will interact with the atmospheric environment through the release of GHGs into the atmosphere as described above for air quality. An assessment of the interactions between the Project and the atmospheric environment due to Project-related GHG emissions is provided in **Section 5.2**.

2.7.3 Noise and Vibration Emissions

Noise emissions from the Project will occur primarily from the operation of mobile equipment for use in decommissioning, demolition, removal, and restoration activities. Vibration will also occur from these same sources, although to a lesser extent.

Noise and vibration will be intermittent, as equipment is operated on an as-needed basis while decommissioning, demolition, removal, and restoration activities are taking place, and mostly during daytime hours. Noise sources will be mitigated through the use of mufflers on all equipment, carrying out routine maintenance of equipment to maintain it in good working order, and limiting intrusive noise-producing operations to daytime (7:00 a.m. and 7:00 p.m.), Monday to Saturday, excluding statutory holidays.

An assessment of the interactions between the Project and the acoustic environment is provided in **Section 5.3**.

2.7.4 Liquid Wastes

Liquid wastes generated during decommissioning, demolition, removal, and restoration activities include oils and lubricants from the mobile equipment. These wastes are considered dangerous goods and will be collected and disposed of in accordance with applicable local and provincial regulations. Other liquid wastes, including sewage and domestic wastewater, will be treated in the Milltown Station's domestic wastewater treatment plant until it is decommissioned, after which portable toilets will be used on-site, which will be collected and disposed of in accordance with local and provincial standards.

2.7.5 Solid Wastes

Solid wastes generated during decommissioning, demolition, removal, and restoration activities will include concrete, brick, rock, metal wood, creosote-treated wood, and other detritus. The means by which each of these types of wastes would be recycled, reused, or disposed of were outlined in the description of Project phases and activities in **Section 2.3** above. Generally speaking, it is expected that most equipment contained in the buildings and structures at the Milltown Station, as well as scrap metal, will be destined for salvage, storage, or reuse, and that construction and demolition debris would be used as on-site fill or disposed of at approved C&D disposal sites.

Dangerous goods and hazardous materials will be stored on-site in a separate temporary dangerous goods storage area provided with full containment. Dangerous goods will be removed from the site by a licensed contractor and recycled or disposed at approved facilities.

3.0 Summary of Environmental Setting

A high-level overview of the environmental setting for the Project is provided in this section.

3.1 Physical Setting

3.1.1 Topography and Drainage

To a large degree, the landscape of the Milltown area reflects the shape of the underlying bedrock; generally, the softer sedimentary rocks are characterized by low relief (Zelazny 2007). Elevations of the Milltown Station are approximately 10 m above mean sea level (m amsl), with the river cascading quickly immediately below the Station to an elevation of approximately 5 m amsl immediately below the gate house and gated spillway.

The St. Croix River watershed consists of predominately undeveloped wooded terrain and is subject to spring freshet flood events due to snow melt and, to a lesser extent, intense rainfall. The river at the location of the Milltown Station forms the Canada/U.S.A. international border, and flows through the communities of St. Stephen, New Brunswick and Calais, Maine before discharging to the Passamaquoddy Bay.

3.1.2 Surficial Geology

The surficial geology of the Milltown area consists of basal glacial till generally between 1 m and 10 m thick. Basal glacial till is described as sediments that are laid down on the land surface beneath advancing glacial ice (Allard and Dickinson 1992). Depending on the permeability of the till, it can be used as a localized aquifer for groundwater.

3.1.3 Bedrock Geology

The bedrock in the area is a granite-like igneous rock called the St. Stephen Gabbro Troctolite, which is technically comprised of olivine gabbro and minor anorthosite (Fyffe 1990). This bedrock can be fractured and be an aquifer for groundwater and a conduit for groundwater movement.

Based on the geology of the local area, groundwater, locally, is expected to flow towards the St. Croix River, while regional groundwater is expected to flow towards Passamaquoddy Bay and the Bay of Fundy.

3.2 Biophysical Setting

3.2.1 Climate

New Brunswick has a humid continental climate, with slightly milder winters on the Gulf of St. Lawrence coastline. Northern New Brunswick experiences a subarctic climate, particularly in the more elevated area in the far north. Southern New Brunswick experiences a more moderate maritime climate than the

northern or central parts of the province as the Bay of Fundy never fully freezes, thus moderating the winter temperatures and providing generally cooler summer temperatures compared to other inland locations. The cold Bay of Fundy air, combining with the inland warmer temperatures, often creates onshore winds and periods of fog.

The nearest representative weather station to the Milltown area is located in Pennfield, New Brunswick, approximately 50 km east of Milltown. Climate normals data at the Pennfield station are limited to temperature and precipitation. On average, temperatures are lowest in the winter and early spring, and highest during the summer months. Daily averages range from a low of -7.1 degrees Celsius (°C) in January to a high of 15.6°C in both July and August. Precipitation, on average, is highest from the middle of fall to late winter. From 1981 to 2010, the region has received an average of 1,429.7 millimetres (mm) of precipitation per year, of which 1,237.7 mm was rain and 192.0 mm was snowfall (as water equivalent) (GOC 2020a).

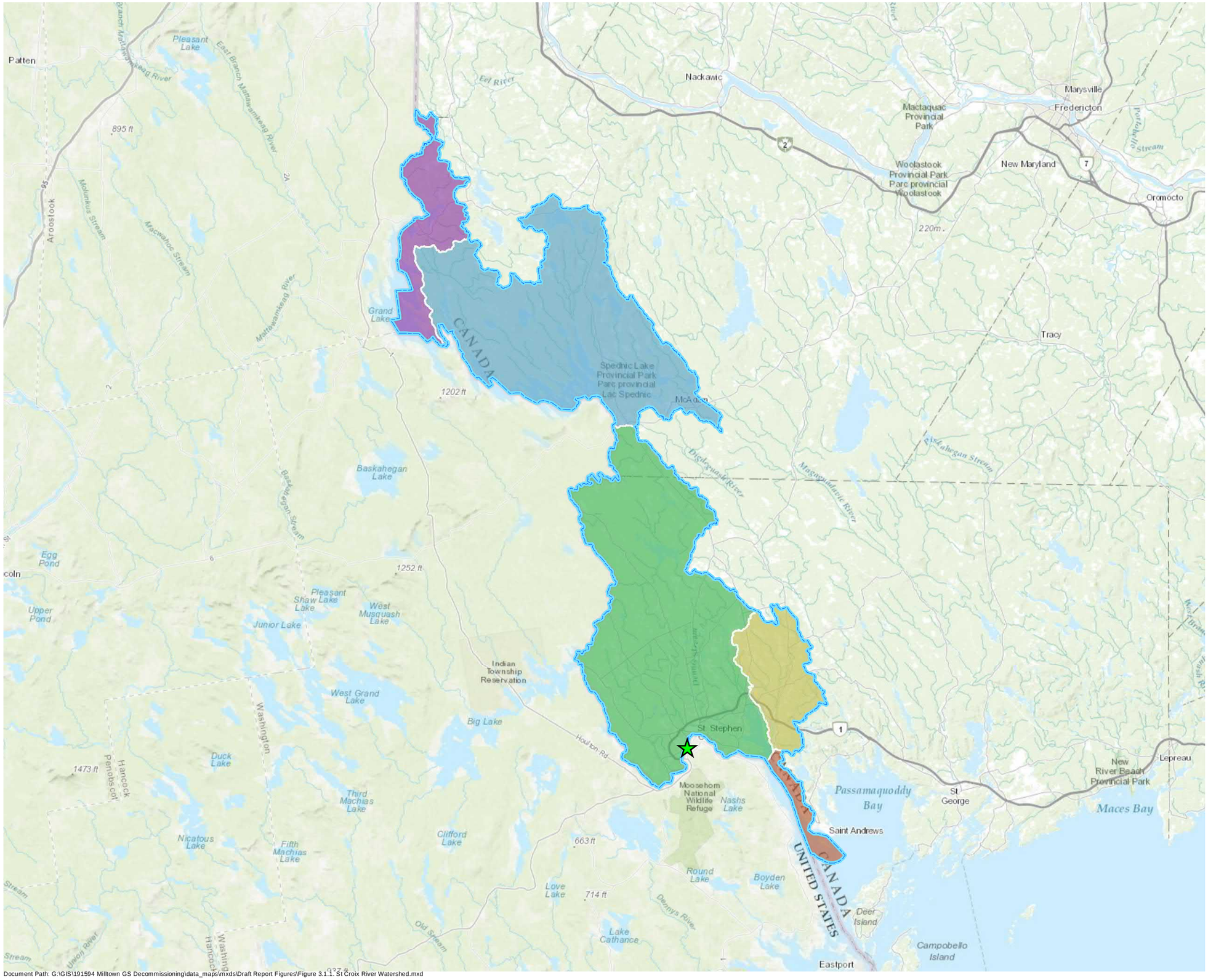
The nearest available wind data is from the Saint John A weather station, located approximately 110 km east of the PDA. Monthly mean wind speeds measured at the Saint John A weather station range from 11.3 to 17.5 kilometres per hour (km/h), with an annual mean wind speed of 15.2 km/h. From May to August, the dominant wind direction is from the south, with winds predominantly blowing from the southwest and northwest from September to February (GOC 2020a).

3.2.2 Atmospheric Environment

Southern New Brunswick areas may experience unique atmospheric conditions compared to other inland areas of the province due to their location downwind of large urban centres in eastern North America (as a result of long-range transport of air contaminants) and their proximity to the Bay of Fundy (a large body of cool water that may produce weather conditions that inhibit dispersion). Despite this, the ambient air quality in the area is generally very good based on data collected from New Brunswick's monitoring station at St. Andrews (approximately 22 km southeast of the Station as a direct line of sight), which is the closest representative station to the Project site; these data are supplemented by data from a station operated by Lake Utopia Paper (GNB 2020a) as well as values summarized for Eastern Maine by the Maine Department of Environmental Protection (Maine DEP 2020).

3.2.3 Freshwater Environment

The St. Croix River forms the Canada/U.S.A. international boundary, with the state of Maine and the province of New Brunswick located on either side of the international boundary. The St. Croix River is located in the southwestern portion of New Brunswick, flowing for over 114 km and covering approximately 3,757 km^2 starting at Chiputneticook Lakes and draining to the Passamaquoddy Bay (in the Bay of Fundy) (GNB 2007). The river boasts numerous lakes and tributaries which provide access for tourism and recreation and have been historically important for the now less dominant forestry and agricultural industries of the area. The St. Croix River watershed is shown in **Figure 3.2.1**.



Document Path: G:\GIS\191594 Milltown GS Decommissioning\data_maps\mxds\Draft Report Figures\Figure 3.1.1. St Croix River Watershed.mxd

Énergie NB Power

MILLTOWN GENERATING STATION DECOMMISSIONING PROJECT

ENVIRONMENTAL IMPACT ASSESSMENT REGISTRATION

ST. CROIX RIVER WATERSHED

FIGURE 3.2.1

- Project Location
- St Croix River Basin*

Subwatershed

- Canoose Stream
- Forest City Stream
- Johnson Cove
- Spednic Lake
- Waweig River

* Data for Canadian extent only

0 2.5 5 10 Kilometres

SCALE 1:500,000

N W E S

MAP DRAWING INFORMATION:
BASEMAP IMAGE SERVICE LAYER CREDITS: ESRI, HERE, GARMIN, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), (C) OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY
DATA PROVIDED BY: DILLON CONSULTING LIMITED, SNB & NB DEPARTMENT OF ENERGY AND NATURAL RESOURCES,

MAP CREATED BY: SCM
MAP CHECKED BY: JB
MAP PROJECTION: NAD_1983 CSRS NEW BURNSWICK STEREOGRAPHIC

DILLON CONSULTING

PROJECT: 19-1594

STATUS: DRAFT

DATE: 2020-01-27

Importantly, the St. Croix River provides habitat for several freshwater and saltwater (i.e., diadromous) fish species (Cronin 1985). Native freshwater species generally include brook trout (*Salvelinus fontinalis*), American shad (*Alosa sapidissima*), gaspereau (*Alosa spp.*, i.e., alewife, *Alosa pseudoharengus* and blueback herring, *Alosa aestivalis*), and Atlantic salmon (*Salmo salar*), while non-native species include smallmouth bass (*Micropterus dolomieu*) (IJC 2015). Other species may include American eel (*Anguilla rostrata*), sea lamprey (*Petromyzon marinus*), and striped bass (*Morone saxatilis*). Freshwater mussels are also known to occur within the St. Croix River (Martel et al. 2010). The most numerous fish species counted at the Milltown Station is gaspereau (ISCRWB 2018b).

3.2.4 Terrestrial Environment

The Project is located within the Valley Lowlands ecoregion and, more specifically, within the Magaguadavic ecodistrict, which features an undulating plateau with many wetlands, meandering streams and minimal relief (Zelazny 2007). This ecoregion is characterized by dramatic influence of major watercourses and large lakes (Zelazny 2007). The interaction of flood events through these major watercourses with the varied topography of the ecoregion creates a wide spectrum of flood and substrate conditions, with a corresponding diversity of wetland types (Zelazny 2007).

Within this ecoregion, tolerant hardwood stands dominated by American beech (*Fagus grandifolia*), sugar maple (*Acer saccharum*), and yellow birch (*Betula alleghaniensis*) sit on ridge tops with fertile soils. On less fertile ridges, hardwoods tend to be dominated by American beech, red maple (*Acer rubrum*), and trembling aspen (*Populus tremuloides*). Softwood forests in the area tend to be associated with lower slopes and shallow soils. The softwood forests are dominated by red spruce (*Picea rubens*), balsam fir (*Abies balsamea*), and white spruce (*Picea glauca*), with occasional eastern hemlock (*Tsuga canadensis*) and white pine (*Pinus strobus*) (Zelazny 2007). Although the Milltown Station is situated within an urbanized/suburban setting, there may remain some aspects of the described forest type along the riverbanks and islands of the St. Croix River.

3.3 Socioeconomic Setting

3.3.1 Demographic and Economic Overview

According to the Statistics Canada 2016 Census Profile for the Town of St. Stephen Census Subdivision (Statistics Canada 2017), the total population of the Town of St. Stephen in 2016 was 4,415, down 8.3% from 4,817 in 2011. The population density of the town is 326.6 persons per square kilometre, compared to 10.5 persons per square kilometre for the province. The age distribution of people living in the Town of St. Stephen for the 2016 Census indicates that the largest proportion of the population is in the 25-54 age group, followed by the 0-24 age group. Both of those age groups have decreased between the 2011 and 2016 Census years, while the number of people aged 65 and over have increased (Statistics Canada 2017).

The Project is located in the Southwest Economic Region which includes Saint John, Kings, and Charlotte Counties. The City of Saint John, located approximately 110 km east of St. Stephen, is the economic centre of the region and holds the largest population in the Southwest Economic Region.

3.3.2 Land Use Overview

The Project is located within the neighbourhood of Milltown in the Town of St. Stephen, in Charlotte County, New Brunswick. Milltown, originally its own municipality and incorporated in the early 1800s, was amalgamated with the Town of St. Stephen in the 1970s. As a whole, the Town of St. Stephen's land use generally represents residential, commercial, industry, agriculture, aquaculture, recreation, and institutional uses in varying degrees.

The Milltown Station is located within Regional Service Commission (RSC) 10, which is comprised of 21 Local Service Districts (LSDs) as well as the Towns and Villages of St. Stephen, St. Andrews, St. George, Blacks Harbour, Campobello, Grand Manan, Harvey, and McAdam (NBDELG 2020b). The Project is located within the LSD of St. Stephen.

The Town of St. Stephen is represented by a municipal council that consists of an elected Mayor, a Deputy Mayor, and five elected Councillors, and is provided its authority pursuant to the New Brunswick *Local Governance Act*. Municipal elections are held every three years as directed by the New Brunswick *Municipal Elections Act*, with the next municipal election having been deferred until May 2021 due to the COVID-19 pandemic (originally scheduled to occur in May 2020). The municipal council is supported by various departments operating under its direction, including water and sewage, parks and recreation, planning, promotion, and tourism, and public works.

Development in the Town of St. Stephen is guided by the Town of St. Stephen Municipal Plan (Town of St. Stephen 2011). The Municipal Plan outlines policies that address a range of issues, including: housing, businesses, transportation, infrastructure, and the environment to ensure that a balanced approach is applied to growth/changes within the community. All by-laws and strategic land use planning must adhere to the Municipal Plan, which is reviewed every 10 years.

3.3.3 Built Heritage

The Milltown Station property is anticipated to have a high potential for built heritage resources due to the former cotton mill site being designated a local historic site (CHP 2020). This designation includes the Salmon Falls, the remnants of the former St. Croix Cotton Mill site (New Brunswick Register of Historic Places record number 1279), and the existing hydroelectric complex (CHP 2020). Historic research also indicates that resources related to an early nineteenth century residential neighbourhood, pre-dating the cotton mill, may also still exist within the PDA.

3.3.4 Archaeological and Palaeontological Resources

The history of human use by Indigenous peoples of the St. Croix River watershed generally, and at the Milltown site specifically, can be traced back thousands of years. The site of Salmon Falls would have been an attractive site for Indigenous peoples due to its access to water, its proximity to the St. Croix

River estuary, and its topography and geography as a natural waterfall located near the head of tide (and the abundance of aquatic resources there as a result of those features) (CRM Group 2020). The surrounding areas was also an attractive site for early European explorers and settlers. The first known non-Indigenous visitors to the area were Sieur de Monts and Samuel de Champlain in the early 1600s, with permanent French settlements beginning in 1684 (CRM Group 2020).

Overall, the remaining areas of the Milltown site and adjacent areas along the St. Croix River are considered to have high potential to harbour heritage resources as evidenced by the nine registered Precontact archaeological sites within a 10 km radius of the Milltown site. One of these sites, Salmon Falls (Borden Number BhDt-03), is located within the PDA, and another is within 150 m of the PDA on the Maine side of the river (Site 96.7 Maine Archaeological Survey). The PDA is anticipated to have a low potential for palaeontological resources due to the recent geological history of the area.

3.3.5 Traditional Land and Resource Use

Historically, the lands of southwestern New Brunswick have been used by Indigenous communities and people for traditional land and resource uses such as hunting, fishing, gathering (i.e., for food or medicinal uses), trapping, subsistence, and related purposes (Goddard 1996). The Wabanaki Confederacy was an alliance between the Indigenous nations in what is now known as the Atlantic Region and the Northeast United States, namely an alliance between the Mi'kmaq, Wolastoqey (Maliseet), Peskotomuhkati (Passamaquoddy), and Penobscot Nations, which facilitated a peace treaty with the Mohawk Nations further to the west (GNB 2020b; PNS 2020a). Although the Wabanaki Confederacy Nations were largely nomadic people, their movements were largely focused around waterbodies.

The St. Croix River, including the tributaries that combine with it to discharge into the Passamaquoddy estuary, then into the Passamaquoddy Bay and eventually into the Bay of Fundy, is a significant water feature in the region. The dam at the Milltown Station, which spans the St. Croix River, is situated on top of a natural waterfall, Salmon Falls. The St. Croix River is recognized to hold significant value for Indigenous people due to its recreational and natural heritage use over thousands of years (CHRS 2017). The area around St. Stephen, New Brunswick and Calais, Maine, including Salmon Falls, was called "Siqoniw Utenehsis" meaning "springtime village" or "Passamaquoddy village"; an 1874 map depicts the presence of an ancestral Passamaquoddy tribal village at Milltown/Calais (PPTG 2000). The Salmon Falls area would have been an ideal location because of the falls, and the ease of fishing in the river and estuary usually in the late spring and summer (CRM Group 2020; PNS 2020b). Similarly, watercourses, such as the St. Croix River, would have been used extensively for travel and movement by Indigenous communities.

Despite the general area of the Milltown Station being largely occupied today by residential, commercial, and agricultural development, these areas are likely still used by Indigenous people for traditional practices such as hunting, fishing, ceremonial, and gathering purposes.

4.0 EIA Scope and Methods

Environmental impact assessment (EIA) is used as a planning tool in the initial stages of project conceptualization, planning, and design. Its intention is to identify or predict Project-related effects (based on results of scientific assessment or traditional knowledge), as well as design mitigative strategies to avoid, reduce, or eliminate adverse environmental effects. The scope of the assessment and the methods used to prepare this EIA Registration document, including the characterization of the factors to be considered, and the details of the assessment of each valued component of the environment are provided below.

4.1 Scope of the EIA Registration

As noted in **Section 1.4.1**, the proposed Project must be registered under the New Brunswick EIA Regulation. This registration document is intended to fulfill the requirements for registration of the Project under the provincial regulation, to initiate the EIA review of the Project. However, as described in **Section 1.4.2**, there are no known requirements for a federal impact assessment under the *Impact Assessment Act* since the Project is not located on federal land and its size does not exceed the threshold for a designated project as defined in the *Physical Activities Regulations* under that Act.

The Project assessed herein conservatively includes bank-to-bank decommissioning and removal of all human-made structures to provide multi-species volitional fish passage, but does not include restoration beyond removal of human-made impediments to fish passage. It is important to note that the term "restoration" in the context of this EIA Registration is limited to achieving the Project purpose; that is, for NB Power to provide volitional fish passage at Salmon Falls for fish species that wish to access the upstream reaches of the St. Croix River and its tributaries in order to carry out their lifecycle processes. Therefore, the scope of this EIA Registration is limited to the removal of all human-made structures at the Milltown Station that impede fish passage, and the limited restoration of Salmon Falls to enable volitional fish passage to occur. Further restoration efforts that might be undertaken by other parties in the future to further enhance fish passage or to achieve other purposes such as further naturalization, beautification, education/awareness, and/or commemoration, as the case may be, would be the responsibility of those other parties and thus are not part of the scope of this EIA Registration.

The scope of this EIA Registration is also limited to the Canadian side of the Canada/U.S.A. international boundary; parallel regulatory processes are underway on the U.S.A. side of the international border and are beyond the scope of this EIA Registration.

4.1.1 Selection of Valued Components

Valued components (VCs) are those components of the biophysical and socioeconomic environments that are of value or interest to regulatory agencies, the public, other stakeholders, and Indigenous peoples. VCs are typically selected for assessment on the basis of: regulatory issues, legislation,

guidelines, policies, and requirements; consultation with regulatory agencies, the public, stakeholder groups, and First Nations; field reconnaissance; and professional judgment.

The VCs selected for this EIA Registration and the rationale for their selection in relation to the Project are outlined in **Table 4.1.1**, below.

Table 4.1.1: Valued Components for the Project, and Rationale for their Selection

Valued Component (VC)	Rationale for Selection of the VC
Atmospheric environment	• Emissions of particulate matter (e.g., dust) and combustion gases related to Project activities may interact with the atmospheric environment and adjacent receptors.
Acoustic environment	• Sound and vibration related to Project activities may interact with adjacent receptors.
Groundwater	• The Project may have limited interactions with groundwater on a very localized basis near the St. Croix River.
Surface water	• The Project may interact with the quality or quantity of surface water within the St. Croix River as a result of a change of the hydrological regime due to Project activities or to changes in water or sediment quality.
Fish and fish habitat	• Fish and fish habitat are protected by the federal Fisheries Act. The Project will interact with fish and fish habitat through the Project activities by temporarily altering fish habitat or through changes in water quality or sediment quality. Following restoration, those alterations would no longer exist and fish habitat upstream will greatly benefit from the anticipated improvements to fish populations due to unimpeded volitional fish passage provided by the Project.
Vegetation and wetlands	• The Project activities may interact with riparian vegetation and may interact with unmapped riparian wetlands should they be present.
Wildlife and wildlife habitat	• Physical alteration of the Project site during decommissioning may result in the loss of wildlife habitat, and Project activities may interact with wildlife (e.g., sensory disturbance due to Project activities).
Socioeconomic environment	• The Project will interact with labour and economy through the generation of employment and associated expenditures, as well as the loss of employment through the closure of the Station. • The Project may result in a change in land use (i.e., change from an operating hydroelectric station to vacant land).

Valued Component (VC)	Rationale for Selection of the VC
Heritage resources	• Heritage resources (e.g., archaeological, palaeontological, or built heritage resources) are protected under the New Brunswick Heritage Conservation Act. • The Project may interact with a known archaeological site (Precontact burial site) located on the property. • The Project will interact with a locally designated heritage site associated with the former Cotton Mill (currently a part of the Station). • Other earth moving activities on the Project site may result in the potential accidental discovery of previously unknown heritage resources that may be present on the Project site.
Traditional land and resource use	• The Project is located in the traditional territory of the Peskotomuhkati (Passamaquoddy) Nation and may have been visited/used by Wolastoqey or Mi'kmaq people. It is known that the Project site has historically been, and may be currently used by, Indigenous persons for practicing traditional activities such as hunting, fishing, trapping, and gathering through the practice of unextinguished Aboriginal and treaty rights. Consultation with Indigenous peoples is required at the planning stage of the Project to determine the extent of potential traditional land and resource use of the site.
Effects of the environment on the Project	• Natural forces and other effects of the environment (such as climate change and other natural hazards or risks) may pose a risk to the Project components and their longevity, or cause delays in the decommissioning of the Project.

The following sections provide a description of the methods of desktop and/or field studies that were required to assess the VCs detailed in **Table 4.1.2**, based on professional judgment, the nature of the Project, knowledge of the Project area, and previous experience on projects of a similar nature. In addition, the methods employed for the analysis of environmental effects are discussed.

4.1.2 Spatial Boundaries

The spatial boundaries of the assessment, which represent the area in which a potential effect could occur and will vary by VC, will typically be based on natural system boundaries for biophysical VCs, or administrative/political boundaries for socio-economic VCs. The assessment of potential environmental interactions with the VCs encompasses two spatial boundaries: Project Development Area (PDA) and Local Assessment Area (LAA).

4.1.2.1 Project Development Area

As was discussed in **Section 2.1.1**, the Project Development Area (PDA) is defined as the area of physical disturbance (or physical footprint) associated with the Project. Although the total land area of the properties associated with the Milltown Station on the Canadian side of the Canada/U.S.A. international

boundary is approximately 5.86 ha, the entirety of that area will not be disturbed by the Project, with only the areas of these properties that will be physically used or disturbed to accomplish the Project. Therefore, specifically, on the Canadian side of the Canada/U.S.A. international boundary, the PDA on land consists of an area of approximately 1.4 ha (i.e., a portion of the Milltown site within the larger 5.86 ha properties associated with the Milltown Station) that will be directly affected by Project activities, which includes all Milltown Station-related facilities that will be decommissioned and removed as well as areas to be used as laydown/temporary storage for the decommissioning activities. In addition, the portion of the PDA located within the St. Croix River itself (Canadian side only of the International Boundary Commission's official boundary line) that will be directly affected by Project activities is approximately 0.54 ha. The portion of the PDA that is subject to this EIA Registration on the Canadian side of the international boundary was shown in **Figure 2.1.2**.

The area that will be affected by the Project on the U.S.A. side of the international boundary is not relevant to this EIA Registration. Physical infrastructure on the U.S.A. side of the international boundary will be managed separately through the applicable U.S.A./State permitting processes. The area of physical disturbance associated with the Project on the U.S.A. side of the international boundary was shown for illustrative purposes in **Figure 2.1.3**.

The PDA is the same for all VCs discussed within this EIA Registration document.

4.1.2.2 Local Assessment Area

The LAA is defined as the maximum area where Project-specific environmental interactions can be predicted and measured with a reasonable degree of accuracy and confidence (i.e., the zone of influence of the Project for each VC). The LAA, which can vary by VC, is summarized for each VC in **Table 4.1.2**.

Table 4.1.2: Local Assessment Area for Valued Components

Valued Component	Local Assessment Area
Atmospheric environment	A 1 km buffer around the Milltown Station, including the PDA.
Acoustic environment	A 1 km buffer around the Milltown Station, including the PDA.
Groundwater	A 250 m buffer around the Milltown Station, including the PDA.
Surface water	Approximate extent of the impoundment (450-500 m upstream of the Milltown Station) to approximately 500 m downstream of the Station, including 30 m of riparian area on the Canadian side of the international boundary.
Fish and fish habitat	Approximate extent of the impoundment (450-500 m upstream of the Milltown Station) to approximately 500 m downstream of the Station, including 30 m of riparian area on the Canadian side of the international boundary.
Vegetation and wetlands	For aquatic vegetation species, the LAA includes a 450-500 m stretch of river upstream and downstream of the dam, which is anticipated to experience changes in water levels (i.e., area to result in loss of

Valued Component	Local Assessment Area
	vegetation through drying or flooding). For terrestrial vegetation species, the LAA includes the PDA and a 30 m stretch of land bordering the section of river within the LAA.
Wildlife and wildlife habitat	The PDA and 30 m of riparian area extending 500 m upstream and downstream of the Milltown Station.
Socioeconomic environment	The PDA and the Town of St. Stephen.
Heritage resources	The PDA and 30 m of riparian area extending 500 m upstream and downstream of the Milltown Station.
Traditional land and resource use	Approximate extent of the impoundment (500 m upstream of the Milltown Station) to the tidal estuary located approximately 2 km downstream of the Station, including 30 m of riparian area on the Canadian side of the International Boundary.

4.1.3 Temporal Boundaries

Temporal boundaries vary according to the different Project phases and potential effects. In typical construction phases, specific construction-related effects are typically short-term (for example, effects related to the use of laydown areas for construction activities).

The temporal boundaries for the Project correspond to the timing of decommissioning and restoration activities as it was defined in the Project schedule in **Section 2.4**.

4.2 EIA Methods

This EIA Registration was developed in a two-step process, where the initial EIA Registration document was based on a **desktop level assessment**, which was followed by the completion of **confirmatory field studies** during appropriate seasonal windows to confirm the predictions of the desktop level EIA Registration. In general, this EIA Registration considers the following factors:

- Interactions between the physical activities associated with the Project;
- Mitigation measures that are technically and economically feasible and that would mitigate any anticipated significant adverse environmental effects of the Project, including requirements for follow-up studies or monitoring;
- The environmental effects of malfunctions or accidents that may occur in connection with the Project;
- Any change to the Project that may be caused by the environment; and
- Comments received from the public, Indigenous persons, regulatory agencies, or other stakeholders.

As a first step, Dillon uses a streamlined and focussed approach in the preparation of the analysis of interactions between the Project and VCs. During the environmental effects analysis, Project-VC

interactions are first identified through a matrix table. If a Project-VC interaction is not identified, a rationale is provided to explain its exclusion from the assessment.

Following the identification of Project-VC interactions, mitigation and best management practices are outlined to lessen or eliminate the potential interaction between the Project and VCs. Then, the anticipated Project-VC interactions following the planned application of mitigation are characterized, and potential environmental effects as a result of these interactions are predicted. The environmental assessment methodology involves the following generalized steps.

- **Scope of VC** – This involves the scoping of the assessment for the VC, and includes a definition of the VC and a rationale for its selection and a description of temporal and spatial boundaries. This step relies upon the scoping undertaken by regulatory authorities; consideration of the input of the public, stakeholders, and First Nations (as applicable); and the professional judgment of the Study Team.
- **Existing Conditions** – This step involves the establishment of existing (baseline) environmental conditions for the VC, in the absence of the Project. In many cases, existing conditions expressly and/or implicitly include those environmental effects that may be or may have been caused by other past or present projects or activities that have been or are being carried out. Existing conditions were defined based on both desktop information sources as well as confirmatory field work in the PDA and LAA.
- **Assessment of Project-VC Interactions** – Project interactions with each VC are assessed. The assessment includes:
    - a description of how a potential interaction could occur (in the absence of mitigation);
    - a discussion of the mitigation and environmental protection measures that are proposed to avoid, reduce, or eliminate adverse interactions between the Project and the VC; and
    - a characterization of the interactions and prediction of potential environmental effects that could occur as a result of the interactions. All phases of the Project are assessed, as are accidents, malfunctions, and unplanned events. The evaluation also considers the effects of the environment on the Project.
- **Summary** – A summary of the assessment for the VC is provided, leading to an overall conclusion in respect of the interactions and associated effects of the Project on the VC. The summary also outlines the planned follow-up confirmatory field studies and/or predictive modelling that is recommended for each VC in order to confirm the predicted environmental effects.

Biological field studies to inform existing conditions were conducted during the spring and summer of 2020. Some further confirmatory field surveys may be completed prior to the start of the decommissioning activities for the Project, if required. The results of the follow-up surveys will be made available to the NBDELG in supplementary reports, as applicable.

5.0 Assessment of Environmental Interactions with the Project

An assessment of the environmental effects of the Project on each of the identified valued components (VCs) is provided in this chapter.

In this chapter, following an identification of Project interactions with the environment, potential environmental effects in the absence of mitigation are described at a high level with a view to determining if an interaction between the Project and the VC could occur. The identification of Project-VC interactions is done for each Project phase in a matrix format (see **Section 5.1**, Project Interactions with the Environment) to determine which potential interactions may occur; justification is provided for those VCs for which the Project is not expected to interact.

Then, for each VC for which an interaction with the Project was identified, a more detailed assessment is provided in a standalone section whereby: the scope of the VC is defined; existing conditions are established; potential interactions without mitigation are identified; mitigation to avoid, reduce, or eliminate adverse environmental interactions are described; and residual interactions after the application of mitigation are described.

The identification of potential interactions between the Project and the VCs will be undertaken in consideration of the nature of the Project, its planned activities.

5.1 Project Interactions with the Environment

The potential interactions with the surrounding environment have been considered in terms of the current plans for decommissioning, demolition, removal, and restoration activities associated with the Project as planned. Accidents and malfunctions can be referenced in **Section 7.0**.

This initial screening (i.e., project interaction matrix) assists in determining if an interaction between the activities being carried out in each phase/activity of the proposed Project and the VC is possible. A qualitative rating system was used to evaluate the potential for interactions between the Project and the environment. One of the following two ratings was prescribed for each individual VC:

- An interaction between the Project and the environment could occur (which is identified with a checkmark in the matrix below), which are carried forward for further assessment; or
- No interaction occurs between the Project and the environment, and therefore no further assessment is required and the issue is not discussed further.

Based on the Project Description (refer to **Section 2.0**), the Environmental Setting (refer to **Section 3.0**), and the scope of the EIA (refer to **Section 4.0**), the potential interactions between the Project and the environment are summarized in **Table 5.1.1** below.

Table 5.1.1: Potential Interactions Between the Project and the Environment

Valued Component (VC)	Project Phases	
	Decommissioning, Demolition, and Removal of the Milltown Station	River Improvements for Multi-Species Volitional Fish Passage
Atmospheric environment	✓	-
Acoustic environment	✓	-
Groundwater	✓	-
Surface water	✓	✓
Fish and fish habitat	✓	✓
Vegetation and wetlands	✓	✓
Wildlife and wildlife habitat	✓	✓
Socioeconomic environment	✓	✓
Heritage resources	✓	✓
Traditional land and resource use	✓	✓

Legend: ✓ = Potential interaction

In the table above, the interaction with a particular VC is identified when the interaction first occurs. VCs for which an interaction occurs are carried forward in the environmental effects assessment in **Sections 5.2** to **5.11**, below. The following sections are organized by VC, and describe: the scope of each VC; their existing conditions (based on the qualitative assessments described herein); potential interactions that could occur between the Project and the VC in the absence of mitigation; planned mitigation to offset, reduce or eliminate predicted adverse interactions; and residual interactions that may occur after the implementation of site specific and general mitigation and lead to unmitigated environmental effects. Furthermore and where applicable, specific follow-up or monitoring plans to verify the effects predictions or the effectiveness of mitigation will be described.

5.2 Atmospheric Environment

The potential interactions between the Project activities and the atmospheric environment are assessed in this section.

5.2.1 Scope of VC

The atmospheric environment is defined as the layer of air above the earth's surface to a height of approximately 10 km. The atmospheric environment includes air quality and climate (including greenhouse gases), which are characterized as follows:

- Air quality is characterized by the composition of the ambient air, including the presence and quantity of air contaminants in the atmosphere in comparison to applicable air quality objectives; and

- Climate is characterized by the long-term historical seasonal weather conditions of a region, which can include temperature, humidity, precipitation, sunshine, cloudiness, and winds. Statistical climate data are typically averaged over a period of several decades, and climate "normals" are normally based on historical averages and extremes over a period of 30 years. Project-based releases of greenhouse gases (GHGs), such as carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O), are typically used as an indicator of the potential for environmental interactions with climate change. It is understood that GHG releases on a global scale from both natural processes/sources and human activities are increasing global concentrations of GHGs in the atmosphere and they contribute to climate change.

The atmospheric environment has been selected as a valued component (VC) because the atmosphere helps maintain the health and well-being of humans, wildlife, vegetation, and other biota. Emissions from the Project to the air may cause adverse environmental effects through the various transport, dispersion, deposition, and transformation processes that occur in the atmosphere.

The atmospheric environment constitutes a VC due to:

- Emissions of contaminants to the atmosphere during decommissioning, demolition, removal, and restoration activities, which may present a pathway for humans and biota to be exposed to air contaminants;
- Provisions regarding air contaminant emissions under the New Brunswick *Air Quality Regulation*; and/or
- Releases of GHGs and their accumulation in the atmosphere influence global climate and may affect emission reduction targets for GHGs that have been set or are being developed federally and provincially.

This assessment of the atmospheric environment considers the air contaminants that are typically associated with this type of project, which are regulated provincially (and in some cases federally). These air contaminants are generated from fuel combustion and fugitive dust generated from the movement of mobile equipment and material transfer mechanisms during various decommissioning activities. For the Project components and activities assessed herein, combustion gases (including but not limited to sulphur dioxide [SO_2], carbon monoxide [CO], and nitrogen oxides [NO_x]), and particulate matter (PM) are considered to be the potential contaminants of concern relating to air quality. Releases of GHGs from the combustion of fossil fuels in mobile equipment are also considered in relation to the potential for interactions with climate change.

Air quality in New Brunswick is regulated pursuant to the New Brunswick *Air Quality Regulation* under the *Clean Air Act*. Federally, the main instrument for managing air quality is the *Canadian Environmental Protection Act* (CEPA) as well as Canada-Wide Standards developed by the Canadian Council of Ministers of the Environment (CCME). The recently enacted Canadian Ambient Air Quality Standards (CAAQS) developed by the CCME provide additional ambient limits for nitrogen dioxide (NO_2), and additional standards for SO_2, fine particulate matter, and ozone (O_3) have been proposed.

New Brunswick's *Air Quality Regulation* specifies maximum permissible ground-level concentrations for five air contaminants, namely total suspended particulate (TSP), CO, SO_2, NO_2, and hydrogen sulphide (H_2S). The criteria in the regulation are based on the National Ambient Air Quality Objectives (NAAQOs), although the two do differ slightly, as presented in **Table 5.2.1**. The Regulation is legally binding in New Brunswick, whereas the NAAQOs are guidelines used as a benchmark to assess the effects of air pollutants.

Table 5.2.1: Ambient Air Quality Standards and Objectives

		New Brunswick *Air Quality Regulation*	National Ambient Air Quality Objectives (NAAQO)	
Air Contaminant	**Averaging Period**	**Maximum Permissible Ground Level Concentration (µg/m³)**	**Maximum Acceptable Level (µg/m³)**	**Maximum Desirable Level (µg/m³)**
Total suspended particulate (TSP)	24 hour	120	120	--
	Annual	70 (geometric mean)	70	60
Carbon monoxide (CO)	8 hour	15,000	15,000	6,000
	1 hour	35,000	35,000	15,000
Nitrogen dioxide (NO_2)	1 hour	400	400	--
	24 hour	200	--	--
	Annual	100	100	60
Sulphur dioxide (SO_2)	1 hour	450*	900	450
	24 hour	150*	300	150
	Annual	30*	60	30
Hydrogen sulphide (H_2S)	1 hour	15	--	--
	24 hour	5	--	--

Sources: New Brunswick Regulation 97-133.
Note: NAAQO uses conditions of 25 °C and 101.3 kPa in converting from µg/m³ to ppm.
Note: * SO_2 standard applicable in Saint John, Charlotte, and Kings Counties.

5.2.2 Existing Conditions

Existing (baseline) conditions with respect to the atmospheric environment are discussed in this section.

5.2.2.1 Ambient Air Quality

The air quality can be defined from historical air quality monitoring conducted in the region for the key contaminants of concern. There is no single monitoring station within the immediate vicinity of the Project, nor one regionally that collects data for every parameter. Therefore, for the purpose of this EIA Registration, air quality is characterized using data collected more regionally from several monitoring stations. Data collected from New Brunswick's monitoring station at St. Andrews (approximately 22 km

southeast of the Station) is used as it is the closest representative station to the Project site; these data are supplemented by data from a station operated by Lake Utopia Paper (GNB 2020a) as well as values summarized for Eastern Maine by the Maine Department of Environmental Protection (Maine DEP 2020). The maximum measured concentrations for the respective averaging periods of each contaminant spanning the last 3 years (2017-2019) from the monitoring data are presented in **Table 5.2.2**.

Table 5.2.2: Ambient Monitoring Data – 2017-2019 Maximums

Air Contaminant	Averaging Period	St. Andrews	Lake Utopia[A]	Eastern Maine[B]
Particulate matter less than 2.5 microns ($PM_{2.5}$) ($\mu g/m^3$)	24 hour	14	-	17
	Annual	5	-	5
Carbon monoxide (CO) ($\mu g/m^3$)	1 hour	-	-	365
	8 hour	-	-	322
	Annual	-	-	-
Nitrogen dioxide (NO_2) ($\mu g/m^3$)	1 hour	55	-	43
	Annual	7	-	4
Sulphur dioxide (SO_2) ($\mu g/m^3$)	1 hour	-	105	24
	24 hour	-	32	11
	Annual	-	7	1

Notes:

- = not reported

[A] Data available are limited to November 22, 2019 to December 31, 2019

[B] Eastern Maine Rural Values

In consideration of the data presented in **Table 5.2.2** above, the ambient air quality in the Milltown area is generally very good. The maximum reported values for each contaminant are well below their respective ambient air quality standards and objectives.

5.2.2.2 Climate

New Brunswick has a humid continental climate, with slightly milder winters on the Gulf of St. Lawrence coastline. Northern New Brunswick experiences a subarctic climate, particularly in the more elevated area in the far north. Southern New Brunswick experiences a more moderate maritime climate than the northern or central parts of the province since the Bay of Fundy never fully freezes, thus moderating the winter temperatures and providing generally cooler summer temperatures compared to other inland locations. The cold Bay of Fundy air combining with the inland warmer temperatures often creates onshore winds and periods of fog.

Climate normals from the nearest representative weather station (located in Pennfield) are presented in **Table 5.2.3** below. Data at the Pennfield weather station are limited to temperature and precipitation; therefore, climate normals from the Saint John (A) Airport weather station are also presented in **Table 5.2.4** to capture other parameters.

Table 5.2.3: Climate Normals, Pennfield, New Brunswick (1981-2010)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Temperature Normals, Pennfield (1981 - 2010)													
Daily Average (°C)	-7.1	-5.5	-1.5	4.0	8.7	12.8	15.6	15.6	12.4	7.6	2.7	-3.4	5.2
Daily Maximum (°C)	-1.9	0.0	3.4	9.0	14.3	18.5	21.1	21.3	18.1	12.8	7.0	1.4	10.4
Daily Minimum (°C)	-12.3	-10.9	-6.3	-1.0	3.1	7.0	10.0	10.0	6.8	2.4	-1.6	-8.2	-0.1
Precipitation Normals, Pennfield (1981 - 2010)													
Rainfall (mm)	73.1	60.6	84.9	105.8	130.2	111.0	107.3	98.0	120.9	115.8	132.2	97.9	1,237.7
Snowfall (cm)	53.5	40.7	45.2	10.3	0.0	0.0	0.0	0.0	0.0	0.1	8.3	34.1	192.0
Precipitation (mm)	126.6	101.3	130.1	116.0	130.2	111.0	107.3	98.0	120.9	115.8	140.4	132.0	1,429.7

Source: Canadian Climate Normals (GOC 2020a)

Table 5.2.4: Climate Normals, Saint John A (Saint John Airport), New Brunswick (1981-2010)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Temperature Normals, Saint John (1981 - 2010)													
Daily Average (°C)	-7.9	-7.1	-2.5	3.7	9.5	14	17.1	16.8	13	7.6	2.3	-4.4	5.2
Daily Maximum (°C)	-2.5	-1.5	2.4	8.5	15	19.6	22.6	22.4	18.2	12.3	6.4	0.5	10.3
Daily Minimum (°C)	-13.3	-12.6	-7.4	-1.2	3.9	8.4	11.6	11.2	7.7	2.8	-1.9	-9.3	0
Precipitation Normals, Saint John (1981 - 2010)													
Rainfall (mm)	66.1	49	66.6	85.7	108.5	101	88.4	81.7	105.6	115.8	123.7	84	1,076
Snowfall (cm)	64.3	48.4	44.4	20	1.2	0	0	0	0	0.5	10.8	49.9	239.6
Precipitation (mm)	123.5	91	108.2	105.3	109.8	101	88.4	81.7	105.6	116.4	134.1	130.4	1,295.5
Wind Normals, Saint John (1981 - 2010)													
Average Wind Speed (km/h)	16.9	17.1	17.5	17.2	15.4	13.4	12	11.3	13	15.1	16.4	17.1	15.2
Most Frequent Wind Direction*	NW	NW	N	N	S	S	S	S	SW	SW	NW	NW	SW
Maximum Hourly Wind Speed (km/h)	111	100	80	85	64	61	76	68	97	89	89	83	Not applicable
Direction of Maximum Hourly Speed*	SW	S	S	N	S	S	W	N	S	N	S	S	Not applicable

Source: Canadian Climate Normals (GOC 2020b)

Note: * indicates the direction from which the wind is blowing.

Greenhouse gas emissions in Canada totalled 729 million tonnes (Mt CO_2e, as CO_2-equivalents) in 2018 (ECCC 2020a), as published in Canada's most recent annual report on greenhouse gas emissions. Total greenhouse gases for New Brunswick were 14.3 Mt CO_2e in 2017 (the most recent year for which New Brunswick data are available), whereas they were 16.1 Mt CO_2e in 1990 and 20.0 Mt CO_2e in 2005. Since 2005, New Brunswick has seen a 28.5% decrease in total greenhouse gas emissions.

5.2.3 Assessment of Potential Interactions between the Project and the Atmospheric Environment

The environmental effects of the Project on the atmospheric environment are assessed in this section.

5.2.3.1 Potential Interactions

Without mitigation, the Project could interact with the atmospheric environment in several ways:

- Emissions of combustion gases from heavy equipment and vehicles associated with on-site decommissioning, demolition, removal, and restoration activities, and from transport of materials on- and off-site, could result in air contaminants that could disperse in the atmosphere to off-site receptors;
- Emissions of fugitive dust from structure demolition and removal and associated earth moving activities, and from transport of materials on- and off-site during decommissioning could be generated and disperse in the atmosphere to off-site receptors; and
- The operation of mobile equipment and on-site trucks during decommissioning activities could result in emissions of greenhouse gases.

5.2.3.2 Mitigation

The following mitigation measures will be implemented to reduce environmental effects on the atmospheric environment:

- Vehicles and equipment will be maintained in proper working order;
- Limiting the conduct of intrusive activities to 7:00 a.m. to 7:00 p.m., Monday to Saturday; and
- Instituting and following a non-idling policy.

5.2.3.3 Characterization of Potential Interactions Following Mitigation

Emissions during the decommissioning, demolition, removal, and restoration activities are expected to be primarily related to the operation of heavy mobile equipment used in such activities. These activities have the potential to result in changes to the local air quality through the generation of fugitive dust and particulate matter from material movement as well as combustion emissions associated with the heavy equipment.

Emissions associated with the decommissioning activities were estimated, based on published emission factors and the anticipated type of heavy equipment to be used and their anticipated operation periods. The decommissioning will consist primarily of demolition and material movement activities using rock breakers and excavators, with material movement on and off-site via dump trucks. A rock

breaker/excavator (also referred to as a hydraulic jackhammer) will also be used to break up concrete structures prior to material removal via excavator and subsequently by dump truck. Bulldozers and front end loaders may be used during site restoration activities. Given that engineering refinements for the Project are ongoing at this time, and in the absence of specific information regarding the need for specific types of equipment, phasing and sequencing of the activities, and the duration of these activities at this time, the emissions were estimated based on conservative assumptions around the number and operating duration of various heavy equipment, as summarized in **Table 5.2.5**.

Table 5.2.5: Summary of Estimated Heavy Equipment During Decommissioning

Equipment	No. of Units Assumed	Assumed Daily Operation (hours)	Assumed Activity Duration (months)
Excavator	2	10	6
Rock Breaker/Drill Excavator	1	10	6
Dump Truck	2	10	6
Flat Bed Trailer	1	10	10

Though it is not likely in practice that all of these equipment will be operating simultaneously and continuously as listed, it was conservatively assumed that they would be, so as to cover off potential intermittent use of other comparable or smaller equipment use on-site (such as bulldozers, skid-steer loaders, etc.) and to be conservative in the emissions calculations in the absence of more detail in this regard.

Fugitive emissions of particulate matter will largely be localized to the activity at the site and primarily a result of demolition, rock breaking, and hauling of material. Due to the limited footprint of the Project, the temporary nature of the activities, and the composition and/or moisture content of the majority of the materials being handled, fugitive emissions, if any, are expected to be nominal, very localized and are not anticipated to be perceived off-site nor to contribute to ambient air quality in a substantive way. They have therefore not been quantified as part of the emissions estimation.

Estimates of emissions associated with decommissioning are summarized in **Table 5.2.6**.

Table 5.2.6: Estimated Emissions Associated with Decommissioning (From Heavy Equipment Use)

Air Contaminant	Estimated Emissions throughout the Duration of the Project (tonnes)
Particulate Matter (PM)	0.59
Particulate Matter less than 10 microns (PM_{10})	0.59
Particulate Matter less than 2.5 microns ($PM_{2.5}$)	0.59
Carbon Monoxide (CO)	3.2
Nitrogen Oxides (NO_X)	9.5
Sulphur Dioxide (SO_2)	0.013
Carbon Dioxide (CO_2)	2,024

As evidenced by the data in **Table 5.2.6** above, emissions associated with fuel combustion in heavy equipment used for the Project are very low in comparison to those associated with other industrial developments and are thus not expected have a substantive effect on local or regional air quality.

With respect to climate, total greenhouse gas emissions associated with the Project are estimated to be 2,024 tonnes, which represents approximately 0.014% of New Brunswick's last reported total of 14.3 Mt CO_2e in 2017. Given the relatively low magnitude of emissions and that emissions will not continue in future years after the decommissioning activities, no further action is taken in the analysis as per the guidance provided in the document titled *Incorporating Climate Change Considerations in Environmental Assessment: General Guidance for Practitioners* (CEA Agency 2003).

5.2.4 Summary

The effects of decommissioning, demolition, removal, and restoration activities on ambient air quality due to fugitive dust and emissions from equipment are expected to be temporary, very localized and minimal, using standard and site-specific mitigation as identified. Appropriate mitigative measures will be taken when required to ensure potential nuisance dust levels are controlled such that they do not cause an exceedance of ambient air quality standards at the property line. It is unlikely that emissions will exceed New Brunswick or federal air quality standards or objectives beyond the property boundary for the Project.

Greenhouse gas emissions from the Project are not anticipated to materially contribute to overall emissions in the region given that emissions are temporary and represent less than 0.014% of annual greenhouse gas emissions in the province.

In light of the above, the potential interactions between the Project and the atmospheric environment are not expected to be substantive.

Given the relatively straightforward nature of the Project, the limited activities arising from it, and the anticipated lack of substantive interactions with the atmospheric environment, no follow-up or monitoring is proposed to monitor environmental interactions with the atmospheric environment.

5.3 Acoustic Environment

The potential interactions between the Project and the acoustic environment are assessed in this section. We first provide an overview of the existing environment as it pertains to the acoustic environment, then conduct an evaluation of potential interactions on the acoustic environment, and then present a plan for follow-up and monitoring throughout the duration of the Project.

5.3.1 Scope of VC

The acoustic environment focuses on ambient noise within the LAA, both natural and human-made. It is identified as a VC because noise is defined as a contaminant in the New Brunswick *Air Quality Regulation – Clean Air Act*, and noise levels may be of concern in relation to human health, socioeconomic values, and in relation to potential disturbance of ecological functions.

Potential changes to the acoustic environment may affect humans and wildlife. Components considered under this VEC are sound pressure levels that could affect nearby receptors. Unwanted changes to sound pressure levels that are nuisance is generally referred to as noise.

The assessment of potential interactions on the acoustic environment is characterized by the type, frequency, intensity, and duration of noise (unwanted sound) in the outdoor environment. Vibration, or oscillation in matter that may lead to noise or stress in materials of adjacent structures, is also considered as an element of the acoustic environment.

Specific regulations or guidelines related to sound quality have not been established in New Brunswick and may be addressed through the Certificate of Approvals process for industrial facilities under the *Air Quality Regulation*. In the absence of local guidance, the following generally accepted criteria that have been applied in Certificates of Approval in New Brunswick in the past are proposed for the purpose of the assessment (Glynn, M., pers. comm., 2012):

- 65 A-weighted decibels (dBA) measured as a 1-hour equivalent sound level (Leq) from 6:00 a.m. to 10:00 p.m. (daytime); and
- 55 dBA measured as a 1-hour Leq from 10:00 p.m. to 6:00 a.m. (nighttime).

5.3.2 Existing Conditions

The emission of sound waves from natural and human-made sources, their propagation through the atmosphere, and their detection through auditory or other means at a noise sensitive receptor in the ambient environment characterizes sound quality. Sound pressure levels in units of dBA are the typical measure of sound. The A-weighting scale is the most commonly used scale for expressing the perception of audible noise by humans.

The potential acoustic sensitive receptors within a 1 km radius of the PDA are illustrated on **Figure 5.3.1**. An acoustic sensitive receptor, for the purpose of this assessment, is defined as a residential building, a nursing home, hospital, school, or daycare facility.

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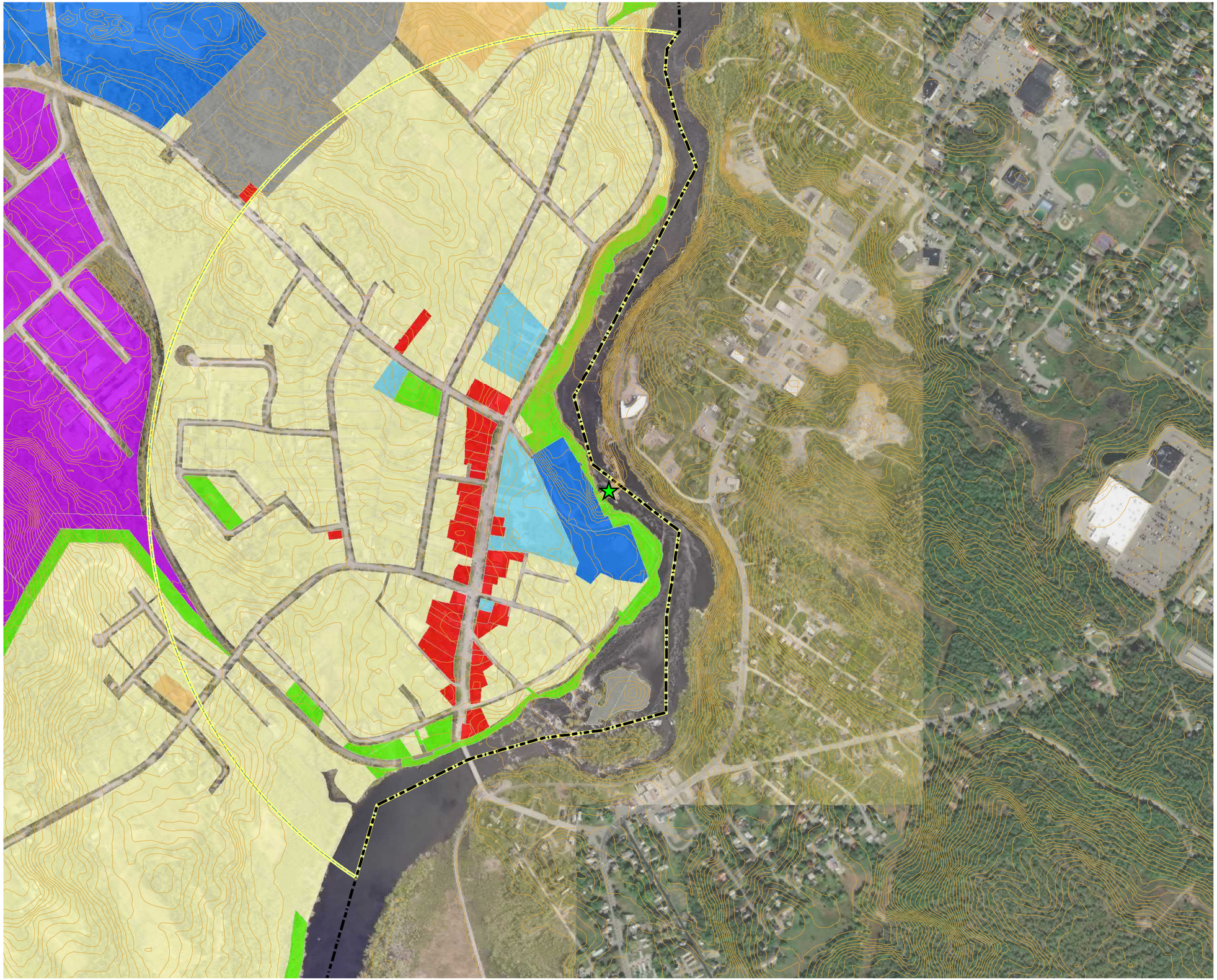


MILLTOWN GENERATING STATION DECOMMISSIONING PROJECT

ENVIRONMENTAL IMPACT ASSESSMENT REGISTRATION

POTENTIAL NOISE SENSITIVE RECEPTORS WITHIN 1 KILOMETRE OF PROJECT

FIGURE 5.3.1

- Project Location
- Contours (1m)
- Canada-USA Border
- Acoutic VC Local Assessment Area
- Light Industrial
- RLL (Land Lease Residential)
- FD (Future Development)
- Residential
- Commercial
- Park and Open Space
- Institutional
- Heavy Industrial

0 50 100 200 m

SCALE 1:8,000

N W E S

MAP DRAWING INFORMATION: CANVEC
SERVICE LAYER CREDITS: ESRI, HERE, GARMIN, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), SWISS TOPO, OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY
DATA PROVIDED BY: DILLON CONSULTING LIMITED, NB DEPARTMENT OF NATURAL RESOURCES, INTERNATIONAL BOUNDARY COMMISSION
TOWN OF ST. STEPHEN

MAP CREATED BY: SCM
MAP CHECKED BY: JAB
MAP PROJECTION: NAD_1983_CSRS_New_Brunswick_Stereographic

DILLON CONSULTING

PROJECT: 19-1594

DATE: 2020-01-22

The Milltown Station is located in St. Stephen, Charlotte County, New Brunswick. Since no baseline noise monitoring has been completed for the Project to date, the baseline noise levels assumed to be present at or near the Station were estimated using guidance provided by Health Canada (2017), Alberta Energy Regulator (AER 2007), and United States Environmental Protection Agency (US EPA 1974). Based on the population density (Statistics Canada 2020) and the lack of other potential significant noise sources within the LAA, it was determined the noise levels within the LAA are typical of a normal suburban residential area, with estimated baseline sound levels of approximately 53 - 57 dBA (US EPA 1974 and AER 2007). An average baseline sound level of 55 dBA is assumed for the purpose of this EIA Registration. The locations of the nearest noise sensitive receptors to the Milltown Station are presented in **Table 5.3.1** and **Figure 5.3.2**.

Table 5.3.1: Nearest Noise Sensitive Receptors to the Project

Receptor ID	Receptor Address	Receptor Description	Linear Distance from the Station (m)
R1	388 Milltown Blvd.	Two storey residential	325
R2	1 Mill Lane	Two storey residential	190
R3	430 Milltown Blvd.	Milltown Elementary School	115
R4	1 Riverside Drive	Two storey residential	146

5.3.3 Assessment of Potential Interactions between the Project and the Acoustic Environment

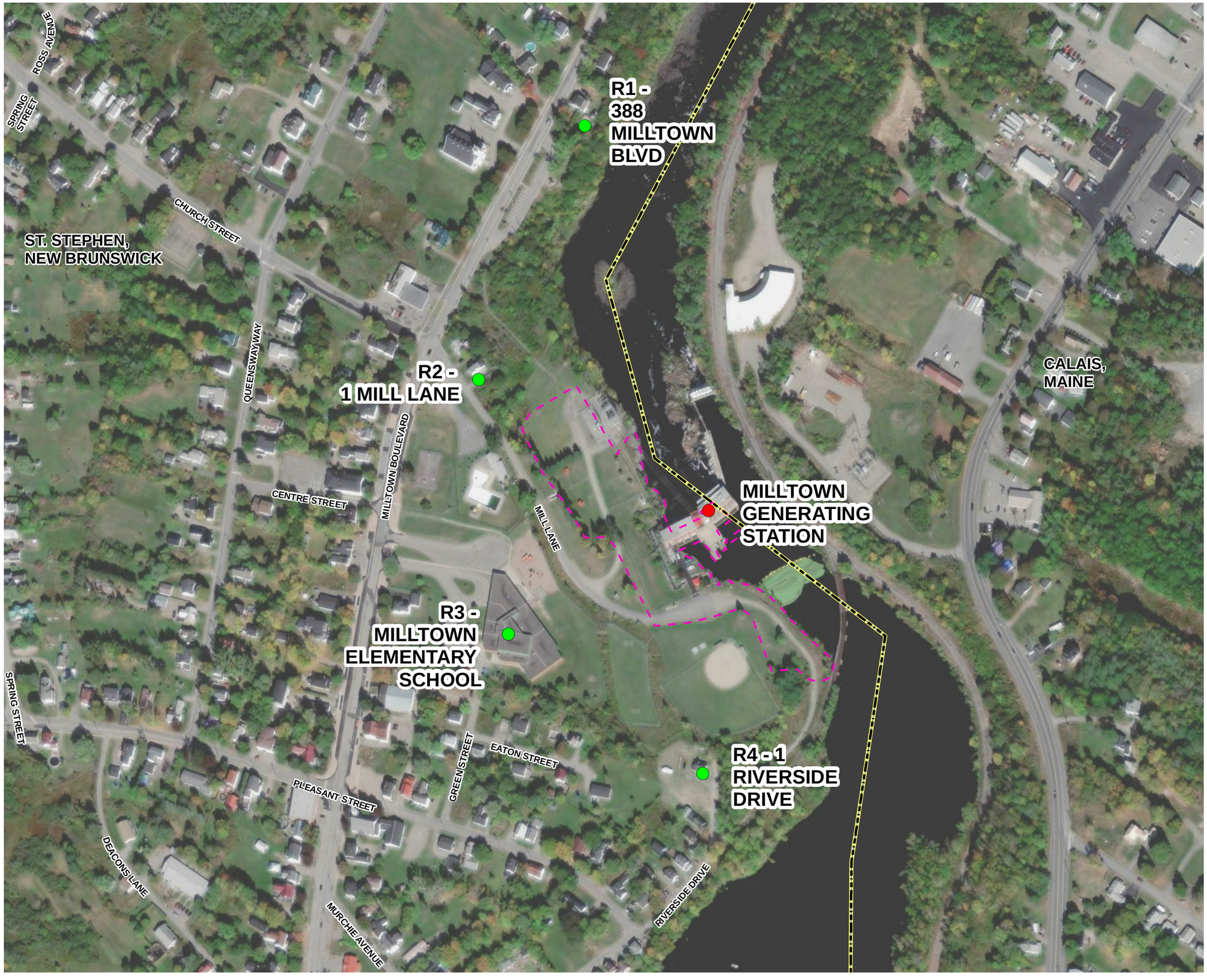
The potential interactions between the Project and the acoustic environment are assessed in this section.

5.3.3.1 Potential Interactions

Without mitigation, the Project could produce changes in the acoustic environment at nearby acoustic sensitive receptors as follows:

- Noise emissions from the removal of equipment from the Milltown Station; and
- Noise emissions during the demolition and removal of the Milltown Station and related facilities.

The typical sound levels of the area of approximately 55 dBA is considered to be the baseline scenario and representative of existing environmental conditions. Effects to the acoustic environment after the removal of the Milltown Station are outside the scope of this assessment and are therefore not considered further.



Énergie NB Power

F

- Source
- Receptor
- NBRoads
- Canada-USA Border
- Project Development Area
- Local Assessment Area: Acoustic Environment

0 25 50 100 m

SCALE 1:3,000

N W E S

MAP DRAWING INFORMATION: CANVEC
SERVICE LAYER CREDITS: ESRI, HERE, GARMIN, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), SWISS TOPO, OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY
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TOWN OF ST. STEPHEN

MAP CREATED BY: SCM
MAP CHECKED BY: JAB
MAP PROJECTION: NAD 1983 CSRS New Brunswick Stereographic

DILLON CONSULTING

PROJECT: 19-1594

DATE: 2020-11-26

5.3.3.2 Mitigation

The following mitigation measures will be used to control nuisance noise during decommissioning, demolition, removal, and restoration activities associated with the Milltown Station:

- Scheduling restrictions, where possible (or alternative mitigation implemented), to ensure that demolition activities with elevated noise emissions occur during the daytime (7:00 a.m. to 7:00 p.m. from Monday to Saturday);
- Limit activities that generate impulsive noise (e.g., rock breaking) to the daytime (7:00 a.m. to 7:00 p.m.), Monday to Saturday, without exception. Only non-intrusive activities will occur during the night time (7:00 p.m. to 7:00 a.m.), on Sundays, or on statutory holidays;
- Vehicles and equipment shall be maintained in good working order with quality mufflers;
- Requirements will be in tenders clauses that assure minimization of noise;
- Regular discussions will be conducted with workers and contractors on noise minimization practices;
- NB Power will ensure drivers know the designated vehicle routes, parking locations, idling policy, normal delivery hours, and use of engine brakes policy; and
- Use of standard NB Power communication procedures, via telephone or email, to communicate with local residents who have questions or concerns related to Project-related noise.

5.3.3.3 Characterization of Potential Interactions Following Mitigation

Potential interactions following the application of mitigation are assessed below.

New Brunswick has no specific regulations or guidelines for noise; therefore, the generally accepted criteria of 65 dBA for the daytime will be used. Intrusive noise-producing activities associated with decommissioning, removal, demolition, and restoration activities will be restricted to 7:00 a.m. to 7:00 p.m., Mondays to Saturdays, and will not be conducted at night time (7:00 p.m. to 7:00 a.m.), on Sundays, or on statutory holidays.

Activities related to decommissioning, demolition, removal, and restoration as part of the Project have the potential to result in noise emissions with potential disturbance effects for humans, with a particular focus on demolition activities in the text that follows as those are the activities that are anticipated to generate the greatest noise levels as part of the Project. During the removal of equipment and demolition of the Milltown Station, sound emissions are expected to be primarily related to operation of heavy equipment and related demolition activities. To determine the potential interactions the demolition activities have on nearby receptors, acoustic modelling of the potential sound emissions and their associated levels at the four discrete acoustic sensitive receptors was undertaken. The four acoustic sensitive receptors where modelling was undertaken are the same four receptors identified in **Table 5.3.1** and **Figure 5.3.2**. Modelling was conducted for the removal of equipment and demolition phase, no noise modelling was completed for post-removal as it is beyond the scope of this EIA Registration.

The United States Department of Transportation, Federal Highway Administration Roadway Construction Noise Model (RCNM) (USDOT 2006) was used to predict noise levels from the demolition activities. While the model was initially designed to predict the change in sound levels from the construction of highways, it has been used throughout Canada and the United States on a wide variety of construction sites. Preliminary demolition information indicates that excavators, rock breaker/concrete drill excavator, dump trucks, and flatbed trailer will be utilized throughout the Project. A list of anticipated construction equipment, and the measured sound pressure levels (USDOT 2006) associated with them, is provided in **Table 5.3.2**.

Table 5.3.2: Typical Construction Equipment Sound Pressure Levels (USDOT 2006)

Description	Maximum (Lmax, dBA measured at 15 m from the equipment)	Assumed Number of Each Type of Equipment Used During Construction
Dump Truck	76.5	2
Excavator	80.7	2
Rock Breaker/Concrete Drill Excavator	90	1
Flatbed Truck	84	1

The RCNM was used to predict the Leq at the four discrete receptor locations that were identified in **Table 5.3.1**. The number and types of each equipment operating at a given time were presented in **Table 5.3.2**. During the modelling, the equipment operating was assumed to be conservatively operating 12 hours a day, seven days a week, from 7:00 a.m. to 7:00 p.m. It was conservatively assumed for modelling purposes that some demolition activities will occur during the evening and night as well on weekends, but these non-intrusive activities will be conducted largely inside the buildings at the Milltown Station and will not generate any appreciable external noise beyond the property line of the Milltown Station. Demolition activities will not occur at night, on Sundays, or on statutory holidays. The predicted demolition sound pressure levels for the daytime period at each discrete receptor location are presented in **Table 5.3.3**.

Table 5.3.3: Model Predicted Daytime External Sound Levels during Demolition at Each of the Four Potential Receptor Locations

Receptor ID	Potential Receptor Address (Subject to Landowner Permission)	Receptor Description	Calculated Leq (dBA)
R1	388 Milltown Blvd.	Two storey residential	57
R2	1 Mill Lane	Two storey residential	57
R3	430 Milltown Blvd.	Milltown Elementary School	61
R4	1 Riverside Drive	Two storey residential	59

The predicted demolition sound levels will be noticeable over the baseline noise levels at the four receptors due to the impulsive noise from the rock breaker/concrete drill excavator used on-site.

Receptors R1, R2, and R4 are all two storey residential receptors, and while the predicted sound levels are noticeable over baseline conditions, they will be short-term and limited to the hours between 7:00 a.m. and 7:00 p.m. and are below the daytime criteria of 65 dBA.

Model predicted exterior sound levels at R3, Milltown Elementary School, are below the daytime criteria of 65 dBA. For schools, the World Health Organization (WHO) recommends an ideal background noise level of 35 dBA within the classroom (WHO 1999). Using the RCNM, a recommended outside-to-inside noise reduction (OINR) of 27 dBA (USDOT 2006; Health Canada 2017) and a 5 dBA shielding to account for the change in elevation between the receptors (USDOT 2006), the predicted sound levels within the classroom are 34 dBA, just below the recommended threshold of 35 dBA.

5.3.4 Summary

During the demolition activities for the Milltown Station, sources of noise are expected to be primarily related to operation of heavy equipment and related demolition activities. Demolition-related activities have the potential to result in changes in local noise levels due to the operation of heavy equipment. Noise levels associated with demolition activities are expected to be fairly localized, short-term, and reversible. As such, and in consideration of the noise modelling results being less than the recommended levels provided in guidance from regulatory agencies, the potential interactions of the Project-related activities on the acoustic environment are not expected to be substantive.

Should elevated noise levels be noticed while carrying out the Project, or in response to any noise complaints from members of the public, NB Power may conduct noise monitoring to determine if sound pressure levels have the potential to exceed, or are exceeding, the above-noted noise thresholds. Results of any acoustic monitoring conducted will be used to validate the assumptions and, if necessary, re-run predictive models and may lead to the inclusion of additional mitigation measures, if required. Periodic noise monitoring may also be conducted during demolition activities as spot-checks to ensure compliance with noise guideline levels and/or in response to noise complaints.

5.4 Groundwater

The potential interactions between the Project and groundwater resources are assessed in this section.

5.4.1 Scope of VC

Water is essential for life on Earth. As humans, we need water for drinking, bathing, sanitation, recreation, and for the production of food and goods. Fish, birds, animals, and plants also rely on the availability of water to live and flourish. Changes in the availability of water, both in the amount of water and the quality of the water, may affect the lives of people and other living things.

Groundwater is considered a valued component (VC) as it is an important part of the hydrologic cycle through infiltration of precipitation or surface water, and it is important to local ecosystems and for potable water supplies. Due to the presence of groundwater at and around the site, there is potential for this resource to be affected by the Project through changes in groundwater quality or quantity.

In general, groundwater flows from recharge areas (areas of high elevation) to discharge areas (areas of low elevation), which are commonly lakes, streams, and rivers. Groundwater is contained in aquifers, which are geological units such as gravels, sands, or fractured bedrock. The natural quality of the groundwater contained in aquifers varies depending on the geochemical composition of the material (i.e., soil, sediment and/or bedrock) in which the water flows.

5.4.1.1 Regulations and Policies Relevant to Groundwater

Where applicable, the Project will adhere to standard provincial and federal government legislation and associated regulations, including the following:

Federal

- Canadian Council of Ministers of the Environment (CCME) Environmental Quality Guidelines (CCME 1999); and
- Guidelines for Canadian Drinking Water Quality (GCDWQ; Health Canada 2017) – administered by Health Canada (rev. 2019).

Provincial

- *Clean Water Act* – administered by NBDELG; and
- *Clean Environment Act* – administered by the NBDELG.

5.4.2 Existing Conditions

The surficial geology of the area consists of basal glacial till generally between 1 m and 10 m thick. Basal glacial till is described as sediments that are laid down on the land surface beneath advancing glacial ice (Allard and Dickinson 1992). Depending on the permeability of the till, it can be used as a localized aquifer for groundwater.

The bedrock in the area is a granite-like igneous rock called the St. Stephen Gabbro Troctolite, which is technically comprised of olivine gabbro and minor anorthosite (Fyffe 1990). This bedrock can be fractured and be an aquifer for groundwater and a conduit for groundwater movement.

Based on the geology of the local area, groundwater, locally, is expected to flow towards the St. Croix River, while regional groundwater is expected to flow towards Passamaquoddy Bay and the Bay of Fundy.

Potable water in the Milltown/St. Stephen area is provided by the Town of St. Stephen through the Dennis Stream Watershed Protected Area in Maxwell Crossing, a groundwater supply that sources from a gravel deposit that is in direct connection to the Dennis Stream. The water supply is located approximately 7.5 km from the Milltown Station and is in a separate watershed from groundwater in the vicinity of the Station.

There is no publicly available information on the St. Stephen municipal water supply distribution system. However, it is known that some areas do not have access to the municipal water supply and have their own potable water supply wells. Therefore, a desktop review of the NBDELG's Online Well Log System (OWLS; NBDELG 2020) was completed to determine if potable wells were located in the general vicinity of the Milltown Station. For the OWLS data review, a search radius of 2 km was selected. It should be noted that the radial search is property based, and the OWLS will return wells that are affiliated with any property in which a portion of the property falls within the search radius. Therefore, the wells discussed may be located beyond the 2 km search radius surrounding the Project site. Another important limitation of the OWLS database is that it includes only wells that were completed after 1994; thus there may be other wells present in an area if they existing prior to that year.

The OWLS query yielded results for eight water wells near or within the 2 km radius surrounding the subject property (**Figure 5.4.1**). Two of the eight wells are located at the Milltown Station and will be decommissioned as part of the Project in accordance with the NBDELG's well decommissioning guidelines. The construction details of these wells as documented in the OWLS database are summarized in **Table 5.4.1** below.

Table 5.4.1: Well Construction Details for Eight Wells from the NBDELG OWLS Database within 2 km of the Milltown Station

Well Identification	Overall Well Depth (m bgs)	Well Casing Diameter (cm)	Well Casing Depth (m)	Estimated Safe Yield (L/min)[1]
DW1	56.39	15.24	7.32	54.6
DW2	9.75	15.24	7.92	0
DW3	7.92	15.24	7.92	0
DW4	7.92	15.24	7.01	0
DW5	45.72	15.24	13.72	182
DW6	14.94	15.24	14.94	341.25
DW7	88.39	15.24	6.1	31.85
DW8	30.48	15.24	14.02	22.75

Note:

[1]The estimated safe yield is based upon the well driller's estimate at the time of well drilling and development and may not represent the long term sustainability of the well.

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MILLTOWN GENERATING STATION DECOMMISSIONING PROJECT

ENVIRONMENTAL IMPACT ASSESSMENT REGISTRATION

POTABLE WELL LOCATIONS SURROUNDING THE MILLTOWN GENERATING STATION

FIGURE 5.4.1

- Project Location
- Project Development Area
- Local Assessment Area: Groundwater Environment
- Canada-USA Border
- Subject Parcel
- Property Boundary

0 50 100 200 m

SCALE 1:9,000

N W E S

MAP DRAWING INFORMATION: CANVEC
SERVICE LAYER CREDITS: ESRI, HERE, GARMIN, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), SWISS TOPO, OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY
DATA PROVIDED BY: DILLON CONSULTING LIMITED, NB DEPARTMENT OF NATURAL RESOURCES, INTERNATIONAL BOUNDARY COMMISSION

MAP CREATED BY: SCM
MAP CHECKED BY: JAB
MAP PROJECTION: NAD 1983 CSRS New Brunswick Stereographic

DILLON CONSULTING

PROJECT: 19-1594

DATE: 2020-01-27

Observed stratigraphy is recorded by the licensed well drillers during each well installation. Available information regarding observed stratigraphy as documented in the OWLS database is presented below in **Table 5.4.2**.

Table 5.4.2: Observed Stratigraphy of Eight Wells in the NBDELG OWLS Database within 2 km of the Milltown Station

Well Identification	Depth of Top of Zone (m)	Depth of Bottom of Zone (m)	Stratigraphy[1]
DW1	0	4.57	Brown Till
	4.57	56.39	Grey Slate
DW2	0	3.05	Brown Till
	3.35	6.71	Grey Clay
	6.71	7.92	Grey Broken Bedrock
	7.92	9.75	Grey Gravel
DW3	0	0.91	Brown Mud
	0.91	2.13	Grey Sand
	2.44	4.88	Grey Clay
	4.88	5.18	Grey Sand
	5.49	5.79	Grey Clay
	5.79	7.92	Brown and Grey Sand and Gravel
DW4	0	1.22	N/A
	1.22	2.44	Grey Sand
	2.44	5.18	Grey Clay
	5.18	7.92	Grey Sand and Gravel
DW5	0	1.52	Brown Mud and Gravel
	1.52	5.18	Brown Silt
	5.18	6.1	Grey Clay
	6.1	9.14	Blue Clay
	9.14	13.11	Grey Sand and Gravel
	13.11	23.16	Black Gravel
	23.16	24.99	Grey Gravel
	24.99	35.05	Black Gravel
	35.05	45.72	Grey Gravel

Well Identification	Depth of Top of Zone (m)	Depth of Bottom of Zone (m)	Stratigraphy[1]
DW6	0	3.35	Brown Gravel
	3.35	10.67	Brown Clay
	10.67	14.33	Brown Clay and Sand
	14.33	14.94	Grey Broken Rock
DW7	0	1.52	Brown Fill
	1.52	3.05	Black Mud
DW8	3.05	5.18	Brown Till
	5.18	88.39	White Granite
	0	13.41	Brown Sand
	13.41	21.34	Red and Grey Granite
	21.34	30.48	Grey Granite

Note:
[1]The stratigraphy is based upon the observations of drill cuttings made by the well driller at the time of drilling. The stratigraphy should be considered as a general description only and interpreted geologic unit.

In accordance with the New Brunswick *Clean Water Act*, the OWLS database does not attribute any reported water quality analytical data to its corresponding well. The OWLS database search completed as part of this assessment did not yield analytical data for any of the eight wells found within the search. Therefore, no information is available about groundwater quality in the general vicinity of the Project.

5.4.3 Assessment of Potential Interactions between the Project and Groundwater

The potential interactions between the Project and groundwater resources are assessed in this section.

5.4.3.1 Potential Interactions

The Project site is in and immediately adjacent to the St. Croix River, which is a regional discharge zone for groundwater. As the Project site is at the downstream end of the groundwater flow system (i.e., the St. Croix River), groundwater flow and groundwater quantity is unlikely to be adversely affected by the Project, given its limited disturbance and limited scope of activities to be carried out. However, there is a potential for Project-related activities to affect local groundwater quality.

Without mitigation, the Project may interact with groundwater in the following ways.

- Decommissioning activities at the Project site have a potential to cause increased turbidity and changes in groundwater quality in adjacent groundwater wells. This can occur when vibrations from machinery during decommissioning activities release trapped sediment/silt into the aquifer. These small particles of sediment/silt can cause unfavourable discolouration as well as alter water chemistry.

- Changes in the water level of the St. Croix River as a result of decommissioning activities may have a potential to affect the quantity of available water in local aquifers. As the water levels fluctuate and return to their natural elevations in the St. Croix River, groundwater aquifers directly connected to the river may also be affected.
- Water quality could be affected by accidental release of lubricants and/or fuels at the Project site during decommissioning activities. This could occur if wells that extract groundwater from aquifers directly connected to the St. Croix River were to contain lubricants and/or fuels, or any other chemicals used or stored on the Project site.
- Acid rock drainage can occur through exposure of sulphide-rich rocks in oxidizing environments. However, not all sulphide-containing rocks generate acid under these conditions. Due to the localized bedrock geology of the area being gabbro, a potential exists for acid rock drainage to occur if bedrock, outside of the river channel, is exposed during decommissioning activities. Generation of acid can reduce the pH of any natural water sources.

5.4.3.2 Mitigation

The following mitigation measures are proposed as a means to reduce the effects of potential interactions identified above.

- Potable wells located within the 2 km search radius that are used for drinking water could be monitored periodically throughout the Project activities to evaluate the potential for changes in water quality of the local aquifer. Monitoring of potable wells identified within a 2 km radius would include completing a questionnaire with the property owner and collecting a representative sample from their well, if so desired by the well owner. It would be recommended that samples be collected prior to the initiation of decommissioning activities to establish baseline data and subsequent samples collected thereafter until project completion.
- As water levels in the St. Croix River return to their natural state, any anticipated minor fluctuations in water levels within local aquifers, should also normalize with the natural river conditions.
- Spill response measures should be implemented during decommissioning activities to properly deal with any Project-related contaminant releases. The extent of area potentially affected by a release depends on the type and volume of the contaminant.
- Based on the extent of the Project site and that the area is underwater during the majority of the year, any acid rock drainage that occurs would have negligible adverse effects on water quality during or after the completion of the decommissioning activities.

5.4.3.3 Characterization of Potential Interactions Following Mitigation

Potable water in the Milltown/St. Stephen area is provided by the Town of St. Stephen through the Dennis Stream Watershed Protected Area in Maxwell Crossing, a groundwater supply that sources water from a gravel deposit that is in direct connection to the Dennis Stream. The water supply is located

approximately 7.5 km from the Milltown Station and is in a separate watershed from groundwater in the vicinity of the Station. Due to these circumstances, there is no potential for influence on groundwater quantity or quality of the Dennis Stream municipal water supply from the Project.

Decommissioning activities at the Project site have a potential to increase turbidity and change the quality of groundwater in local aquifers. Potable well questionnaires and sampling methods can be used to monitor groundwater quality throughout the decommissioning. It is unlikely that groundwater quality changes will occur during the decommissioning process, but if they do occur, they would be isolated to the Project site, and they are not anticipated to continue post-decommissioning.

Water levels within the St. Croix River have a potential to affect groundwater quantity in groundwater aquifers within close proximity to the Project site. As the decommissioning process comes to a finish, the water levels in the St. Croix River as well the local aquifers should return to equilibrium without negatively impacting localized groundwater regimes.

Water quality of local groundwater could also be affected by spills that occur on the Project site. Spill measures will be in place during decommissioning activities in case of an incident, and lubricants, fuels, and chemicals will be properly stored until removed from site upon completion of the Project.

Acid rock drainage can arise when sulphide-rich rocks are exposed to oxygen. The local bedrock geology of Milltown contains gabbro, which can contain sulphide bearing minerals. Acid generation is unlikely to occur since the portions of the Milltown Station that will be removed and thus leading to exposed bedrock are submerged or nearly submerged for the majority of the year. However, if acid generation were to occur, the amount generated would have negligible effect on the pH of local groundwater aquifers, due to minimal extent of the Project area.

5.4.4 Summary

The municipal water supply for the area is well outside influence from the site. However, eight wells are known to be located within 2 km of the Milltown Station (including two at the Milltown Station itself that will be decommissioned as part of the Project). The quality of groundwater in these wells has a potential to be affected by decommissioning activities and/or spills associated with these activities. Spill response measures will be put in place during decommissioning, and potable well sampling during decommissioning and post-decommissioning may be conducted if complaints are received in order to ensure that groundwater elevations or quality is not adversely affected by the Project. Changes in water levels in the St. Croix River due to decommissioning are not anticipated to cause changes in water quantity of local aquifers.

In consideration of the nature of the Project, the environmental setting including the limited potable water wells in close proximity to the Project site and the relative distance to the Dennis Stream watershed, and in light of proposed mitigation, potential negative interactions of the Project with groundwater are not expected.

5.5 Surface Water

Water is essential for life on Earth. As humans, we need water for drinking, bathing, sanitation, recreation, and for the production of food and goods. Fish, birds, animals, and plants also rely on the availability of water to live and flourish. Changes in the availability of water, both in the amount of water and the quality of the water, may affect the lives of people and other living things.

5.5.1 Scope of VC

Surface water consists of wetlands, watercourses (mapped and unmapped), water bodies, and surface water drainage channels that are within the property boundary or within the areas that may be potentially affected by the Project. Surface water was selected as a VC based on the importance of the resource to both humans and biota, including its importance in supporting fish and fish habitat and other aquatic life, and because of the potential for these resources to be affected by the Project through changes in surface water quality or quantity.

The potential interactions of the Project with water levels and flows, as well as the movement of sediment currently entrained behind the dam or escaping from water/sediment control structures, resulting from the decommissioning of the Milltown Station are important components of the surface water VC due to the potential for hydraulic impacts along the St. Croix River. This VC includes water levels, flows, surface water quality, and sediment quality.

Potential interactions with the VC are discussed within the context of the goal of the Project in removing human-made structures that obstruct fish passage so as to allow fish to naturally access the upstream reaches of the St. Croix River, creating a naturalized channel. The possible interactions with the quality or quantity of surface water include:

- Potential change in surface water flow regime, including:
    - Water flow pattern changes – interaction of change to water levels, depths, and velocities,
    - Flow retention and management,
    - Sediment transport, and
    - Shoreline stability and slumping.
- Potential changes in surface water or sediment quality.

5.5.1.1 Regulations and Policies Relevant to Surface Water

Where applicable, the Project will adhere to standard provincial and federal government legislation and associated regulations, including the following:

Federal

- *Canadian Environmental Protection Act* (CEPA) – administered by Environment and Climate Change Canada;

- Canadian Council of Ministers of the Environment (CCME) Environmental Quality Guidelines (CCME 1999); and
- Guidelines for Canadian Drinking Water Quality (GCDWQ; Health Canada 2017) – administered by Health Canada (rev. 2019).

Provincial

- *Clean Water Act* – administered by NBDELG; and
- *Clean Environment Act* – administered by the NBDELG.

Watercourses and areas meeting the definition of a wetland in New Brunswick are regulated by the New Brunswick *Clean Water Act* including its *Watercourse and Wetland Alteration Regulation,* and the New Brunswick "Wetlands Conservation Policy" (NBDNRE-NBDELG 2002). Surface water supplies used as public drinking water sources are protected under the *Watershed Protected Area Designation Order – Clean Water Act.*

Objectives for the quality of drinking water are provided in Health Canada's "Guidelines for Canadian Drinking Water Quality" (GCDWQ) (Health Canada 2017). Though not having force of law unless formally adopted by provincial legislation, these guidelines provide guidance to decision-makers with respect to the potability of drinking water for human use.

5.5.2 Existing Conditions

Existing conditions for surface water are discussed below.

5.5.2.1 Watershed Characteristics

The Milltown Dam is located on the lower reach of the St. Croix River, which has a total contributing watershed of approximately 3,757 km^2 (ISCRWB 2008). The St. Croix River watershed consists of predominately undeveloped wooded terrain and is subject to spring freshet flood events due to snow melt and, to a lesser extent, intense rainfall. The river forms the Canada/U.S.A. international border, and flows through the communities of St. Stephen, New Brunswick and Calais, Maine before discharging to the Passamaquoddy Bay.

The river has several major dams along its 114 km length, these are presented in **Table 5.5.1** with the approximate year of construction, contributory watershed area, and dam height (ISCRWB 2008). The watershed areas provided in **Table 5.5.1** represent the contributory watershed area up to each dam location. Milltown is the downstream-most dam and was constructed on what was known as Salmon Falls.

Table 5.5.1: Summary of Existing Dams along the St. Croix River (ISCRWB 2008)

Name	Approximate Year of Construction	Contributing Watershed Area (km^2)	Height (m)
Forest City Dam	1908	357	4.9
West Grand Lake Dam	1836	580	4.0
Vanceboro Dam	1836	1,036	6.7
Grand Falls Dam	1915	3,419	15.2
Woodland Dam	1906	3,497	14.0
Milltown Dam	**1881**	**3,757**	**7.3**

While photographs of the Project area before construction of the Milltown Dam are not available, it is likely that the river bed consisted of a steep natural gradient; this is further supported by the bathymetric survey data collected for this EIA Registration. The bathymetric survey data (**Figure 5.5.1**) demonstrates that the bed elevation decreases rapidly by roughly 4 m over a 40 m reach length across the existing dam location (an approximate 13% bed slope).

The existing Milltown dam structure is in excess of 7 m high and approximately 180 m long. The dam is equipped with the following hydraulic features (**Figure 5.5.2**):

- Six sluice gate openings operated using stop logs;
- Rollway with flashboards;
- Gated spillway with five timber gates; and
- A pool-and-weir fishway and downstream fish passage facilities.

The existing dam structure has a relatively small impoundment, extending approximately 450-500 m upstream of the dam, and has a surface area of approximately 0.06 km^2 (6 ha). An operational water surface elevation between 13.7 and 14.0 m is typically maintained in the upstream impoundment area. A significant change in bed slope elevation and riffle is visible at the upstream limit of the impoundment. Given this relatively limited impoundment volume, the attenuation storage influences of the dam are expected to be minimal. Based on these observations and preliminary modelling results, the Milltown Station operates essentially as a run-of-the-river dam (Kleinschmidt 2016).

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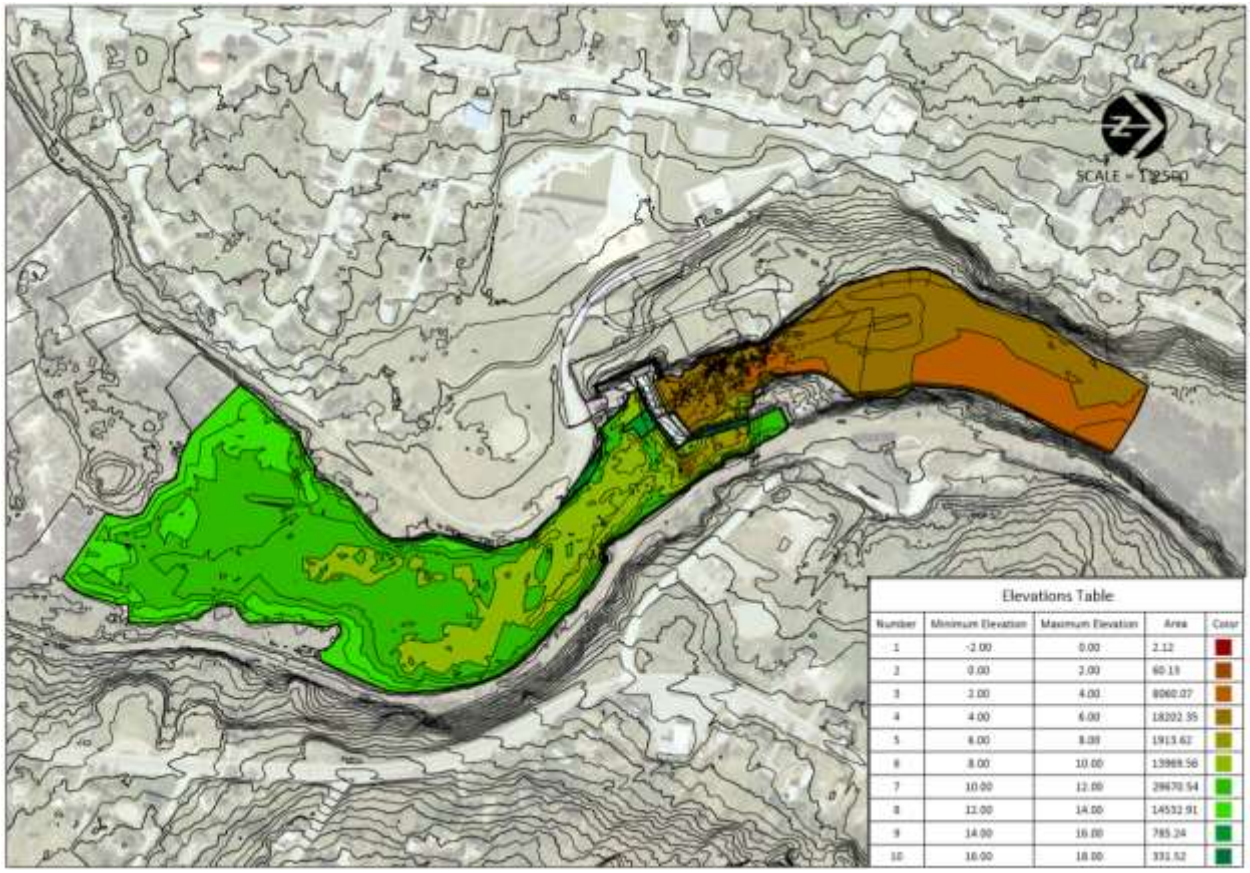

Figure 5.5.1: Bathymetry of the St. Croix River Near the Milltown Station (GHD and Inter-Fluve 2020)

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Figure 5.5.2: Key Features of the Milltown Dam (GHD and Inter-Fluve 2020)

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5.5.2.2 Flow Regime

The existing dam structure has an estimated capacity in the order of 64.5 m^3/s (2,280 cfs), this estimate accounts for the closure of Unit #4 (Kleinschmidt 2016). A hydrologic assessment was completed by Kleinschmidt (2016), which included a review of flow data from the United States Geological Service (USGS) St. Croix hydrometric station at Baring, Maine (Station #01021000). A historical flow duration curve was previously prepared by Acres in 1959. Kleinschmidt (2016) presented an updated flow duration curve for the St. Croix River at Baring station using flow data between 1986 and 2015 (29 years). This updated flow duration curve is presented in **Figure 5.5.3**.

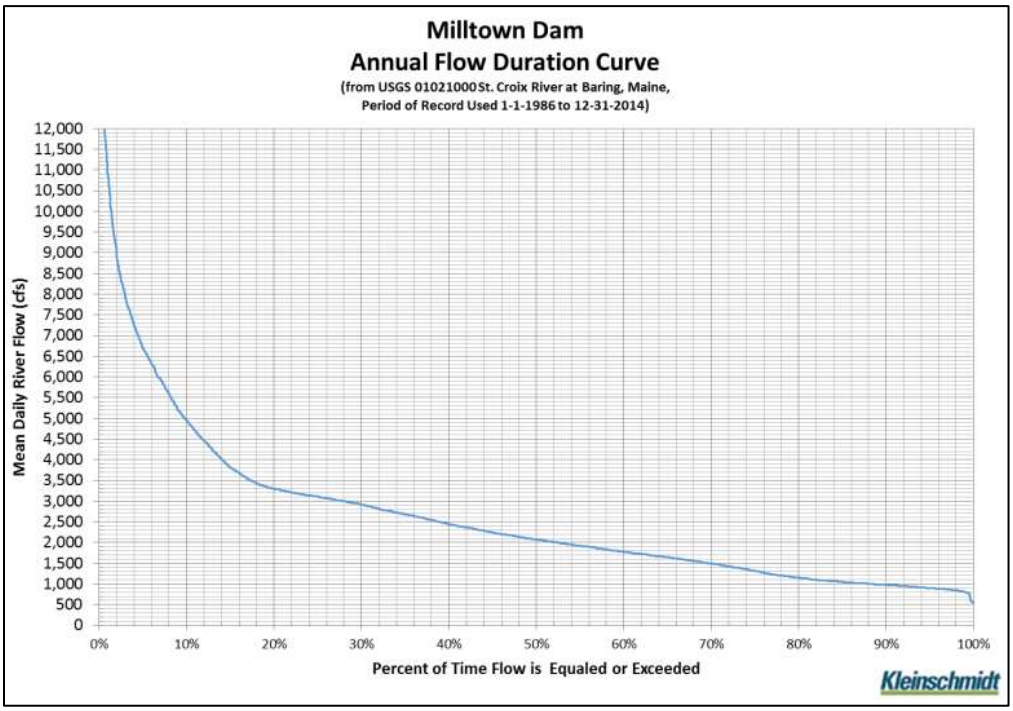

Figure 5.5.3: Updated Flow Duration Curve for St. Croix at Baring, Maine (Kleinschmidt 2016)

The updated 2016 flow duration curve suggests a slight increase in flow rate compared to the 1959 Acres values. This increase was most pronounced at higher flow frequencies, therefore suggesting that the river has a slightly shorter rainfall-runoff response. The dam capacity mentioned previously (64.5 m^3/s) corresponds to a flow exceedance value of 44%, which is notably below the typical dam capacity target of 30 to 20% flow exceedance level (Kleinschmidt 2016).

5.5.2.3 Surface Water Quality, Sediment Quantity, and Sediment Quality

The St. Croix River moves sediments at or near the bottom of the river (referred to bed load) as well as suspended within its flow (referred to as suspended load). The water and sediments carry with them nutrients that serve to nourish the environment and support the aquatic life within the river. If the flow regime changes, the movement of sediment can also change.

Water Quality – Summary from International St. Croix River Watershed Board in 2017

In 2009, Environment Canada established a continuous water level and water quality monitoring station at Milltown. The International St. Croix River Watershed Board (ISCRWB) was established to assist the International Joint Commission, which is a binational United States-Canada organization established under the Boundary Waters Treaty of 1909. The ISCRWB prepares annual reports covering the Orders of Approval with respect to the control of the discharge of the St. Croix River at Forest City, Vanceboro, and the water levels of East Grand Lake, Spednic Lake, Grand Falls Flowage, and Milltown Dam forebay, as well as the water quality and aquatic ecosystem health of the St. Croix River boundary waters. The data for the Milltown monitoring station are summarized below, based on the ISCRWB's most recent report published in 2018 and which pertains to data collected in 2017 (ISCRWB 2018a). It is noted that the sonde malfunctioned from January 1-11, 2017 due to a power cable issue and the water level was lowered at the dam from early to mid-August, leaving the sonde out of the water for that period. Without adequate moisture, the sensors dried out, and data generated were unreliable until a replacement sonde was deployed in early September 2017. The missing data for that time period is easily recognized in the real time graphs as a straight line for the majority of the month of August 2017 and may have impacted average calculations.

Water Temperature

Water temperature at the site in 2017 increased gradually through the spring and summer until it reached its maximum of 27.19°C on July 21, 2017. The lowest temperatures recorded were all in January 2017. The daily mean water temperature stayed over 20°C for 69 days, which is consistent with the majority of previous years. Water temperature was below 5°C for 140 days in 2017, which is similar to the 2015 data but approximately 35 days more than 2016. Water temperature at this station averaged 11.25°C, but would likely be greater if not for the data gap in the summer (ISCRWB 2018a).

Dissolved Oxygen

Dissolved oxygen (DO) readings in 2017 followed a similar, but inverse, trend to water temperature, reaching the lowest concentration of 7.15 mg/L on July 22, 2017, and the highest concentration of 14.83 mg/L on December 12, 2017. Dissolved oxygen averaged 10.9 mg/L in 2017. All dissolved oxygen values measured in 2017 were above the minimum CCME Guideline for the Protection of Aquatic Life of 6.5 mg/L (CCME n.d.). Diurnal changes can be observed at a daily range of values (ISCRWB 2018a).

pH

Measurements of pH in 2017 stayed within the CCME guideline (6.5-9) for most of the year, with measurements close to 7.0 during the summer. However, for parts of autumn and spring 2017, measurements were below 6.5. The minimum pH measurement was 5.42, recorded in late October 2017; and the maximum pH was 7.42, recorded in mid-September 2017. Average pH at this station was 6.67 for the year of 2017 (with some days omitted due to malfunctions). This is consistent with data collected between 2010 and 2016 (ISCRWB 2018a).

Specific Conductance

Specific conductance is a measure of how well water can conduct an electrical current. It increases with increasing concentration of ions in the water, such as chloride, calcium, magnesium, sodium, nitrate, phosphate, and iron. Specific conductance readings in 2017 fluctuated moderately between 23.9 and 185.4 microSiemens per centimetre (µS/cm) and averaged 73.6 µS/cm during 2017. These values are very similar to those of 2014-2016.

Measurements of specific conductance reached their highest of 185.4 µS/cm on October 9, 2017, and their lowest on May 8, 2017. A sharp drop in specific conductance is usually associated with a rise in stream height or volume. Stream height at this location is controlled by the dam but ion concentrations can change depending on rainfall events and/or spring melt/freshet conditions. Specific conductance has also been shown to vary with the release of upstream effluents, such as the Woodland Pulp LLC facility during its shutdown in 2015 for repairs following an accidental spill. The lowest specific conductance measured in May 2017 is closely timed with the highest primary water level measured at this site (ISCRWB 2018a).

Turbidity

Daily mean turbidity values in 2017 stayed below 1 nephelometric turbidity unit (NTU) for almost 66% of measurements (214 days), although turbid events (spikes) occurred once or twice per month. Turbidity values ranged from 0 to 1,023 NTU and averaged 3.4 NTU. As in 2016, the bulk of the elevated turbidity measurements occurred in November-December 2017. While there is not a numeric CCME guideline for turbidity, increases in turbidity may pose a concern. Depending on the flow regime and background turbidity measurements, in general, turbidity should not increase more than 10% over background (ISCRWB 2018a).

Trace Metals

Eight grab samples were collected in 2017 at the Milltown station and submitted for analysis of trace metals and general chemistry parameters (ISCRWB 2018a). The results, as summarized and interpreted by ISCRWB (2018a), were as follows:

- Total aluminum exceeded the CCME guideline of 100 µg/L in seven out of eight samples in 2017. Observations in 2016 had four out of seven samples above the guideline. Elevated levels of aluminum are fairly common in Atlantic Canada, although the aquatic life seems to be in good health. This is believed to be because most of the aluminum in Atlantic Canadian rivers is complexed with organic compounds, and therefore, is not bio-available to aquatic life. Dennis and Clair (2012) produced data that supported this theory and they developed an algorithm for calculating the amount of complexed aluminum based on measured total organic carbon (TOC) in Atlantic rivers. With TOC values ranging from 7.31 to 18.8 mg/L, the calculated complexed aluminum concentrations made up a large proportion of the measured total aluminum (at least 75%).

- In 2017, no samples had cadmium concentrations above the calculated CCME cadmium guideline, based on water hardness, which is in contrast to 2016, where four samples were above the guideline and two others were near the guideline value.
- The CCME guidelines for cadmium, copper, nickel and lead are all based on a formula which uses water hardness to determine guideline concentration and also has a minimum, regardless of water hardness. Based on the range of water hardness at the Milltown Station, the minimum values stated in Appendix 5 of the CCME guidelines for these metals were used. No values exceeded those guidelines in 2017.

General Chemistry

In 2017, total phosphorus was 3 to 8 times higher at Milltown than at Forest City, and two measurements exceeded the Ontario Ministry of the Environment (OMOE 1994) phosphorus guideline of 0.03 mg/L. These results are comparable to the 2015 and 2016 observations that were 2 to 5 times higher at Milltown than at Forest City. Similarly, nitrate is also higher at Milltown than at Forest City, although well below the CCME guideline. This indicates that sources such as municipal and industrial wastewater are likely contributing nutrient loads that can increase algal production in the downstream reaches of the river and the receiving estuary.

Water Quality – 2020 Field Work in Support of this EIA Registration

To support this EIA Registration, water quality sampling was conducted by Dillon biologists on August 31 to September 3, 2020. The results are detailed in the technical report titled "Fish and Fish Habitat Technical Report, Milltown Generating Station Decommissioning Project, Milltown, New Brunswick" (Dillon 2020a; **Appendix E**) and are summarized as follows.

The in-situ water quality parameters were collected in a total of five locations both upstream and downstream in the LAA where easy access was obtainable. In-situ water quality parameters were measured within the top 0.5 m from the surface of the water using a calibrated YSI Pro Plus multimeter. The parameters sampled consisted of pH (measured values ranged from 7.3 to 7.73), temperature in degrees Celsius (°C) (measured values ranged from 19 to 20.2°C), dissolved oxygen in milligrams per litre (measured values ranged from 13.98 to 19.11 mg/L) , total dissolved solids in milligrams per litre (measured values ranged from 53.95 to 56.25 mg/L), specific water conductance in microSiemens per centimeter (measured values ranged from 82.8 to 85.4 µS/cm), and dissolved oxygen in percent saturation (measured values ranged from 109.8 to 194.7%).

Surface temperature was consistently slightly below or at 20°C, which is considered to be relatively warm in relation to fish habitat (MacMillan et al. 2005), although not unexpected given the hot, dry summer conditions experienced throughout summer 2020. Some species of fish including salmonids require cool water temperatures (< 16.5°C) to survive and cooler temperatures may occur at lower depths (MacMillan et al. 2005). Cooler temperatures may occur at depth within the impoundment. The DO values throughout the field surveys were well above the CCME DO requirement for early life stages of warm water biota (6 mg/L), and the CCME DO requirement of early life stages of cool water biota (9.5 mg/L), indicating generally good water quality for fish health. It is anticipated that the upper strata

of the impoundment as well as the shallow water would be warmest, and it should be noted that the weather had been seasonally warm and dry at the time of, and leading up to the field survey. The pH values were within the CCME acceptable range of 6.5 to 9.0.

Water quality samples were also collected at various locations both upstream and downstream of the Station as part of the 2020 field work conducted by Dillon. Samples were submitted to the Research and Productivity Council (RPC) laboratory in Fredericton, New Brunswick, which is accredited by the Canadian Association for Laboratory Accreditation (CALA) and analyzed for general chemistry, trace metals, and pesticides and herbicides. The results of the surface water quality laboratory analyses are provided in the above-noted technical report (Dillon 2020a), and are summarized as follows.

- Trace metal concentrations in surface water for the sample collected from the lower reach below the Milltown Station were below the applicable CCME guidelines.
- There was a minor exceedance of the CCME guideline for cadmium (i.e., 0.05 µg/L) in the upper reach above the Milltown Station. The other metals analyzed in samples collected upstream of the Milltown Station were below the applicable CCME guidelines.
- Concentrations of pesticides and herbicides were below the laboratory detection both upstream and downstream of the Milltown Station and met the applicable CCME guidelines.
- General chemistry results fall within the expected range of a typical New Brunswick watercourse and show almost no difference in parameters between upstream and downstream sampling locations.

Sediment Quantity

The GHD/Inter-Fluve team completed a field survey in November 2019 to obtain information on potential areas of sediment accumulation in the impoundment. The following are excerpts from the GHD and Inter-Fluve (2020) report in this regard.

"Dam impoundments are typically low energy, depositional environments. The quantity and quality of impounded sediment is an important consideration in the Station decommissioning process. Fine-grained sediment is of primary concern because pollutants, if present in the water column, often bind to this fine-grained sediment, which is more likely to be mobilized in the event of dam removal. The quantity of sediment deposited upstream of a dam is a function of the amount of sediment delivered from the upstream watershed, as well as the age, trapping efficiency and operation of the impoundment. The quality of sediment is often a function of the industrial history and land use in the upstream watershed.

*The field survey completed in November 2019 suggests that the bed of the impoundment upstream of the Station is generally composed of coarse-grained material (coarse sand and gravel to boulders) and bedrock. Photographs of the impoundment during annual drawdowns provide further evidence that substantial accumulation of fine-grained sediment is sparse in the impoundment area upstream of the Station. A modest volume of fine-grained sediment was detected, largely confined to four discrete locations (**Figure 5.5.4**). These deposits are located in eddies or low velocity zones along the margin of the impoundment. The ranges indicated in **Table 5.5.2** below reflect the sensitivity of the estimates to*

the assumptions of the area represented by each spot measurement in the data set. Because the deposits are small and the largest deposit was partially obscured by ice at the time of survey, the estimates are modestly sensitive to the extrapolation method.

Table 5.5.2: Impounded Sediment Volume Estimate

Deposit Location (see Figure 5.5.4)	Approximate Area (m^2)	Approximate Volume Range (m^3)
1	475	350-700
2	3,000	1,350-2,700
3	50	15-30
4	725	150-300
Total	**4,250**	**1,865-3,730**

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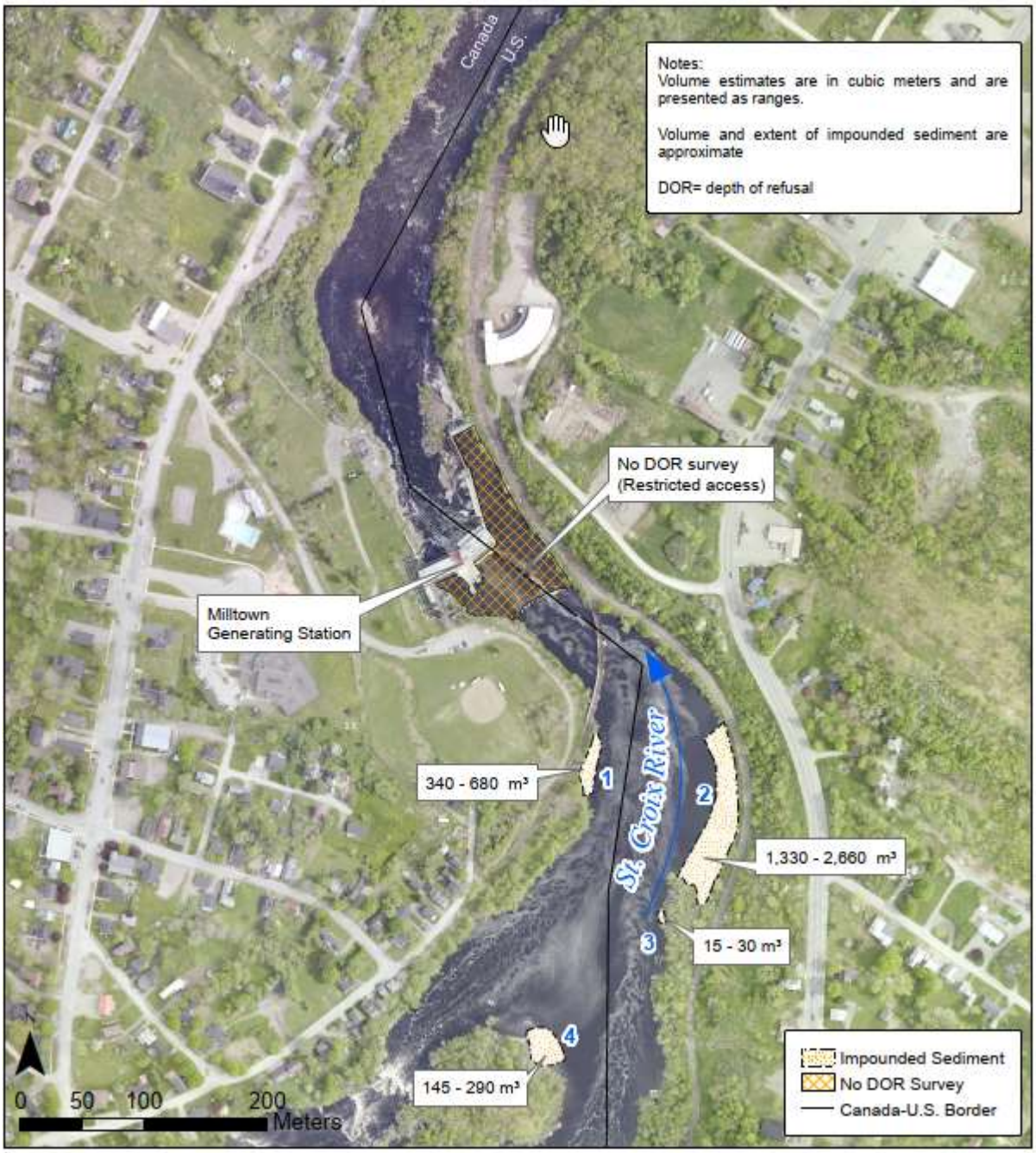

Figure 5.5.4: Locations of Accumulated Sediment in the Impoundment (GHD and Inter-Fluve 2020)

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It should be noted that the survey extent was limited to the area upstream of the Station navigational safety buoy. While no direct observations were made inside the buoy, the series of drawdown photos that were made available by NB Power as part of the Fall 2019 investigation suggest that sediment accumulation inside the buoy is negligible.

The low volume of impounded fine sediment is likely due to the low rate of sediment delivery from upstream given the presence of upstream impoundments and natural lakes, low trapping efficiency of the impoundment, and the annual to semi-annual drawdown activities which have likely mobilized accumulated sediment over time. The St. Croix watershed, particularly the drainage area between the Station and the next upstream dam (Woodland), is largely underlain by crystalline (metamorphic and igneous) bedrock, which has low erodibility and is thus a poor source of sediment. The recent history of glaciation in the watershed left the region covered by a thin mantle of till, which also reduces the availability of mobile sediment.

In addition to the low load of sediment delivered from upstream, the small impoundment associated with the Station (approximately 500 metres long) suggests a low trapping efficiency with much of the sediment that enters the impoundment being transported downstream. For fine sediment deposition to occur, particles must have enough time in the impoundment to settle out of suspension. Within this impoundment, most fine sediment particles may be able to remain in suspension long enough to be transported downstream. This combination of low sediment delivery and poor trapping efficiency accounts for the modest volume of impounded fine sediment.

Fine sediment that does accumulate within the impoundment despite the low sediment load and low trapping efficiency may subsequently be mobilized and transported downstream during the drawdown of the impoundment as part of the Station's annual maintenance activities. As the water surface in the impoundment lowers, the water velocity in the impoundment increases (specifically along the impoundment banks and bed), thus potentially mobilizing small deposits of fine-grained sediment accumulated during typical Station operations." (GHD and Inter-Fluve 2020).

Sediment Quality

Sediment quality can be a good indicator of the environmental condition of a watercourse as substances that originate from anthropogenic activities (such as agriculture and forestry) and wastewater outfall discharge tend to adhere to sediments, in particular to the smaller sediment sizes. Once attached to sediments, these substances can be transported over long distances as part of the suspended or bed loads of rivers.

In studies completed as part of a review of potential options related to the possible removal of a dam along the Saint John River, trace metals, polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs) and chlorinated pesticides were found in impounded sediments; some exceeding applicable CCME environmental quality guidelines. To address potential concerns that the sediment quality might also be similarly affected in the St. Croix River, sediment sampling was carried out by Dillon between August 31 and September 3, 2020 at two depositional areas noted on **Figure 5.5.4** (i.e., Area 1 and Area 4 on **Figure 5.5.4**) as well as one location downstream of the Station. The results of the

sediment sampling are detailed in the technical report titled "Fish and Fish Habitat Technical Report, Milltown Generating Station Decommissioning Project, Milltown, New Brunswick" (Dillon 2020a; **Appendix E**) and are summarized as follows.

The sediment samples were collected wearing nitrile gloves using a 6"x6" mini-ponar grab sampler, either from a boat or the shoreline (depending upon water depths/accessibility). The samples were decanted and collected using a composition of multiple grabs to obtain a representative composite sample before being placed directly into laboratory supplied containers. Sampling equipment was cleaned and rinsed between each sampling location.

The sediment samples were sent to RPC to be analyzed for:

- General chemistry, including: grain size analysis, trace metals, and petroleum hydrocarbons; and
- Additional chemical analysis to include pesticides and herbicides.

Results were compared to the CCME environmental quality guidelines for chemical concentrations in sediment (CCME 1999).

Concentrations of cadmium in the two depositional areas upstream of the Milltown Station (Areas 1 and 4 on **Figure 5.5.4**) were above the CCME interim sediment quality guidelines (ISQGs) for both samples collected (0.71 mg/kg and 0.72 mg/kg respectively), however, these concentrations are below the CCME probable effects levels (PELs) guidelines. The CCME ISQGs are no or low effect level sediment quality benchmarks that represent sediment concentrations associated with never or almost never observed effects in benthic organisms. It has become well established in the scientific and regulatory literature over the years that exceedances over PELs and similar benchmarks are often a better or more reliable indicator of potential sediment toxicity (or an increased likelihood for benthic community impairment) than no or low effect level benchmark (e.g., ISQG) exceedances.

Concentrations of zinc were slightly above the CCME ISQG guidelines both above (173 mg/kg) and below (133 mg/kg) the Milltown Station, but were not above the PEL guideline. Concentrations of copper at one location above the Milltown Station (53 mg/kg at Area 1 on **Figure 5.5.4**) and arsenic below the Milltown Station (7 mg/kg) were also above the CCME ISQG, but were below the PEL guidelines. Concentrations of lead at one location above the Milltown Station were above the CCME PEL guideline (122 mg/kg at Area 1 on **Figure 5.5.4**).

The greatest number of exceedances of metals in sediment (i.e., cadmium, copper, lead, manganese and zinc) were noted within the upper reach along the shoreline at Area 1 on **Figure 5.5.4**, on an inside meander of the River within the impoundment where water velocity is slower and where deposition and therefore accumulated fine particles would be higher. This greater number of exceedances observed may be attributed to this environmental factor/characteristic at this sampling location.

Concentrations of pesticides in sediment were below the laboratory detection limits, and therefore, below the CCME guidelines.

There are no CCME guidelines for petroleum hydrocarbons in sediment with regard to the protection of aquatic life in freshwater. The results were therefore compared to the Atlantic PIRI Tier I Ecological

Screening Levels for the Protection of Plants and Soil Invertebrates. There were no detectable hydrocarbon concentrations in the lower reach below the Milltown Station; however, there were total petroleum hydrocarbon concentrations above the detection limit but below the applicable guidelines in both of the upstream sampling locations.

5.5.3 Assessment of Potential Interactions between the Project and Surface Water

The potential interactions between the Project and surface water are assessed below.

5.5.3.1 Potential Interactions

The environmental interactions of the Project may result in physical changes both upstream and downstream of the dam. The following detailed potential interactions are based on the current understanding and goal of the Project (as described in **Section 2.3**).

Without mitigation, the Project may interact with surface water in the following ways.

- Dams interrupt the natural flow of a watercourse, typically increasing water depth upstream of the dam and flooding shoreline land. Dam removal may affect water levels along the river temporarily and/or permanently.
- Flow velocities upstream and downstream of the dam may be affected as dam removal will eliminate the upstream impoundment area and result in a potential increase in velocity.
- Changes in the flow regime may result in changes to the channel characteristics, including substrate composition, geomorphology, and wetted area.
- Water characteristics (e.g., temperature, DO, pH, water clarity, and chemical composition) may be affected as a result of changes in the overall flow regime.
- Over time, suspended sediments that may normally be transported downstream may have been trapped and settled behind the Milltown Station. Removal of physical structures as part of decommissioning may remobilize these sediments, causing a temporary or long term increase in suspended sediments transported downstream that could affect water quality, and consequently affect fish.
- Changes in sediment transport patterns may lead to a change in sediment and associated nutrient transport downstream.
- During decommissioning, heavy equipment activity may temporarily cause erosion. The failure of water or sediment control structures may allow sediment to enter the river.
- Equipment used during decommissioning may affect water quality as a result of potential spills of petroleum hydrocarbons and hydraulic fluids.

Generally, dam removal will result in flow characteristics more similar to the natural characteristics of the St. Croix River as they existed prior to the Milltown Station being constructed. Water velocities may increase and water depths may decrease. Flooded shoreline may be unstable and susceptible to erosion. It is understood that inputs from industrial, agricultural, and municipal sources (current and historical)

likely affect sediment and water quality within the area of the Project. Sediment that has deposited behind the dam may be flushed downstream with potentially contaminated sediment re-suspended in the water column.

5.5.3.2 Mitigation

Standard mitigation and best management practices that are relevant to the surface water VC will be implemented for the decommissioning activities. These are based on normal operating procedures and regulatory requirements, and include mitigation specific to the surface water VC, such as the following.

- The area of disturbance of the Project will be limited to that which is absolutely necessary to achieve the Project purpose.
- Cleared areas will be re-vegetated where possible and natural vegetation will be preserved when possible.
- The area of exposed soil will be limited, and the length of time soil is exposed without mitigation (e.g., mulching, seeding, rock cover) will be reduced through scheduled work progression.
- Erosion and sedimentation control structures (e.g., check dams, silt curtains) will be maintained throughout decommissioning and river improvement activities and inspected regularly, in particular before and after heavy rain events as well as during the freshet. These structures will remain in place until the area is stabilized or naturally re-vegetated.
- Water released from the site will be monitored for quality to be consistent with suspended sediment limits specified by regulatory approvals, as applicable.
- Dewatering of excavated areas will control release of sediment-laden water (e.g., filtration through vegetation or engineered erosion control devices).
- Construction material (e.g., gravel), if placed in or next to watercourses, will be free of debris, fine silt and sand, and chemical contaminants.
- A cofferdam/temporary road will be used where feasible during the demolition/ decommissioning of structures located below the water line.
- Disturbed areas will be returned to as near pre-construction grades as possible, where feasible, with remaining organic material or topsoil redistributed over the disturbed areas.
- Where possible, compacted areas will be scarified or ripped after the temporary fill (rock/gravel) is removed to loosen the ground before new topsoil is added, unless in an area of high archaeological potential (see **Section 5.10**).
- Exposed slopes with high potential for slumping or erosion will be stabilized as early as possible to prevent erosion.
- All fuels and lubricants used during construction will be stored according to containment standards (e.g., secondary containment) in designated areas. Storage areas will not be located within watercourses, wetlands (if present) or water supply areas (including the location of

known private wells), and permits will be obtained if they need to be located within 30 m from watercourses or wetlands.

- Temporary storage of waste materials on-site will be located at least 30 m from watercourses, wetlands (if present), and water supply areas (including known private wells).
- Refueling of machinery will not occur within 30 m of watercourses and water supply areas (including known locations of private wells). Where stationary equipment is situated near a wetland (if present), special precautions will be implemented to prevent spills during refueling (e.g., absorbent pads located below nozzles and spill response kits located at the refueling location).
- Emergency response plans will be in place for spill response with spill kits and trained personnel present on-site at all times.

5.5.3.3 Characterization of Potential Interactions Following Mitigation

The most significant hydraulic impacts associated with dam decommissioning are those related to changes in upstream/downstream water surface elevation, and the potential for increased flow velocity. Preliminary impacts have been inferred from the initial hydraulic simulation results completed by GHD and Inter-Fluve in late 2019, and are outlined in the following sections.

To support the EIA Registration, bank-to-bank decommissioning and removal has been assumed when identifying potential effects, which is expected to result in the most significant changes in upstream/downstream water level, and overall flow regime. Preliminary, one-dimensional, steady state hydraulic modelling has been completed by GHD and Inter-Fluve (2020), and two-dimensional hydraulic modelling is underway. These simulation results were reviewed to identify potential surface water impacts, and are discussed below.

Water Levels

The most common water level impact associated with dam removal is a decrease in water level upstream of the dam, and a corresponding increase in downstream levels. Changes in water level should be evaluated for both flood (e.g., 100-year flood) and average flow conditions to understand impacts for a range of hydraulic conditions.

During flood flow conditions, the hydraulic simulation results suggest that the change in water level associated with the Project will be buffered by the existing railway bridge located approximately 100 m upstream of the dam. Therefore, the impact of bank-to-bank dam removal upstream of the railway bridge is expected to be minor (within a 0.2 m decrease in water level) during the 2, 10, and 100-year return period flow event. The orientation of the existing impoundment area and railway bridge are presented in **Figure 5.5.5**.

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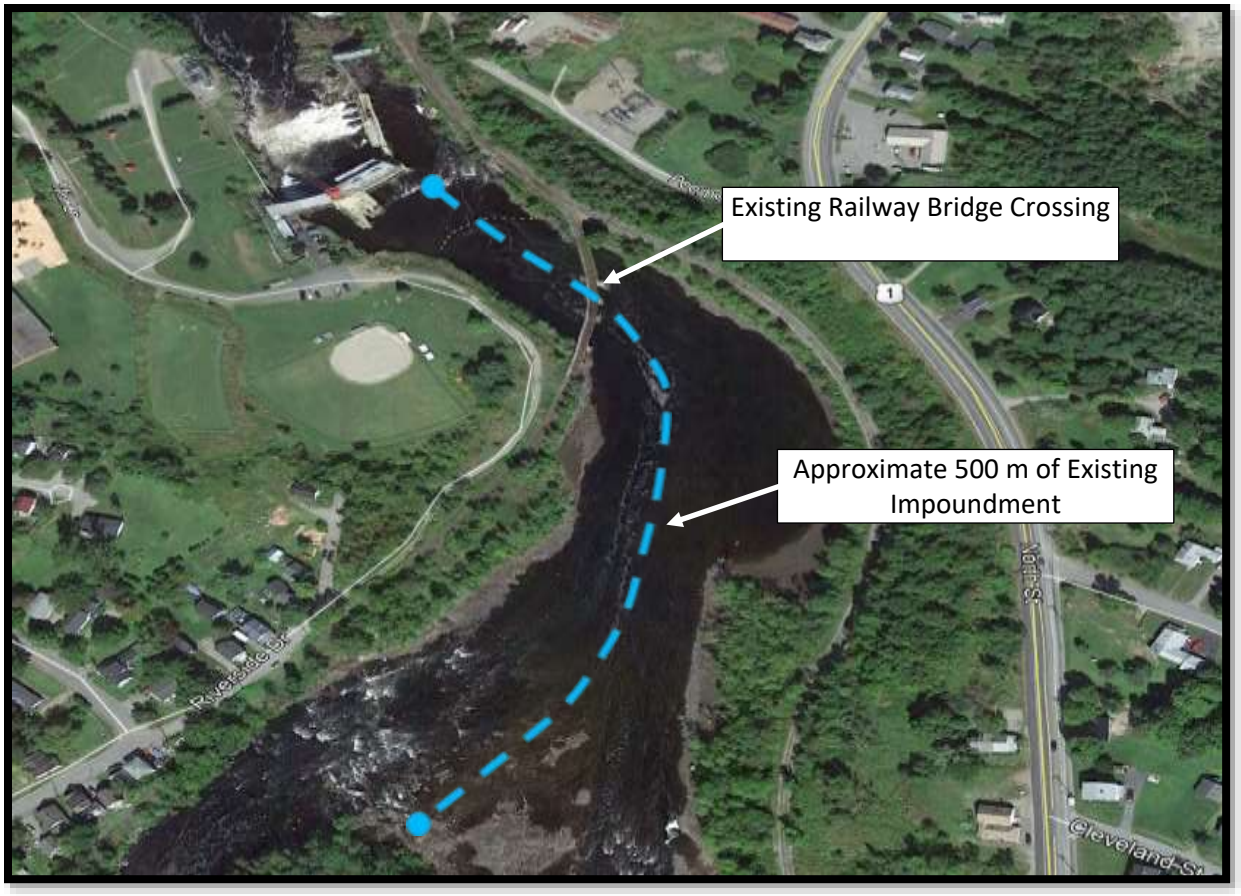

Figure 5.5.5: Existing Impoundment and Existing Railway Bridge

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When average monthly flows are simulated, the model suggests a considerable decrease in upstream water level under average monthly flow conditions. It is estimated that the water surface elevation will range between 12 m and 9 m from the upstream limit of the impoundment to the former dam location. Spring average flows (April) are on the higher end of this range (12 m), while the summer low flow season (August) would operate on the lower end (9 m). This is compared to a typical existing impoundment water surface elevation ranging between 13.7 m and 14 m (Kleinschmidt 2016). The hydraulic constriction at the railway bridge does not have a significant influence during average flow conditions, and a 2-5 m decrease in water level upstream of the dam is anticipated.

The preliminary hydraulic model suggests that downstream water levels remain unchanged from existing conditions during both average and flood flow conditions. However, the steady-state hydraulic modelling completed to date does not account for the loss of upstream storage capacity of the dam (i.e., impoundment).

Flow Velocity

The existing dam impoundment area shown in **Figure 5.5.5** is expected to have a relatively low velocity under average flow conditions. Dam removal would be expected to increase velocity along the 450-500 m long impoundment. However, the increased velocity is expected to be representative of other reaches along the St. Croix River since the bed slope along the existing impoundment area is relatively mild (approximately 0.5%). Increases in velocity downstream of the existing dam structure are expected to be minor during average flow conditions.

Velocities upstream of the dam are expected to increase during extreme flood flow conditions. However, this increase in upstream velocity is expected to be limited to the reach between the railway bridge and the dam. The change in velocity downstream of the railway bridge over Salmon Falls could be significant; however, this would be limited to a relatively short reach (approximately 100-200 m) and velocities will quickly be dampened by the larger estuary that opens up approximately 1-2 km downstream of the dam. Velocity impacts to the reach downstream of the existing dam are expected to be negligible during flood flow conditions; however, this will be evaluated further as part of more detailed modelling.

Given the potential hydraulic impacts described above, other possible interactions associated with these changes have been considered and are described below.

Fish Passage

Fish passage efficiency is dependent on flow velocity and depth relative to the swimming characteristics of the fish species present in the reach. It is expected that Salmon Falls may present a natural barrier to fish passage, assuming the dam is completely removed. The existing dam structure currently includes fish passage facilities in the form an upstream fishway and downstream fishway. The efficiencies of the existing fishways are uncertain; however, some form of intervention to enhance fish passage will likely need to be incorporated into the proposed post-dam closure condition.

Flood Risk Vulnerability

Flood risk vulnerability both upstream and downstream of the dam is not expected to be affected by dam removal. As described above, the upstream water levels are buffered by the existing railway bridge during extreme flow conditions resulting in a relatively minor reduction in water level (approximately 0.2 m). The downstream water levels are expected to remain reasonably consistent; however, this finding will be investigated further using an unsteady-state hydrodynamic model to simulate the attenuation effects of the existing impoundment. The very nature of the Project as a dam removal initiative is, in and of itself, mitigation for upstream and downstream flooding compared to the potential flood risk that exists from impounding water as currently.

Preliminary results suggest that the impact on flood risk vulnerability along the upstream and downstream reaches will be minor.

Erosion and Sedimentation

The changes to the flow regime discussed in the above sections may result in fluctuations of sediment accretion/deposition within the study reach, and potentially beyond. The transportation of sediments in a river system are sensitive to changes in both flow depth and velocity. While hydrodynamic modelling results will greatly assist in evaluating the magnitude and extent of these potential effects, the preliminary results suggest that the upstream reach may be prone to increased erosion due to higher flow velocities. Portions of the bank and river channel upstream of the dam could be at an increased risk of erosion following dam decommissioning, which would be addressed as necessary as part of the Project. Implications for sedimentation and erosion as well as slope stability will be evaluated further as part of planning for the decommissioning process.

Sediment and Water Quality

Potentially low-quality (i.e., contaminated) sediment may become exposed on the banks of the river and behind the dam and migrate to downstream reaches of the river, contributing to sediment runoff, slumping, and temporary increases in suspended sediment levels or turbidity levels in the river, affecting water quality. Similarly, failure of water and sediment control structures (e.g., the cofferdam) may result in release of sediment to the river. Based on water and sediment quality samples collected in 2020 in support of this EIA, while exceedances of some parameters were observed (e.g., cadmium in surface water above the Station; cadmium, zinc, copper, lead, and manganese in sediment above the Station), they appear to be related to the geology of the area rather than from human influence. If elevated levels of contaminants are identified in sediment and/or surface water in the future, a human health and ecological risk assessment might need to be conducted (though not currently planned) to assess the interaction of impurities in mobilized sediments with the ecosystem which will assist in determining future fate or deposition of these sediments. In general, the mitigation measures discussed above can be put in place to limit erosion and sedimentation, which will serve to reduce the risk of exposure to contaminated sediments.

5.5.4 Summary

In summary, the following hydraulic impacts are anticipated and will be evaluated further during subsequent modelling and EIA review period:

- Decrease in upstream (impoundment area) water levels under average flow conditions;
- Hydraulic influence of the existing railway bridge during extreme flood flow conditions to buffer changes in upstream water levels have been evaluated;
- Increased flow velocity in upstream reaches during average and flood flow conditions;
- Impacts to downstream reach water level and flow velocity characteristics under average and flood flow conditions (preliminary modelling suggests this is expected to be minor);
- Accretion and erosion of sediment along upstream/downstream reaches; and
- Changes to sediment and surface water quality.

The potential interactions associated with the above include changes to migratory fish passage and habitat, flood risk vulnerability, accretion/erosion of sediment, and sediment and water quality. These potential interactions and associated effects will be evaluated further using more detailed hydraulic modelling techniques of existing and proposed conditions, sediment and surface water quality testing, and bathymetric surveys in the final planning for decommissioning of the Project. However, given the above analysis and in light of the Project as currently planned and planned mitigation to reduce or eliminate negative environmental effects, the potential interactions between the Project and surface water are not expected to be substantive.

5.6 Fish and Fish Habitat

The potential environmental effects of the Project on fish and fish habitat (including aquatic species at risk) are assessed in this section.

5.6.1 Scope of VC

The fish and fish habitat valued component (VC) includes aquatic life such as freshwater fish, benthic invertebrate species, and the habitat that supports them, as well as aquatic species at risk (SAR). Fish and fish habitat are considered a VC because of their importance in supporting aquatic life, as a fisheries resource, as food source for other fish and wildlife, and for providing recreational opportunities, and are of importance to the public, stakeholders, and First Nation communities. It is noted that freshwater mussels are included under the *Fisheries Act* and are also valued by local stakeholders.

First Nations, and in particular the Peskotomuhkati (Passamaquoddy) people, have deep ties to the Schoodic River (St. Croix River) and the species within it including Atlantic salmon (*Salmo salar*), American eel (*Anguilla rostrata*), and gaspereau (*Alosa spp.*), among others (Paul 2018). Specifically, gaspereau is considered a key species they rely upon for sustenance and was widely recognized for its value to the environment and other fish and wildlife (IJC 2015). Additionally, the Peskotomuhkati peoples in particular have expressed a desire to improve river conditions to allow for Atlantic sturgeon

and shortnose sturgeon, anecdotally noted by them as having been historically present in the river, to return and access valuable spawning and rearing grounds in the St. Croix River. Traditional land and resource use is described below in **Section 5.11**. For details on recreational fishing conducted within the St. Croix River, refer to **Section 5.9**.

Additionally, fish and fish habitat are protected through the federal *Fisheries Act* as well as the New Brunswick *Fish and Wildlife Act* and the New Brunswick *Watercourse and Wetland Alteration Regulation – Clean Water Act*. The federal *Fisheries Act* provides protection for all fish and fish habitat (DFO 2019b). Section 35(2) of the *Fisheries Act* prohibits "harmful alteration, disruption or destruction of fish habitat". Additionally, aquatic SAR are protected under both the federal *Species at Risk Act* (SARA) and New Brunswick *Species at Risk Act* (NB SARA). Although the Canadian Council of Ministers of Environment (CCME) "Canadian Water Quality Guidelines for the Protection of Freshwater Aquatic Life" (CWQG FWAL) do not have force of law, they provide environmental quality objectives for protecting fish from lethal and sub-lethal effects.

In this EIA Registration, we define "species at risk" (abbreviated SAR) as those species that are listed as "Extirpated", "Endangered", or "Threatened" on Schedule 1 of the *Species at Risk* Act (SARA) or the New Brunswick *Species at Risk Act* (NB SARA). We also define "species of conservation concern" (abbreviated SOCC) as those species that are not SAR but are listed in other parts of SARA, NB SARA, the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), or are regionally rare or endangered by the Atlantic Canada Conservation Data Centre (AC CDC) (i.e., those species with AC CDC S-ranks of "extremely rare" [S1], "rare" [S2], or "uncommon" [S3]).

The fish and fish habitat VC has important connections to the surface water VC (**Section 5.5**) and the vegetation and wetlands VC (**Section 5.7**).

5.6.2 Existing Conditions

In addition to a field evaluation of the local assessment area (LAA) (defined as the extent of the impoundment, approximately 450-500 m upstream of the Milltown Station, to the tidal estuary located approximately 1-2 km downstream of the Station, including 30 m of riparian area on the Canadian side of the international boundary) conducted in support of this EIA Registration, the information regarding the presence and characterization of fish and fish habitat within the PDA and LAA was derived from several reliable existing databases and secondary information sources. Dillon completed a review of the following sources and data lists:

- AC CDC (refer to **Appendix A** for site-specific AC CDC Report);
- Department of Fisheries and Oceans Canada (DFO);
- New Brunswick Department of Natural resources and Energy Development (NBDNRED);
- NBDELG;
- The federal SARA;
- The provincial NB SARA;

- COSEWIC; and
- High resolution aerial photography.

In addition, fish and fish habitat surveys were conducted by Dillon biologists between August 31 and September 3, 2020 within the impoundment approximately 450-500 m upstream of the Milltown Station as well as a reach approximately 200 m below the Milltown Station, including:

- Presence/absence fish surveys;
- Observations and identification of other fish passage barriers;
- Aquatic habitat assessments to characterize habitat quality;
- Surface water sampling, both using in-situ water quality measurements as well as sampling with subsequent laboratory analysis; and
- Sediment sampling with subsequent laboratory analysis.

The field survey team was led by an experienced biologist from Boreal Environmental and supplemented by Dillon aquatic technicians, representatives from the Peskotomuhkati First Nation, and NB Power's Indigenous field liaison. The fish and fish habitat surveys were conducted using survey protocols based on NBDNR (now NBDNRED) and DFO standard aquatic assessment forms (Hooper et al. 1995) and the NBDNR Provincial Brook Trout Assessment Outline (NBDNR 2010). In addition, qualitative fish presence assessments were conducted using backpack electrofishing techniques, fyke nets, seine netting, and conventional angling where conditions allowed. Finally, in-situ water quality measurements, surface water sampling, and sediment sampling were conducted. Where needed, a boat was available to aid in the methods described above.

5.6.2.1 Aquatic Setting

The St. Croix River forms the Canada/U.S.A. international boundary, with the state of Maine and the province of New Brunswick located on either side of the international boundary. The St. Croix River ("the river") is managed by the International Joint Commission (IJC) who is responsible for the management the river on both sides of the international boundary. The St. Croix River is located in the southwestern portion of New Brunswick, flowing for over 114 km and covering a watershed area of approximately 3,757 km^2 starting at Chiputneticook Lakes and draining to the Passamaquoddy Bay (in the Bay of Fundy) (GNB 2007). The river boasts numerous lakes and tributaries which provide access for tourism and recreation and have been historically important for the now less dominant forestry and agricultural industries of the area (refer to the socioeconomic environment VC in **Section 5.9**). Importantly, the St. Croix River provides habitat for several freshwater and saltwater (i.e., diadromous) fish species (Cronin 1985).

In general, fish communities have drastically changed within the St. Croix River system (and in systems throughout New Brunswick), primarily in abundance and diversity. Aquatic species and assemblages are further discussed below in **Section 5.6.2.4**. Declines in abundance (i.e., from numbers in the millions to

thousands or even hundreds in some cases) and species diversity are due primarily to dams and other fish barriers along the St. Croix River, over-population, and other environmental stressors (e.g., pulp and paper mills, wastewater treatment facilities) from the industrial operations along the river (Nedeau 2003; Saunders et al. 2006; Paul 2018). The biggest impediment, however, still remains to be human-made obstructions (i.e., dams). Many of the dams have limited migrations by blocking access for diadromous fish species such as Atlantic salmon, American shad (*Alosa sapidissima*), and gaspereau (i.e., alewife [*Alosa pseudoharengus*] and blueback herring [*Alosa aestivalis*], also sometimes referred to as river herring) to upstream habitats and spawning areas, dramatically reducing their numbers and in some cases have led to extirpation (Limburg and Waldman 2009; Brown et al. 2013; Mattocks et al. 2017). This decline is well documented through both studies/research and fish counts at the Milltown Station fishway (IJC 2005; Dill et al. 2010; IJC-Bunch 2018; Paul 2018). The history of dams along the St. Croix River goes back to at least the 1700s, and most dams built in the past either did not have any fish passage components or had inadequate passages (Perley 1852; Paul 2018). Concerns of overfishing and fish passage obstacles were recorded as early as the 1800s in the Maine Legislature (Watts 2005).

The original Milltown Station was built nearly 140 years ago over Salmon Falls and has been expanded and upgraded, eventually being equipped with a fish passage component. The pool-and-weir fishway (sometimes referred to as a fish ladder) present today provides upstream fish passage during key migration periods (the fishway is operated from April 15 to November 15 of each year); it was built in 1981 to replace the original system to provide better fish passage and access for diadromous species to migrate upstream to carry out their life cycle processes (refer to **Section 2.2.3**) (IJC n.d.; Flagg 2007; IJC-Bunch 2018). In recent years, the Milltown Station fishway has come under the scrutiny by DFO for its limited efficiency in providing adequate passage to diadromous fish species in the St. Croix River. Improvements to the operation of the fishway requires significant (and costly) upgrades, one of the reasons behind the decommissioning and the overall goal of the Project (refer to **Section 1.3.2**).

In addition to the Milltown Station, there exists five other major operational dams upstream: the Woodland Dam approximately 16 km upstream, the Grand Falls dam approximately 30 km upstream, the Vanceboro Dam approximately 80 km upstream, the West Grand Lake dam approximately 30 km upstream, and the Forest City Dam approximately 114 km upstream. Only the Milltown Station is located in New Brunswick and is under Canadian jurisdiction; all others are located in (and under the jurisdiction of) the State of Maine and/or federal agencies in the U.S.A. There may be other smaller dams upstream within the watershed. These dams are primarily intended to maintain or elevate water levels of a lake, or to provide an industrial water supply; only the Milltown Station and the Woodland Dam generate hydroelectricity. Although all dams provide fish passage, the International St. Croix River Watershed Board (ISCRWB) states that "*these dams are the first obstacles that river herring and other fish encounter in the St. Croix Watershed, and are hypothesized to be significant obstacles to their upstream migration*" (ISCRWB 2018a).

5.6.2.2 Fish Habitat

Potential for fish habitat within the LAA is dependent primarily on sufficient size and flow characteristics of the river, and on the ability of fish to access the LAA (i.e., suitable fish passage to upstream and downstream habitat). Fish movements include those of anadromous fish (i.e., fish spawning in freshwater but living in marine environments as part of their life stages), catadromous fish (i.e., fish spawning in marine environments but living in freshwater as part of their life stages), and fish that move between marine water and freshwater or travel within a watercourse as part of seasonal habitat use.

The St. Croix River is a large, permanent watercourse that, within the LAA, ranges from approximately 50 m to 200 m wide. The surrounding upland area within the PDA is largely developed and includes a train bridge that spans the river approximately 125 m upstream of the powerhouse. The river is confined on both sides by steeply sloping banks which are lined with a thin strip of mature riparian vegetation. As a result of both the river's width and the limited riparian cover, crown closure (i.e., shade provided) within the LAA is minimal.

The St. Croix River generally exhibits an irregular meander pattern within the vicinity of the Milltown Station with several large islands located upstream and one small island downstream. The river's morphology immediately upstream of the Station consists primarily of a run, above which is a large set of rapids known locally as Milltown Rapids. Immediately downstream of the dam, the turbulent tail-water (and associated hydraulic jump) rapidly settles into a short flat run before developing into a long riffle sequence. The head of tide of the St. Croix River is thought to be approximately 1-2 km downstream of the Milltown Station, where the estuary begins.

The benthic substrate at the Milltown Station location itself is characterized by exposed bedrock, having been built across a narrow channel of ledges known as Salmon Falls (Marshal 1976). Upstream of the Milltown Station, substrates are assumed to be bedrock within the set of rapids, changing to a patchy mix of cobble, gravel, sands and silts within the run area, depending on depth and flow velocity. Downstream of the Milltown Station, benthic substrate is again expected to be a patchy mix of cobble, gravel, sands and silts within the flat area, transitioning to cobble, larger gravels, and some exposed bedrock within the riffle sequence.

Water depths within the impoundment the Milltown Station generally range from 12.7 m to 14.3 m amsl (ECCC 2020b). Water levels below the dam are subject to tidal influences.

Specifically in support of this EIA Registration, fish habitat surveys were conducted by Boreal, Dillon, and other parties between August 31 and September 3, 2020 within the impoundment approximately 450-500 m upstream of the Milltown Station as well as a reach approximately 200 m below the Milltown Station The fish habitat surveys were conducted using survey protocols based on NBDNRED (formerly NBDNR) and DFO standard aquatic assessment forms (Hooper et al. 1995) and the NBDNR Provincial Brook Trout Assessment Outline (NBDNR 2010). The full results of these surveys are detailed in Dillon (2020a) (**Appendix E**). A summary of these surveys follows.

Fish habitat surveys were conducted via transects within the upper reach upstream of the Milltown Station (i.e., transects UR-1 to UR-5) and the lower reach downstream of the Milltown Station (i.e., transects LR-1 and LR-2). The upper reach was characterized, in general, as a headpond impoundment. The upper reach was observed to provide suitable habitat for species such as smallmouth bass (*Micropterus dolomieu*), which was the most abundant species in this reach at the time of the field survey. The lower reach was characterized as run habitat throughout the restricted/confined tailrace area before braiding into two separate riffles/channeled sections. The lower reach was observed to provide suitable habitat for salmonids and American eel (most abundant within this reach). Habitat present in the lower reach was characterized as good riffle/run habitat, which provide a more diverse habitat compared to that observed within the impoundment. Water levels were low to average due to a warm and dry summer, however, recent rain events occurred around the time of the field surveys. Fish habitat results are summarized in **Table 5.6.1**, below.

Table 5.6.1: Summary of Aquatic Habitat Characteristics

Transect ID	Representative Photo	Average Widths (m)	Dominant Aquatic Habitat Type and Other Observations
Upper Reach - Headpond Impoundment			
UR-1		**Wet Width:** 192 m **Bankfull Width:** 194 m	**Fish Habitat Suitability and Watercourse Characteristics:** Deep pools with bedrock and gravel substrates. Potential for some forage habitat (e.g., smallmouth bass) and cold water refuge at depth. **Dominant Substrate:** 70% Bedrock, 10% Boulder, 5% Rock, 5% Rubble, 5% Gravel, 5% Sand. **Average Depth(s):** 3.37 m – Pool/run
UR-2		**Wet Width:** 105m **Bankfull Width:** 109 m	**Fish Habitat Suitability and Watercourse Characteristics:** Deep pools with bedrock and gravel substrates. Potential for some forage habitat (e.g., smallmouth bass) and cold water refuge at depth. **Dominant Substrate:** 70% Bedrock, 10% Boulder, 5% Rock, 5% Rubble, 5% Gravel, 5% Sand. **Average Depth(s):** 3.91 m – Pool/run

Transect ID	Representative Photo	Average Widths (m)	Dominant Aquatic Habitat Type and Other Observations
UR-3		**Wet Width:** 122 m **Bankfull Width:** 128 m	**Fish Habitat Suitability and Watercourse Characteristics:** Deep pools with bedrock and gravel substrates. Potential for some forage habitat (e.g., smallmouth bass) and cold water refuge at depth. **Dominant Substrate:** 70% Bedrock, 10% Boulder, 5% Rock, 5% Rubble, 5% Gravel, 5% Sand. **Average Depth(s):** 4.1 m – Pool/run
UR-4		**Wet Width:** 65 m **Bankfull Width:** 66 m	**Fish Habitat Suitability and Watercourse Characteristics:** Deep pools with bedrock and gravel substrates. Potential for some forage habitat (e.g., smallmouth bass) and cold water refuge at depth. **Dominant Substrate:** 70% Bedrock, 10% Boulder, 5% Rock, 5% Rubble, 5% Gravel, 5% Sand. **Average Depth(s):** 4.93 m – Pool/run
UR-5		**Wet Width:** 550 m **Bankfull Width:** 56 m	**Fish Habitat Suitability and Watercourse Characteristics:** Deep pools with bedrock and gravel substrates. Potential for some forage habitat (e.g., smallmouth bass) and cold water refuge at depth. **Dominant Substrate:** 70% Bedrock, 10% Boulder, 5% Rock, 5% Rubble, 5% Gravel, 5% Sand. **Average Depth(s):** 4.35 m – Pool/run

Transect ID	Representative Photo	Average Widths (m)	Dominant Aquatic Habitat Type and Other Observations
Lower Reach - Braided Channel			
LR-1		**Wet Width:** 33 m (1 of 2 channels) **Bankfull Width:** 84 m	**Fish Habitat Suitability and Watercourse Characteristics:** Braided channels with good riffle/run (fish) habitat. Potential spawning, rearing, foraging and passage habitat for multiple species, including salmonids. **Dominant Substrate:** 40% Bedrock, 15% Rock, 15% Rubble, 15% Gravel, 10% Sand, 5% Fines. **Average Depth(s):** 0.44 m – Riffle
LR-2		**Wet Width:** 31 m (1 of 2 channels) **Bankfull Width:** 98m	**Fish Habitat Suitability and Watercourse Characteristics:** Braided channels with good riffle/run (fish) habitat. Potential spawning, rearing, foraging and passage habitat for multiple species, including salmonids. **Dominant Substrate:** 40% Bedrock, 10% Boulder, 5% Rock, 15% Rubble, 15% Gravel, 15% Sand. **Average Depth(s):** 0.50 m – Riffle

Sediment in the upper reach is dominated by bedrock and medium to smaller sized boulders, rock, and rubble with silt and organics, whereas sediment in the lower reach was dominated by bedrock and larger to medium sized boulders, rock, rubble, and sand. Bank erosion was not noted during the field surveys; this may be attributed to the relatively vegetated riparian area and the natural presence of bedrock and boulders/rock/rubble along the watercourse banks.

The River is braided both above and below the Milltown Station. Braided river systems form when the sediment load within them is high and promotes the development of bars/islands. High sediment loading within watercourses can be attributed to slope characteristics, presence of mid-channel islands, as well as other sources of sedimentation from former and active anthropogenic developments such as logging and agriculture. Turbidity levels were low and no elevated sedimentation levels were observed during the field survey.

Other than the Milltown Station and its dam and related structures, no other obstructions to fish passage were observed during the field survey.

In summary, the results of the fish and fish habitat field surveys confirm that fish occupancy and suitable habitats are present above and below the Milltown Station. Foraging and potential cold water refuge were characterized in the impoundment above the Milltown Station, whereas spawning, rearing, foraging, and passage habitat were characterized downstream of the Milltown Station.

5.6.2.3 Water Quality and Sediment Quality

In addition to the physical characteristics of the river, water quality is an important component of fish habitat. ECCC and NBDELG operate a real-time water quality analysis monitoring station at the Milltown Station just above the dam, and the depth of the monitoring station (1.8 to 3.0 m) depends on the impoundment elevation (ISCRWB 2018a). The monitoring station records hourly data including temperature, DO, pH, specific conductance, and turbidity (ISCRWB 2018a). The most recent International St. Croix River Watershed Board (ISCRWB) Annual Report for the year 2017 noted that technical malfunctions caused losses of data between January 1 to 11, 2017 and early August and early September 2017 (ISCRWB 2018a). The measured ranges in throughout 2017 were as follows: temperature 0°C to 27°C, dissolved oxygen (DO) 7.15 mg/L in July to 14.55 mg/L in January, pH 5.42 to 7.43, conductivity 23.9 to 185.4 µS/cm, and turbidity 0 to 1,023 NTU (ISCRWB 2018a).

The mean temperatures between June and September of 2017 were above 20°C (ISCRWB 2018a), which is considered to be warm in relation to fish habitat (MacMillan et al. 2005). For example, some species of fish including salmonids require cool water temperatures (< 16.5°C) to survive (MacMillan et al. 2005). The minimum DO values throughout 2017 were above the CWQG FWAL DO requirement for early life stages of warm water biota (6 mg/L); however, the minimum DO values fell below the CWQG FWAL DO requirement of early life stages of cool water biota (9.5 mg/L) between the months of June to October (CCME n.d.; ISCRWB 2018a). The warm temperatures and low DO values in summer months are likely due to cool water being released from the bottom of the impoundment and the warming of the slow-moving water in the upper strata of the impoundment. The mean pH values were within the CWQG FWAL acceptable range of 6.5 to 9.0 throughout 2017; however, in January and between October and December 2017, the minimum pH values fell below the CWQG FWAL (CCME n.d.; ISCRWB 2018a). The pH values below the CWQG FWAL ranged from 5.4 to 6.4 and are considered unlikely to be harmful to fish with the exception of some salmonids under certain conditions (Task Force on Water Quality Guidelines of the CCME 2008). The temperature, DO, and pH values recorded in the impoundment of the Milltown Station in 2017 indicate an inhospitable environment for some salmonid species during most of the calendar year.

Eight water samples were collected at the Milltown Station throughout 2017 and submitted for trace metals and general chemistry analysis (ISCRWB 2018a). Of the eight samples, seven exceeded either or both of the CWQG FWAL of 0.1 mg/L in water with a pH greater than 6.5 and 0.005 mg/L in water with a pH less than 6.5 (CCME n.d.). The exceeding aluminum concentrations were all greater than 0.1 mg/L, which is considered deleterious to growth and survival of fish. However, the report notes, "*Elevated levels of aluminum are fairly common in Atlantic Canada, and the aquatic life seems to be in good health. This is believed to be because most of the aluminum in rivers in Atlantic Canada is complexed*

with organic compounds and; therefore, not bio-available to aquatic life". Dennis and Clair (2012) produced data which supported that theory and they developed an algorithm for calculating the amount of complexed aluminum based on measured total organic carbon (TOC) in Atlantic Canadian rivers.

Anthropogenic sources of contaminants in sediment can have a varying degree of impact on the macroinvertebrate community, and subsequently the fish community, in a river system. To our knowledge, testing of the chemistry of the sediment in the vicinity of the dam has not been completed to date and existing conditions remain unknown.

Details on water quality and sediment quality analyses conducted specifically in support of this EIA Registration are provided in the report titled "Fish and Fish Habitat Technical Report, Milltown Generating Station Decommissioning Project, Milltown, New Brunswick" (Dillon 2020a; **Appendix E**). A summary of the main water quality and sediment quality results from this report was provided in **Section 5.5.2.3**.

Further discussions on surface water quality can be found in **Section 5.5**.

5.6.2.4 Aquatic Species and Assemblages

A number of both native and non-native freshwater and diadromous (anadromous and catadromous) fish species are found in the St. Croix River (IJC 2005). Native freshwater species generally include brook trout (*Salvelinus fontinalis*), American shad (*Alosa sapidissima*), gaspereau (*Alosa spp.*, i.e., alewife [*Alosa pseudoharengus*] and blueback herring [*Alosa aestivalis*]), and Atlantic salmon (*Salmo salar*), while non-native species include smallmouth bass (*Micropterus dolomieu*) (IJC 2015). Other species may include American eel (*Anguilla rostrata*), sea lamprey (*Petromyzon marinus*), and striped bass (*Morone saxatilis*).

Freshwater mussels are also known to occur within the St. Croix River system (Martel et al. 2010). Both fish and freshwater mussel species known to occur within the St. Croix River recorded through the Milltown Station fishway are listed and described in **Table 5.6.2** below (Saunders et al. 2006; IJC-Bunch 2017; ISCRWB 2018a; ISCRWB 2018b; Paul 2018; DFO 2019c), and further discussion on the potential fish assemblages and populations within the PDA and LAA is provided below.

Though marine mammals including grey seal, harbour seal, harbour porpoise, and various species of whales are frequently present in Passamaquoddy Bay and even in portions of the associated lower St. Croix River estuary, given that the Station is located several kilometres upstream of the main estuary, the presence of marine mammals near the Station is unlikely.

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Table 5.6.2: Summary of Non-SAR/SOCC Aquatic Species

Species	Status[1]	Species Description	Potential to Occur in Project Area
Fish species			
American shad (*Alosa sapidissima*)	**COSEWIC:** Unlisted **SARA:** Unlisted **NB SARA**: Unlisted **S-Rank :** S5	The American shad is an anadromous fish closely related to gaspereau (see below). The spawning migration of eastern Canada typically occurs between late April and late June (DFO 1990). Spawning occurs at night, usually in deep areas of a river with a moderate to strong current. American shad males usually reach spawning age at around four years, while females reach maturity around 5 years. American shad are repeat spawners and among Canadian populations may spawn up to seven times and live to be approximately 13 years old (DF0 1990). Adults return to sea after spawning, while newly hatched young-of-the-year will spend their first summer in freshwater before moving out to sea when river temperatures drop below 15°C (DFO 1990).	Known to occur in the PDA/LAA.
Atlantic salmon – landlocked population (*Salmo salar sebago*)	**COSEWIC:** Unlisted **SARA:** Unlisted **NB SARA**: Unlisted **S-Rank:** S5	Taxonomically, there is no major difference between ocean-run Atlantic salmon and landlocked Atlantic salmon; they are the same species. The life history of the two species (rather than genetic differences) distinguish them from each other. Landlocked Atlantic salmon generally do not grow as large as their ocean-run counterparts and spend most of their life cycles in lakes, rather than the ocean, before migrating into rivers and streams to spawn (Page and Burr 1991).	Known to occur in the PDA/LAA. Last record was over 14 years ago (IJC-Bunch 2018).
Brook trout (*Salvelinus fontinalis*)	**COSEWIC:** Unlisted **SARA:** Unlisted **NB SARA**: Unlisted **S-Rank:** S4	This species, also known as speckled trout, is native to many areas of eastern North America, but has also been introduced throughout the world due to its popularity as a sportfish. Brook trout prefer cool, clear waters with plenty of cover and make use of nearly anything that will provide them with hiding places. Sea-run brook trout in New Brunswick spawn during October and November in shallow, gravelly areas of streams with clean bottoms and good water flow (Page and Burr 1991).	Known to occur in the PDA/LAA.
Common shiner (*Luxilus cornutus*)	**COSEWIC:** Unlisted **SARA:** Unlisted **NB SARA**: Unlisted **S-Rank:** S5	The common shiner is an abundant minnow species that primarily inhabits Maritime streams, but it is also found in lakes with weeds and grave/rubble bottoms (DFO 2018a).	Known to occur in the PDA/LAA.

Species	Status[1]	Species Description	Potential to Occur in Project Area
Gaspereau (*Alosa spp.*): Alewife (*Alosa pseudoharengus*) and **Blueback herring** (*Alosa aestivalis*)	**COSEWIC:** Unlisted **SARA:** Unlisted **NB SARA**: Unlisted **S-Rank:** S5	Alewives and blueback herring are anadromous fish that, in the Maritimes, are collectively referred to as "gaspereau" or sometimes "river herring". These fish are abundant to Maritime watercourses, entering the majority of streams and rivers in the Maritimes. Generally, blueback herring occur in fewer rivers and are typically less abundant than alewives where they co-exist (DFO 2001). They play important roles in food webs and nutrient cycles for marine, freshwater, and terrestrial species (IJC 2005). The spawning migrations of alewives typically begins approximately two weeks earlier than blueback herring, in late April and is generally completed by late June or early July (DFO 2001). In the Maritimes, both species will typically reach spawning age around three years. Gaspereau are repeat spawners, usually spawning three to five times during their lifespan (Page and Burr 1991). Both species will return to sea shortly after spawning and from August to October the newly hatched young-of-the-year will migrate downstream, gathering in large schools to live in estuaries and surrounding coastal areas, while adults over-winter at sea (Page and Burr 1991).	Known to occur in the PDA/LAA.
Golden shiner (*Notemigonus crysoleucas*)	**COSEWIC:** Unlisted **SARA:** Unlisted **NB SARA**: Unlisted **S-Rank:** S5	The golden shiner is a common minnow species found in most Maritime freshwater rivers, lakes and streams. Golden shiners typically inhabit warm, weedy shallow areas. Spawning is thought to occur during the summer and adhesive eggs are laid scattered among aquatic vegetation (Gilhen 1974).	Known to occur in the PDA/LAA.
Rainbow smelt (*Osmerus mordax*)	**COSEWIC:** Unlisted **SARA:** Unlisted **NB SARA**: Unlisted **S-Rank:** S5	Rainbow smelt are anadromous schooling species found in rivers and along coastal areas of North America. They grow and mature in shallow coastal waters and migrate up freshwater streams to spawn (Page and Burr 1991). Landlocked species swim up tributaries during spawning or spawn along the shoreline of a lake. Spawning occurs between February and June at night in fast moving water between 4^{o}C and 10^{o}C (Page and Burr 1991). Eggs laid are sticky and attach to the bottom of the stream. Once hatched, fry float downstream to brackish water, using water depth as cover and feeding on plankton near the surface during the night (Page and Burr 1991). In the first year, smelt grow rapidly, increasing their tolerance for salt water as they get older. They also begin eating larger invertebrates and fish while staying close to shore and seeking cover in eelgrass beds or mud (Page and Burr 1991).	Known to occur in the PDA/LAA.

Species	Status[1]	Species Description	Potential to Occur in Project Area
Redbreast sunfish (*Lepomis auritus*)	**COSEWIC:** Data Deficient **SARA:** Unlisted **NB SARA**: Unlisted **S-Rank:** S4	In Canada, this species has only been reported from southwestern New Brunswick, where it is known from eight lakes and seven rivers/streams, all within the Saint John River drainage (COSEWIC 2008a). This species spawn in the spring when water temperatures reach approximately 20°C (COSEWIC 2008a). The male excavates a nest, which can be up to 1 m in diameter, typically in depths of about 50 cm. The male will guard the nest and developing larvae for up to two weeks as the newly hatched young disperse (COSEWIC 2008a).	Known to occur in the PDA/LAA.
Sea lamprey (*Petromyzon marinus*)	**COSEWIC:** Unlisted **SARA:** Unlisted **NB SARA**: Unlisted **S-Rank:** S5	Sea lamprey are an anadromous parasitic species native to the Atlantic Ocean and occur along the North American coast. This species resembles the American eel in shape, but lacks paired fins and has a cartilaginous skeleton with no jaw. Instead of a jaw, the adult sea lamprey attach to host fish with a circular, sucker-like mouth lined with rasping teeth which allows them to feed on the blood and body fluids of their prey. In eastern Canada spawning runs likely occur from late May and through early summer, with peak spawning occurring when water temperatures reach 17°C to 19°C (Kircheis 2004). Adult sea lampreys build and lay their eggs crescent-shaped nests in gravel substrates and die shortly after spawning (Kircheis 2004). Eggs will hatch in 10 to 13 days later and metamorphose into “ammocoetes” which will drift downstream and burrow into the muddy substrates where they will filter-feed on planktonic drift for 4 to 8 years (Kircheis 2004). Eventually, they will emerge from their burrow and metamorphose into “transformers”, their migration life stage similar to their final adult form (Kircheis 2004). These ‘transformers’ will migrate out to sea to become adults and begin their hematophagus method of feeding, returning to freshwater to spawn in 1.5 to 2 years (Kircheis 2004).	Known to occur in the PDA/LAA.

Species	Status[1]	Species Description	Potential to Occur in Project Area
Smallmouth bass (*Micropterus dolomieu*)	**COSEWIC:** Unlisted **SARA:** Unlisted **NB SARA**: Unlisted **S-Rank:** SNA (Not applicable as it is an exotic species and is considered invasive)	Smallmouth bass are a highly prized freshwater sport fish which has led to many North American introductions (as was the case in the St. Croix River in the late 1800s – see below) and their apparent deliberate and illegal invasive spread into new waterbodies is considered a threat to freshwater biodiversity and has created considerable concern in Canada (Brown et al. 2009). Smallmouth bass are not native to any part of Atlantic Canada. In northern areas, smallmouth bass are found in shallow rocky and sandy areas with plenty of vegetation (Brown et al. 2009). They tend to spawn in June and July, with males excavating a small circular concave nest in firm sand, mud or gravels (Brown et al. 2009). Eggs will hatch 4 to 10 days later into fry and will remain in the nest for an additional 10 to 12 days until their yolk is absorbed (Brown et al. 2009). The male will guard the eggs, nest and fry until they disperse. This can last up to 28 days, in which time the male bass is extremely aggressive and territorial. Juvenile smallmouth bass will prey on a variety of zooplankton and aquatic insect larvae as they grow before reaching adulthood at around one year (Brown et al. 2009).	Known to occur in the PDA/LAA.
White sucker (*Catostomus commersonii*)	**COSEWIC:** Unlisted **SARA:** Unlisted **NB SARA**: Unlisted **S-Rank:** S5	The white sucker is one of the most common freshwater fish in the Maritimes, occurring in practically all freshwater bodies (Gilhen 1974). This species is a bottom-feeder, spending most of its time hugging the bottom in shallow waters filter feeding in sandy or muddy substrates. White suckers spawn during the spring, typically migrating from lakes up into streams, laying their eggs in shallow areas with a gravelled bottom (Gilhen 1974).	This species is known to occur within the PDA/LAA.
Mussel species			
Alewife floater (*Anodonta implicate*)	**COSEWIC:** Unlisted **SARA:** Unlisted **NB SARA**: Unlisted **S-Rank:** Unranked	Alewife floaters can be found in rivers, streams, ponds, and lakes tolerating a variety of flow rates and substrate types within these waterbodies ranging from cobble to silty or sandy. All freshwater mussel species must attach to the fin or gills of a host fish in order to complete their life cycle. The alewife floater is only known to attach to alewife (*Alosa pseudoharengus*), blueback herring (*Alosa aestivalis*), and American shad (*Alosa sapidissima*) (Nedeau 2008). Thus, alewife floaters will occur only in waterbodies that support populations of these host fish.	This species may occur within the PDA/LAA as their host fish have been recorded in the areas.

Species	Status[1]	Species Description	Potential to Occur in Project Area
Eastern elliptio (*Elliptio complanata*)	**COSEWIC:** Unlisted **SARA:** Unlisted **NB SARA**: Unlisted **S-Rank:** S5	The eastern elliptio is one of the most common freshwater mussels in eastern Canada in a variety of waterbodies including lakes, small to medium streams, and larger rivers with soft or hard water (Metcalfe-Smith and Cudmore-Vokey 2004; Martel et al. 2010). They prefer shallow waters in a range of substrates in including clay, mud, through sang, gravel, and cobble. As the species is abundant in lakes, it uses a variety of fish host including yellow perch (*Acanthistius cinctus*), banded killifish (*Fundulus diaphanous*), lake chub (*Couesius plumbeus*), creek chub (*Semotilus atromaculatus*), and brook stickleback (*Culaea inconstans*) (Wiles 1975; Watters 1994; Beaudet 2006).	This species may occur in the LAA.
Eastern floater (*Pyganodon cataracta*)	**COSEWIC:** Unlisted **SARA:** Unlisted **NB SARA**: Unlisted **S-Rank:** S5	In addition to the eastern elliptio, the eastern floater is also one of the most common freshwater mussels found along the Atlantic coast of Canada and the US inhabiting a range of habitats (ponds, streams, rivers, streams) preferring, shallow slow-moving water with soft mud-like substrates or sand (Athearn and Clarke 1962; Clarke 1981; Martel et al. 2010). Host fish species for New Brunswick populations include the following: common shiner, blacknose dace (*Rhinichthys atratulus*), creek chub, threespine stickleback (*Gasterosteus aculeatus*), and ninespine stickleback (*Pungitius pungitius*) (Martel et al. 2010).	This species may occur in the LAA.
Eastern lampmussel (*Lampsilis radiata radiata*)	**COSEWIC:** Unlisted **SARA:** Unlisted **NB SARA**: Unlisted **S-Rank:** S5	The eastern lampmussel is prevalent along the northeastern US and eastern Canada, including New Brunswick, in various size lakes and rivers with gravel or sand substrates (primarily) (Martel et al. 2010). The primary fish host is the yellow perch, however, other fish hosts include smallmouth bass, pumpkinseed (*Lepomis gibbosus*), and white perch (*Morone americana*) (Tedla and Fernando 1969; Watters 1994).	This species may occur in the LAA.
Eastern pearlshell (*Margaritifera margaritifera*)	**COSEWIC:** Unlisted **SARA:** Unlisted **NB SARA**: Unlisted **S-Rank:** S4	Eastern pearlshell is the only freshwater mussel found in holartic areas and in Canada it is only found in the Atlantic region where populations are among the largest in the world (Martel et al. 2010). The eastern pearlshell is found in small to medium sized cold-water, shallow sandy or gravel ridges/banks of rivers and streams in New Brunswick with low calcium carbonate (Martel et al. 2010). Hosts fish for this population of eastern pearlshell are brook trout and Atlantic salmon (Athearn and Clarke 1962; Smith 1976; Cunjak and McGladdery 1991).	This species may occur in the LAA.

Notes:

[1]AC CDC S-Ranks as follows: S1: extremely rare in province; S2: rare in province; S3: uncommon in province; S4: widespread, common and apparently secure in province; S5: widespread, abundant and demonstrably secure in province S#S# = a numeric range rank used to indicate any range of uncertainty about the status of the species or community; SNA: Not Applicable - A conservation status rank is not applicable because the species is not a suitable target for conservation activities. B= Breeding, N = Nonbreeding, M = Migrant, U = Unrankable. (AC CDC 2020)

Fish Species Assemblages

The St. Croix International Waterway Commission (SCIWC) operates the Milltown fish trap located at the Milltown Station fishway; however, it falls under jurisdiction of DFO because it is located on Canadian soil. The Milltown Station fishway is generally operated from April 15 to November 15 each year by both the St. Croix International Waterway Commission (for the fish counts) and NB Power (following the fish counts until November), coinciding with the migration periods for key diadromous fish species (ISCRWB 2018a). The St. Croix International Waterway Commission conducts fish counts during the gaspereau migration season, generally from early May to mid-July of each year. Counts have been conducted yearly (up to seven months each year) since 1981; however, since 2007, only the annual river herring run (early May to mid-July) is counted and reported (ISCRWB 2018a). Fish counts for 2017, 2018, and 2020, as well as year-to date gaspereau counts, are provided in **Table 5.6.3** (ISCRWB 2018b; SCIWC 2020a; Babcock, J., pers. comm., 2020).

Table 5.6.3: Milltown Station Fish Count Results, 2017-2020

Species	2017 Count	2018 Count	2019 Count	2020 Count (unofficial count)
American eel (*Anguilla rostrata*)	5	0	4	--
American shad (*Alosa sapidissima*)	56	392	29	--
Brook trout (*Salvelinus fontinalis*)	2	3	5	--
Common shiner (*Luxilis cornutus*)	2	1	0	--
Fallfish (*Semotilus corporalis*)	0	2	1	--
Gaspereau – alewife and blueback herring (*Alosa pseudoharengus* and *Alosa aestivalis*)	157,750	270,659	480,500	611,907
Golden shiner (*Notemigonus crysoleucas*)	3	0	0	--
Lamprey (*Petromyzon marinus*)	8	0	0	--
Pumpkinseed sunfish (*Lopemis gibbosus*)	0	0	1	--
Rainbow smelt (*Osmerus mordax*)	1	0	0	--
Smallmouth bass (*Micropterus dolomieu*)	45	23	6	--
White sucker (*Catostomus commersonii*)	94	87	43	--

Notes:

Freshwater fish presumably dropped below the dam via open gates into the brackish water below and returned back up the fishway to the river (ISCRWB 2018b; SCIWC 2020a; Babcock, J., pers. comm., 2020).

-- means data are not yet available.

Gaspereau numbers have been steadily increasing and have shown considerable increases in numbers since 2012 (ISCRWB 2018b; SCIWC 2020a). As such, they are most abundant species recorded yearly at the Milltown Station fishway (although the numbers are still well below recorded historical levels of approximately 20 million fish in the 1800s and 2.6 million fish in the late 1980s (Perley 1852; Dill et al.

2010). Most recent unofficial fish counts conducted in 2020 have indicated that over 611,000 gaspereau have successfully passed the upstream fishway (Babcock, J., pers. comm., 2020); finalized numbers will be made available following the publication of the annual report by the SCIWC. Additionally, noteworthy is American shad, whose return numbers are slowly increasing after having first been recorded in 2015 (11 species) after a 17-year absence since 1998 (ISCRWB 2018b).

Historically, the St. Croix River has been home to numerous fish species such as within the family Salmonidae (trout and salmon), Clupeidae (gaspereau, American shad), Accipensiridae (shortnose sturgeon [*Acipenser brevirostrum*] and Atlantic sturgeon [*Acipenser oxyrhynchus oxyrhynchus*]), Centrarchidae (sunfish), and Catostomidae (white suckers) (ISCRWB 2018a; Paul 2018; Saunders et al. 2006). Species such as the Atlantic salmon, American shad, and gaspereau have all been historically part of a commercial fishery where fishers were known to often capture hundreds within a single night (Flagg 2007). According to historic records, these diadromous species were found to ascend in large numbers as far as Mud Lake Stream Falls (over 50 km upstream) prior to any fish barriers being constructed along the St. Croix River (Flagg 2007; Paul 2018). Additionally, striped bass (*Morone saxatilis*) and Atlantic tomcod (*Microgadus tomcod*), among others, could historically be found in the river (Saunders et al. 2006).

Smallmouth bass are freshwater species first introduced into the St. Croix River area in the late 1800s and quickly became an important fish for sport fisheries in the area and still today (Cronin 1985; Anon 1988; IJC 2005). Populations of smallmouth bass declined in the 1980s around the same time fisheries management programs were attempting to restore gaspereau populations (with the addition of the new and improved fishway at the Milltown Station) (IJC-Bunch 2018; Cronin 1985). As a result, fishways at two other dams north of the Milltown Station (i.e., Woodland Dam and Grand Falls Dam), under authority of the State of Maine, were closed to limit the presence of gaspereau (IJC 2015; IJC-Bunch 2017), presumably to stabilize or improve smallmouth bass populations that had since become a prized sport fishery particularly in the State of Maine. To offset the dramatic decline in gaspereau, the DFO began stocking gaspereau above the Woodland Dam (Dill et al. 2010). Studies later disproved gaspereau as being the cause of the smallmouth bass population decline and the dams were re-opened in by 2013 (IJC n.d.; Flagg 2007; IJC-Bunch 2018).

Specifically in support of this EIA Registration, fish and fish habitat surveys were conducted by Dillon biologists between August 31 and September 3, 2020 within the impoundment approximately 450-500 m upstream of the Milltown Station as well as a reach approximately 200 m below the Milltown Station The full results of these surveys are detailed in Dillon (2020a) (**Appendix E**). A summary of these surveys follows.

The qualitative fish presence assessments in the PDA were conducted using backpack electrofishing techniques, fyke nets, seine netting, and conventional angling where conditions allowed. Of these methods, backpack electrofishing, fyke nets, and conventional angling were most successful in obtaining fish presence data, and resulted in the identification of the fish species presented in **Table 5.6.4** below.

Table 5.6.4: Summary of Fish Species Observed within the PDA and LAA, August 31-September 3, 2020

Common Name	Scientific Name	Number of Individuals		Capture Methods		Average Weight and Fork Length	Maximum and Minimum Weight	Maximum and Minimum Fork Length
		Upper Reach	Lower Reach	Upper Reach	Lower Reach			
American eel	*Anguilla rostrata*	2	35	Fyke Net	Electrofishing	21.59 (g) and 143.89 (mm)	303 (g) and 0.65 (g)	490 (mm) and 58 (mm)
Smallmouth bass	*Micropterus dolomieu*	31	5	Angling and Fyke Net	Electrofishing	89.82 (g) and 147.167 (mm)	463 (g) and 2.60 (g)	350 (mm) and 58 (mm)
Golden shiner	*Notemigonus crysoleucas*	-	4	N/A	Electrofishing	2.52 (g) and 59.4 (mm)	2.90 (g) and 2.00 (g)	67 (mm) and 45 (mm)
Crayfish	*Luxilus cornutus*	1	4	Fyke Net	Electrofishing	9.31 (g) and 56.8 (mm)	22.40 (g) and 3.72 (g)	75 (mm) and 22 (mm)
Blacknose dace	*Rhinichthys atratulus*	-	1	N/A	Electrofishing	2.68 (g) and 57 (mm)	2.68 (g)	57 (mm)
White sucker	*Catostomus commersoni*	-	1	N/A	Electrofishing	3.34 (g) and 63 (mm)	3.34(g)	63 (mm)

In total, 85 individual fish and six species of fish were captured, weighed, and measured for length (i.e., fork length). The weather conditions at the time of the surveys were sunny and daytime temperatures hovered around 21° C. The water levels noted at the time of the field survey were considered to be seasonally low (due to a warm and dry summer). A summary by each fishing method is as follows.

- **Electrofishing:** Three separate passes were conducted at the lower reach transects below the Milltown Station using the electrofisher with a fishing period of 1,623 seconds for the first pass, 822 seconds for the second pass, and 827 seconds for the third pass. Catch per unit effort (number of fish caught divided by total seconds fished) for the three passes are 0.016, 0.019, and 0.009, respectively.
- **Angling:** Conventional angling took place in the upper reach only from September 1 to 2, for a period of approximately 2 hours each day. The lures used (i.e., Senko worms, Rapala Lures) were mainly targeting smallmouth bass. Angling was successful in capturing fish on September 1 only.
- **Seine Netting:** Seine netting was conducted multiple times at two different locations within the upper reach, but was unsuccessful in catching any fish due to the large size of the area and the depth of the area.
- **Fyke Nets:** Fyke nets were deployed in two areas within the upper reach. One fyke net was deployed for two hours, due ease of access and the potential to lose the equipment, and the second net was in place for a period of 24 hours. Several species were captured using this method, as noted in **Table 5.6.4**.
- **Eel Traps:** Two eel traps were deployed, including one in the upper reach and one in the lower reach. The eel traps were in place for a 24 hour period and were both empty and still baited when retrieved.

Overall, American eel were the most abundant species observed, followed closely by smallmouth bass (i.e., both species recorded over 30 individuals). Low numbers (i.e., 5 or less) of crayfish and golden shiner, and even lower numbers of blacknose dace and white sucker (i.e., 1 each) were observed (refer to **Table 5.6.4**).

Above the Milltown Station in the upper reach of the LAA, smallmouth bass were the most abundant fish species, with minor numbers of American eel and crayfish present (refer to **Table 5.6.4**). Smallmouth bass is an invasive species introduced to the watershed for sport fishing in the late 1800s (Brown et al. 2009). Habitats in the impoundment were characterized by deeper pools with submerged logs, rocky and gravely substrates, i.e., areas preferred by smallmouth bass. Lower overall species diversity within the upper reach may be due to the presence of smallmouth bass as they are top predators that are known to outcompete salmonids and prey on smaller fish species (DFO 2018b).

Below the Milltown Station in the lower reach of the LAA, there was a greater number of individual fish and a greater diversity of fish species caught during the field survey. It should be noted that, although a variety of methods were employed to attempt to survey fish presence and assemblages, the methods

employed (in many cases due to access and safety) between the upper reach and the lower reach may influence the species that were successfully sampled in each area. Although fewer fish and fish species were observed in the upper reach above the Milltown Station, species on average were larger in size compared to those found downstream in the lower reach.

In summary, the results of the qualitative fish presence assessments confirm that a number of species identified in the desktop review, including smallmouth bass, American eel, golden shiner, crayfish, blacknose dace, and white sucker, are present and using habitats offered within the LAA. American eel, the only SAR/SOCC observed during the field survey, was the dominant species found below the Milltown Station. The invasive smallmouth bass was the dominant species found above the Milltown Station. Furthermore, results indicated a slightly higher abundance of fish and greater diversity of fish species below the Milltown Station in the lower reach, than what was observed in the upper reach above the Milltown Station at the time of the field study. Although these assemblages change during different seasons/migration periods, the arrangement of species observed within the LAA could potentially be attributed to factors such as: sampling methodology, habitat variations between the lower reach (i.e., a riffle/run) being preferred over the habitat characteristics of the impoundment (i.e., deeper water levels and less aquatic vegetation present), the potential passage barrier for certain species related to the Station, and lastly, the potential that other species are being outcompeted or preyed upon by smallmouth bass within the impoundment. In addition, it is possible that other species that were not observed during the field survey may be present.

Freshwater Mussel Species Assemblages

In Canada, the general status of freshwater mussel populations is a matter of growing concern for provincial and federal natural resource agencies as freshwater mussels are among the most imperiled North American animals (Metcalfe-Smith and Cudmore-Vokey 2004). There are seven species of freshwater mussels known to occur in the St. Croix River system (Martel et al. 2010). In addition to the five species discussed in **Table 5.6.2**, there is one SAR, brook floater (*Alasmidonta varicosa*), and one uncommon species, triangle floater (*Alasmidonta undulata*), both of which are discussed further in **Section 5.6.2.5**, below.

Freshwater mussel species are long-lived organisms with most species reaching 6 to 15+ years, but life spans of many decades have also been recorded (Metcalfe-Smith and Green 1992). The lifecycle of all freshwater mussel species that occur in Canada is essentially the same and involves one or more fish hosts (McMahon and Bogan 2001). Seasonal timing of breeding varies among Canadian freshwater mussels, but most species release their larvae, known as glochidium, in the summer. The glochidium attaches to a host fish's gills or fins and completes its development into a juvenile mussel, settling into benthic substrates.

Some species such as the eastern elliptio, eastern lampmussel, eastern floater, and triangle floater are capable of tolerating a wide range of habitats. Other species, such as the eastern pearlshell and brook floater are only found in river or running-water environments.

As most species cannot survive for extended periods of time when exposed to air, such as during a rapid reduction of water level above or below a dam, most adult freshwater mussels inhabit depths ranging from 0.3 to 4 m, but they can be found at depths exceeding 10 m (McMahon and Bogan 2001). They occur in a wide variety of permanent freshwater habitats, including rivers, lakes, streams and reservoirs, but as a rule inhabit only those with reasonably good water quality.

Freshwater mussels are filter feeders and feed by filtering planktonic organisms and particles from the water column. In eastern Canada, the period of most intense filter feeding, and associated shell and soft tissue growth, usually begins by late April or early May when spring thaw occurs and can last until October, when water temperature and photoperiod begin to decrease.

Freshwater mussels prefer finer substrates such sands or silts that readily allow for burrowing and horizontal movement. However, some species will inhabit coarser substrates, such as gravels (Clarke 1981). Substrates composed of bedrock, boulders, or large cobbles are likely to support few species or individuals, since these types of substrates are not favorable for burrowing or horizontal movement.

Past studies examined benthic macroinvertebrate (BMI) communities in the St. Croix River in relation to the industry along and within the river (i.e., mills, dams, municipal wastes, etc.) and their effects relating to pollutants, water quality, habitat alterations, and climate change (US EPA 1972; NBDELG 2019). Generally, closer the proximity to a pollutant or effluent from a pollution source, the less diverse the BMI community was, and BMIs found in those areas were more tolerant (i.e., less sensitive) of the pollution (US EPA 1972). Recent studies published by the World Wildlife Fund Canada, indicate “very good” BMI health assessment based off of Hilsenhoff’s Biotic Index (further upstream, values varied from “good” [Vanceboro], “fair” [Spednik Lake], to “very good” [East Grand Lake]) over a seven year study from 2007 to 2014 (WWF Canada 2016).

Other aquatic wildlife such as herptiles that may use habitat within the PDA are discussed in **Section 5.8** (wildlife and wildlife habitat).

5.6.2.5 Aquatic SAR/SOCC

A custom AC CDC (2020) data report (refer to **Appendix A**) was obtained for a 5 km radius around the PDA. According to the AC CDC records review, there is one record of a fish species that has been historically observed within 5 km of the Project: the Atlantic salmon, which has been ranked herein as “May be at Risk” as it is unknown to which sub-population the species belongs. Atlantic salmon has historically been found in abundance in the St. Croix River migrating the river to spawn; however, the last recorded Atlantic salmon (landlocked) to pass the Milltown Station was over 14 years ago (IJC-Goreham and Almeda 2016; IJC-Bunch 2018). Additional SAR and SOCC that have been recorded and/or have historically been found in the St. Croix River are identified in **Table 5.6.5** below.

Table 5.6.5: Summary of SAR/SOCC Aquatic Species

Species	Status[1]	Species Description	Potential to Occur in Project Area
Fish species			
American eel (*Anguilla rostrata*)	**COSEWIC:** Threatened **SARA:** Unlisted **NB SARA**: Threatened **S-Rank:** S4	The American eel is a catadromous species, spending most of its life in freshwater and returning to salt water to spawn. Spawning migration can occur anytime between August and December, but peak migration typically occurs between the months of September to October (Page and Burr 1991). During migration, American eels undertake long oceanic migrations to the Sargasso Sea to spawn (Page and Burr 1991). Their buoyant eggs will typically hatch within one week, hatch and develop into larvae which drift passively with ocean currents of the Gulf Stream to the coastal areas of North America. These larvae will metamorphose into 'glass eels' (juveniles) which are attracted to freshwater, actively migrating into brackish estuaries and developing into "elvers" (COSEWIC 2012a). They may remain in the estuaries for up to a year, moving up and down with the tides as they adapt to living in freshwater. Once "elvers" have completed their migration into freshwater they become "yellow eels", marked by a significant growth phase where their skins thickens and sexual differentiation occurs (COSEWIC 2012a). Between eight and 23 years of growth in freshwater are required for "yellow eels" to become "silver eels", at which time they will begin their spawning migration back to the Sargasso Sea (COSEWIC 2012a).	Known to occur in the PDA/LAA. (Saunders et al. 2006; Paul 2018).
Atlantic salmon – Outer Bay of Fundy population (*Salmo salar*)	**COSEWIC:** Endangered **SARA:** Unlisted **NB SARA**: Endangered **S-Rank:** Unranked	Atlantic salmon are an anadromous species, spending part of their life feeding and growing during long migrations at sea and then returning to reproduce in their natal streams. Atlantic salmon spawning runs typically begin moving up river from spring through into the fall. Peak spawning typically occurs from October to November and eggs are laid in constructed "redds" built in gravel beds near the head of riffles, or the tail of a pool (Page and Burr 1991). Young salmon (smolts) usually live in shallow riffle areas approximately 25 cm deep with gravel, rubble, rock or boulder substrates. Adult salmon that have spawned will usually immediately return to sea before winter, but occasionally will overwinter in freshwater until spring (Page and Burr 1991). This population has historically suffered from dams that have impeded spawning migrations and flooded spawning habitat, as well as from other anthropogenic influences such as pollution and logging, that have further degraded freshwater habitats (COSEWIC 2010a).	Historically, this species occurred within the PDA/LAA and has the potential to occur in the area as the St. Croix River is located within the range of the Outer Bay of Fundy population of Atlantic salmon (Saunders et al. 2006; COSEWIC 2010a).

Species	Status[1]	Species Description	Potential to Occur in Project Area
Atlantic sturgeon (*Acipenser oxyrinchus* - Maritimes population)	**COSEWIC:** Threatened **SARA:** Unlisted **NB SARA:** Threatened **S-Rank:** S3	Atlantic sturgeon are anadromous species and prefer large, preferably deep rivers with a relatively warm estuary. They spawn over rocky-gravel substrates, typically at a depth of 1 to 3 m, occasionally under waterfalls and in deep pools (COSEWIC 2011a). Atlantic sturgeon are a slow growing species with males reaching maturity at 16 to 24 years of age and females at 27 to 28 years of age. Generation time is estimated at about 40 years (COSEWIC 2011a).	Historically, this species occurred within the PDA/LAA (Saunders et al. 2006). However, it is unlikely that this species would ascend the falls (i.e., a natural barrier) to carry out part of their lifecycle processes.
Shortnose sturgeon (*Acipenser brevirostrum*)	**COSEWIC:** Special Concern **SARA:** Special Concern **NB SARA:** Special Concern **S-Rank:** S3	The shortnose sturgeon is an anadromous species of which there are only 19 population segments scattered along the east coast of North America. The only occurrence in Canada is within the Saint John River system, New Brunswick (COSEWIC 2005). This species spawns in fast-flowing water over boulder and gravel substrate from mid-April to June. They are also a slow growing species with males and females reaching sexual maturity around 11 and 13 years, respectively (COSEWIC 2005).	Historically, this species occurred within the PDA/LAA (Saunders et al. 2006). However, it is unlikely that this species would ascend the falls (i.e., a natural barrier) to carry out part of their lifecycle processes.
Mussel Species			
Brook floater (*Alasmidonta varicosa*)	**COSEWIC:** Special Concern **SARA:** Special Concern **NB SARA**: Special Concern **S-Rank:** S2	The brook floater is usually considered to be a habitat specialist that requires running water environments such as shallow rivers or streams with moderate to high water flows (COSEWIC 2009a). It usually prefers sand or fine gravel substrates but is occasionally found in pockets of sand within cobble and rocky bottom areas (COSEWIC 2009a). In New Brunswick, it has only been found in rivers and has only been observed with one host fish species, the ninespine stickleback (COSEWIC 2009a). Although there are no identified records of the brook floater in the PDA, there are records within 100 km of the site and New Brunswick and Nova Scotia are the last remaining areas the species is found and as such the population in Canada is recognized as “an important stronghold for the species” (AC CDC 2020; GOC 2011).	This species may occur within the PDA/LAA (AC CDC 2020; GOC 2011).

Species	Status[1]	Species Description	Potential to Occur in Project Area
Triangle floater (*Alasmidonta undulata*)	**COSEWIC:** Unlisted **SARA:** Unlisted **NB SARA**: Unlisted **S-Rank:** S3	This species of freshwater mussel seems to prefer low to gradient rivers with low to moderate flow velocities and sandy to gravel substrates. However, it is also found in slower moving streams and lakes and can tolerate a range of flow conditions and substrate types (Nedeau 2008). Triangle floaters use a range of host fish including the common shiner, white sucker, and largemouth bass (*Micropterus salmoides*), and therefore occur in habitats where these fish are commonly found.	This species may occur within the PDA/LAA (Martel et al. 2010).

Note:

[1]AC CDC S-Ranks as follows: S1: extremely rare in province; S2: rare in province; S3: uncommon in province; S4: widespread, common and apparently secure in province; S5: widespread, abundant and demonstrably secure in province S#S# = a numeric range rank used to indicate any range of uncertainty about the status of the species or community; SNA: Not Applicable - A conservation status rank is not applicable because the species is not a suitable target for conservation activities. B= Breeding, N = Nonbreeding, M = Migrant, U = Unrankable. (AC CDC 2020).

5.6.3 Assessment of Potential Interactions between the Project and Fish and Fish Habitat

The Project has the potential to affect fish and fish habitat through various phases and activities of the Project through changes in hydrology, geomorphology, water quality and quantity, sedimentation, as well as ecosystem and species biodiversity as outlined below.

5.6.3.1 Potential Interactions

The following detailed potential interactions are based on the current understanding and goal of the Project as described in **Section 2.3**.

Potential Temporary Interactions:

- Change in sediment concentrations, in contaminant concentration, and in general water quality through the entry of deleterious substances through deconstruction, accumulated sediment in the impoundment, accidental spill events, machines in the watercourse and/or its buffer, refuelling in/near water (refer to **Section 7.0**, accidents, malfunctions, and unplanned events);
- Loss or alteration of fish habitat (i.e., loss or change in substrate, water flow/depth, geomorphology and wetted area) upstream of the Milltown Station due to an anticipated water level decrease of 2 to 5 m as a result of the removal of the dam;
- Fish injury and/or mortality from displacement or stranding of fish during decommissioning activities (i.e., dewatering of work area(s) and through the change in water flow and quantity as a result the removal of the dam);
- Fish passage obstruction during decommissioning activities, following mid-July 2021 until structures impeding fish passage (i.e., temporary barriers during decommissioning and while the Station components are being removed); and
- Potential noise and vibration from construction activities.

Potential Permanent Interactions:

- Minor fish habitat gained at the PDA from the removal of the Milltown Station (i.e., its in-water footprint);
- Fish habitat loss along the riparian area due to a 2 to 5 m water level decrease upstream of the Station (i.e., loss of wetted area; refer to surface water VC in **Section 5.5**);
- Restored fish passage at Salmon Falls and improved accessibility to 5 million m^2 of fish habitat for fish throughout the LAA (and beyond);
- Opportunity for improved spawning upstream of the Milltown Station for anadromous fish; and
- Opportunity for improved populations (size and range) of diadromous fish.

5.6.3.2 Mitigation

In addition to the mitigation measures that were defined in **Section 5.5.3.2** for the surface water VC, the following standard mitigation measures have been identified to reduce the likelihood of occurrence, or minimize potential extent of effects of the Project on fish and fish habitat. Planned standard mitigation measures for the proposed project include the following:

- Consultation with DFO throughout the Project to ensure compliance with regulatory requirements and guidelines;
- The area to be disturbed by the Project will be minimized to the extent possible to only that area which is required to accomplish the Project objectives;
- Project activities will comply with the conditions of a watercourse and wetland alteration (WAWA) permit;
- A fish rescue program will be implemented prior decommissioning and demolition activities, and fish will be removed from impounded areas and relocated as per DFO guidance, permits, and consultation;
- A mussel survey of the PDA and LAA will be conducted prior to demolition activities, and any SAR mussels identified will be relocated to suitable habitats prior to dewatering the impoundment;
- Fishway decommissioning and demolition activities will begin once the key migration period for priority species (i.e., gaspereau) ends to avoid impeding key migration for species migrating upstream to spawn. Key migrations are in spring (May) and fall (November);
- Appropriate erosion and sediment control (ESC) measures will be incorporated for all phases of the Project and will be checked regularly and prior to and after storm events to ensure they are continuing to operate properly to prevent the undue release of suspended sediments into water as a result of the demolition activities and minimize potential effects to fish and fish habitat;
- Efforts will be made to ensure that as little demolition material falls into the river itself, and any such materials that fall into the river will be subsequently removed;
- Emergency spill kits will be maintained on-site and all staff will be trained on how to use them; and
- A PSEMP will be completed prior to the start of the Project and will provide details on proper ESC measures, waste management, contingency measures, heavy equipment operations and maintenance, and an emergency response plan or processes for accidental spills, emergencies, incidents or storm events.

5.6.3.3 Characterization of Potential Interactions Following Mitigation

The Project will result in the above mentioned interactions (**Section 5.6.3.1**) with fish and fish habitat and related aquatic species; however, the mitigation measures above will be implemented to minimize any negative interactions to the extent possible.

Although with current documented and available background information, it is not possible to determine the extent to which Salmon Falls has been altered for the construction and continued operation of the Milltown Station, but it is recognized that new fish habitat has established (and re-established) over the years since its construction. The goal of the Project to remove all human-made structures that obstruct fish passage which may temporarily and modestly alter, disrupt, and/or change some aspects of fish and fish habitat as the river system acclimatizes to its new conditions. However, the changes that are anticipated for water depth/flow, wetted area, water and sediment quality, and timing of the phases and activities of the Project are not expected to substantially affect fish and fish habitat, and in particular SAR/SOCC. This is because environmental effects will be short in duration (i.e., until the system equilibrates to restored flow conditions), and may be similar in nature or slightly exceeding current fluctuations (i.e., natural water level fluctuations and operational drawdown of the Milltown Station's impoundment). Furthermore, the ultimate goal is to provide unimpeded fish passage and restored habitat with potential opportunities for restoration efforts continuing outside of the scope of this Project

As noted above, the wetted area upstream of the Milltown Station is subject to water level drawdown, (currently maximum water elevations are specified by the IJC but minimum levels are not regulated), and during the Project, dewatering will be scheduled and carried out during low flow conditions. As such, a loss of 2 to 5 m of water in the impoundment is deemed not substantial with respect to the loss or alteration of fish habitat and change in access to habitat/migration, when compared to the benefits of removing this impediment to fish passage and resulting improved access to 5 million m^2 of fish habitat upstream of the Station as a result of its removal. Given that there is little sediment accumulated in the impoundment and water level changes are minimal and not significant, there are no expected conditions that would be expected to lead to the impairment of water or sediment quality with respect to the CCME guidelines, given that there are few exceedances of the CCME guidelines in surface water and sediment, as evidenced by the results in **Section 5.5.2.3**.

DFO guidelines will be followed for any handling of fish in addition to scheduling the decommissioning of the fishway to ensure it remains operational for key migrations (i.e., the upstream spring migration from May to July 2022) for key diadromous species (particularly gaspereau). Additionally, communication will be maintained with DFO throughout the Project, but there should be no permanent loss of fish and fish habitat as a result of the Project. Although not anticipated as per current design, it is understood that any loss of fish habitat as a result of the Project is self-offsetting with respect to Section 35(2) of the *Fisheries Act* as the Project will provide access to approximately 5 million m^2 of fish habitat.

Following the removal of Milltown Station, it is anticipated that fish will be able to return to the area and fish habitat will be gained not only within the existing footprint of the Station but through

unimpeded access to estuarine and saltwater habitats downstream and to access an additional 16 km upstream of the St. Croix River and its tributaries, should they so choose (i.e., the goal of the Project).

Although continued restoration of the PDA beyond providing volitional fish passage is outside of the scope of this Project, it is possible that through future collaboration of stakeholders and First Nations (particularly with the traditional knowledge of the Peskotomuhkati Nation), a better understanding of Salmon Falls before the construction of the dam at Milltown will be gained (including a better understanding of the natural barrier of Salmon Falls to particular fish species) and work will be completed to monitor and further enhance possibilities for increased/enhancement of fish habitat, species abundance and diversity in the future (outside of the scope of this Project).

5.6.4 Summary

In light of the above, the Project, will interact with fish and fish habitat primarily through temporary means (i.e., temporary change in water flow, temporary fish passage obstruction, etc.) during the Project activities, as well as permanent means (i.e., providing volitional fish passage and access to habitats for life cycle purposes). There are no foreseeable features of the Project that would result in accidents, malfunctions, or unplanned events (refer to **Section 7.0**) that would lead to a significant environmental impact on fish and fish habitat. Negative interactions such as fish injury and alteration of fish habitat will be minimized through the use of mitigation measures for each phase/activity of the Project as necessary, and effects to fish and fish habitat will thus be minimized and are not considered substantial. In particular, fish passage will be maintained during key migration periods to reduce negative effects on key species. Ultimately, the amount of fish habitat gained through the Project outcome is intended to supersede the remaining negative (temporary or permanent) interactions.

The removal of the Milltown Station is anticipated to substantially increase access to fish habitat, including better access for fish species that were not previously able to locate and ascend the fishway. In addition, the removal of the Milltown Station is anticipated to improve the productivity of fish populations, including providing the opportunity for improved species richness and diversity upstream of the Milltown Station, with associated benefits to the fishery (i.e., prey fish) as well as the stakeholders and First Nations that depend on the fishery. Although removal of the Milltown Station has the potential to alter habitat for the currently established resident species in order to accommodate other species, the greater goal is provide volitional fish passage and to re-establish natural components to allow a natural regenerative process and species biodiversity in the future.

In light of the above, and in consideration of planned mitigation and best practices aimed at reducing environmental effects, the potential interactions between the Project and fish and fish habitat are not expected to be substantive.

5.7 Vegetation and Wetlands

The potential interactions between the Project and vegetation and wetlands, including vegetation species at risk (SAR), are assessed in this section.

5.7.1 Scope of VC

Wetlands are defined as land where the water table is at, near, or above the land's surface, or land which is saturated for a long enough period to promote wetland or aquatic processes as indicated by hydric soils, hydrophytic vegetation, and various kinds of biological activities adapted to the wet environment (NBDNRE-NBDELG 2002; NTNB 2018).

Vegetation includes terrestrial and aquatic plant species (both vascular and non-vascular, such as mosses), as well as lichens.

Vegetation and wetlands was selected as a VC because they are valued in their relationship with water resources, wildlife and wildlife habitat, and other biological and physical components addressed as VCs in this EIA Registration. In addition, SAR (including plants) are protected under federal and provincial legislation (pursuant to the federal *Species at Risk Act* [SARA] and the New Brunswick *Species at Risk Act* [NB SARA]) and SAR and other rare plant species are considered valued, including species of conservation concern (SOCC) as identified as "extremely rare" (S1), "rare" (S2) or "uncommon" (S3), if they are present (AC CDC 2020).

In this EIA Registration document, we define "species at risk" (abbreviated SAR) as those species that are listed as "Extirpated", "Endangered", or "Threatened" on Schedule 1 of the federal *Species at Risk Act* (SARA) or the New Brunswick *Species at Risk Act* (NB SARA). We also define "species of conservation concern" (abbreviated SOCC) as those species that are not SAR but are listed in other parts of SARA, NB SARA, COSEWIC, or as regionally rare or endangered by the Atlantic Canada Conservation Data Centre (AC CDC) (i.e., those species with AC CDC S-ranks of "extremely rare" [S1], "rare" [S2] or "uncommon" [S3]).

New Brunswick's wetlands have been given specific protection pursuant to the New Brunswick *Clean Environment Act* and the *Clean Water Act*. The New Brunswick Department of Environment and Local Government (NBDELG) requires a permit for any alteration within 30 m of the banks of a watercourse or wetland. Wetlands often support rare or uncommon vegetation species assemblages, and New Brunswick Wetlands Conservation Policy and regulatory processes are guided towards the goal of achieving no net loss of wetland function (NBDNRE-NBDELG 2002). Also, wetlands are widely recognized as providing a host of ecosystem functions and benefits including, but not limited to, filtering out pollutants and heavy metals, mitigating flood events, and providing habitat to many SAR in New Brunswick such as the wood turtle (*Glyptemys insculpta*), least bittern (*Ixobrychus exilis*), and showy lady's-slipper (*Cypripedium reginae*) (NTNB 2018). Wetland compensation is often required as a condition of a WAWA permit, usually at a ratio of 2 units of wetland to be restored for every unit of wetland altered.

This VC covers the vegetation component of terrestrial and aquatic habitats, as well as wetlands including their habitat functions. It does not cover the wildlife (including wildlife SAR) that may be using the habitats, which is addressed in **Section 5.8** (wildlife and wildlife habitat), nor does it address aquatic wildlife (including fish and aquatic SAR) which is addressed in **Section 5.6** (fish and fish habitat).

5.7.2 Existing Conditions

The information regarding the presence and characterization of wetlands and the characterization of vegetation communities within the PDA and LAA was derived from several sources including existing databases and secondary information sources (i.e., desktop analysis). This desktop analysis is supplemented by a site-specific field evaluation of the Project development area (PDA) and the local assessment area (LAA, defined as 450-500 m upstream and downstream of the Milltown Station, within 30 m from the river's edge) completed on various occasions during the summer of 2020 and as documented in a separate technical report (**Appendix F**). The methods used during the desktop analysis and field surveys are presented in the following sections.

5.7.2.1 Regional Setting

The PDA and LAA are located within the Valley Lowlands ecoregion and, more specifically, within the Magaguadavic ecodistrict, which features an undulating plateau with many wetlands, meandering streams and minimal relief (Zelazny 2007). This ecoregion is characterized by dramatic influence of major watercourses and large lakes (Zelazny 2007). The interaction of flood events through these major watercourses with the varied topography of the ecoregion creates a wide spectrum of flood and substrate conditions, with a corresponding diversity of wetland types (Zelazny 2007).

Within this ecoregion, tolerant hardwood stands dominated by American beech (*Fagus grandifolia*), sugar maple (*Acer saccharum*), and yellow birch (*Betula alleghaniensis*) sit on ridge tops with fertile soils. On less fertile ridges, hardwoods tend to be dominated by American beech, red maple (*Acer rubrum*), and trembling aspen (*Populus tremuloides*). Softwood forests in the area tend to be associated with lower slopes and shallow soils. The softwood forests are dominated by red spruce (*Picea rubens*), balsam fir (*Abies balsamea*), and white spruce (*Picea glauca*), with occasional eastern hemlock (*Tsuga canadensis*) and white pine (*Pinus strobus*) (Zelazny 2007). Although the LAA is situated within an urban/suburban setting, there may remain some aspects of the described forest type along the riverbanks and islands of the St. Croix River.

5.7.2.2 Desktop Analysis

Desktop Analysis Methods

Dillon reviewed readily available information from reputable sources. The information was reviewed to evaluate the potential for vegetation SOCC and/or vegetation SAR within the general area of the Project and to assist in scoping/focussing efforts for the field surveys that were conducted in summer of 2020. Dillon completed a review of the following sources and data lists for the purpose of characterizing existing conditions for this EIA Registration:

- A custom AC CDC report (AC CDC 2020; refer to **Appendix A**);
- NBDNRED and NBDELG publications;
- The federal species at risk registry;
- The provincial species at risk registry;

- Publicly-available Geographic Information Systems (GIS) map layers and databases;
- High resolution aerial photography; and
- GeoNB wetland and watercourse mapping.

As noted previously, the information obtained from this desktop analysis was supplemented by a field survey conducted by Dillon biologists on various occasions during the summer of 2020, to characterize site-specific environmental conditions for vegetation and wetlands near the Milltown Station. The results of these field surveys are summarized below in **Section 5.7.2.3**, with additional detail in a separate technical report located in **Appendix F**.

Desktop Analysis Results – Wetlands

Based on a desktop analysis, there are no identified wetlands within the PDA and LAA. This conclusion was field-verified in the June 18, 2020 field survey conducted by a professional certified in wetland delineation and functional assessments in New Brunswick. The field survey concluded that there were no wetlands in the PDA or LAA, and that there was little potential for wetlands to form in the LAA following the decommissioning of the Milltown Station due to steep river embankments, cascading river features, and expected lower water elevations following removal of the Milltown Station. Wetlands are therefore not discussed in detail in this EIA Registration. Should follow-up and monitoring identify the presence of wetlands, further wetland assessment will be conducted with a view to determining wetland permitting and compensation requirements, as applicable.

Desktop Analysis Results – Vegetation Communities

Based on a desktop analysis, the land within the PDA is predominately urbanized with NB Power buildings and a baseball field and consists primarily of mowed grass, cultivated hardwood and softwood tree varieties, and shrubs and herbaceous species common to developed sites. The LAA upstream of the Milltown Station includes an uninhabited island at the head of the impoundment at Milltown Rapids, which includes a mixed wood stand and a rocky beach. The upstream mainland portion of the LAA includes a railway line, which runs parallel to the river between a narrow strip of wooded land in the riparian zone and a roadway and/or residential properties. The nearby residential properties are expected to contain ornamental tree, shrub, and herbaceous species. Downstream of the Milltown Station, the LAA includes forested parkland and Crown land in the riparian zone, which is bounded by a road and/or residential properties. Both upstream and downstream riparian zones consist of steep slopes and include hardwood dominated wooded areas with a mix of rocky and sandy shorelines, which include non-native shrub and herbaceous species due to the proximity to the railway line and urbanized areas. The section of river within the LAA is fast moving and provides habitat to aquatic species in the littoral zone and on submerged rocks.

A custom AC CDC report was obtained for a 5 km radius around the PDA (AC CDC 2020). The report lists historical observations of species of flora and fauna, including rare species, SOCC (i.e., species with S-ranks of S1, S2, or S3), and SAR within a 5 km radius from the Project site (refer to **Appendix A**). The AC CDC report (AC CDC 2020) included one historical record of a vascular plant SAR under SARA with a

Threatened status, black ash (*Fraxinus nigra*). The report also included 36 vascular plant SOCC historically observed within a 5 km radius of the PDA, and of these, two SOCC, toothed flatsedge (*Cyperus dentatus*) and cursed buttercup (*Ranunculus sceleratus*), were historically recorded within the boundaries of the PDA (AC CDC 2020). There were no AC CDC records of vascular plant SAR, or non-vascular plant (including lichens) SOCC or SAR, historically observed within the 5 km radius around the PDA.

According to the New Brunswick forest inventory (i.e., publicly available GeoNB GIS database), only two mapped forestry polygons occur within the LAA and they consist broadly of the typical forest types for the area, as described by Zelazny (2007). The first, located downstream of the Milltown Station wedged between Milltown Blvd. and the St. Croix River, is listed as an immature hardwood stand likely consisting of species such as oak (*Quercus* spp.), ash (*Fraxinus* spp.), and elm (*Ulmus* spp.). The other, located upstream and confined to a mid-stream island, is listed as an immature mixedwood stand consisting of at least 40% red maple (*Acer rubrum*). Refer to **Figure 5.7.1**.

Desktop Analysis Results – Priority Plants

Based on the desktop analysis, a conservative assessment was made on the potential for priority flora species and their habitats as documented by available information from secondary sources, which includes the AC CDC (2020) report. In the planning for the field surveys, it was conservatively assumed that all priority flora species identified by the AC CDC as having been historically observed within 5 km of the PDA may be present where potential habitat exists within the LAA.

For this EIA Registration, the typical habitat of each SOCC was identified and compared to the habitats identified within the LAA. Each SOCC was evaluated for the potential for occurrence within the LAA as "Known", "Probable", "Possible", and "Unlikely". Of the 36 species identified as priority species (i.e., one SAR and 35 SOCC), two have known occurrences within the PDA, seven were considered to have a probable potential to occur within the LAA, seven were considered to possible potential to occur within the LAA, and the remaining 20 priority species were considered unlikely to occur within the LAA. For each SOCC, the ranking, status, habitat, and potential to occur within the LAA is summarized in **Table B.1** in **Appendix B**.

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Énergie NB Power

MILLTOWN GENERATING STATION DECOMMISSIONING PROJECT

ENVIRONMENTAL IMPACT ASSESSMENT REGISTRATION

LOCAL ASSESSMENT AREA VEGETATION AND WETLANDS

FIGURE 5.7.1

- Species of Conservation Concern, Vascular Plant
- Watercourse
- Hardwood Dominant Stand (>= 70%)
- Mixedwood Stand (>= 40% Tolerant Hardwood)
- Project Development Area
- Local Assessment Area: Vegetation and Wetlands
- Canada-USA Border
- Wetland (NBDELG 2019)

OH: Other hardwood -oak, ash, elm, basswood, black cherry, butternut and/or ironwood
RM: Red maple
I: Immature - merchantable layer, accumulating volume slowly

* Location of record within 50 to 100 m
** Location of record within 100 m to 1 km
Locations of species rounded more than 1 km are not mapped

0 50 100 200 m

SCALE 1:6,000

N W E S

MAP DRAWING INFORMATION:
BASEMAP IMAGE SERVICE LAYER CREDITS: ESRI, HERE, GARMIN, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), SWISS TOPO, OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY (2015)
DATA PROVIDED BY: DILLON CONSULTING LIMITED, SNB & NB DEPARTMENT OF NATURAL RESOURCES (FOREST STAND DATA: 2006) THE ATLANTIC CANADA DATA CONSERVATION DATA CENTRE, THE INTERNATIONAL BOUNDARY COMMISSION.

MAP CREATED BY: SCM
MAP CHECKED BY: JB
MAP PROJECTION: NAD 1983 CSRS NEW BRUNSWICK STEREOGRAPHIC

DILLON CONSULTING

PROJECT: 19-1594

DATE: 2020-01-27

The two SOCC that were identified by the AC CDC records of being historically present within the PDA are as follows.

- **Toothed Flatsedge (*Cyperus dentatus*)** is ranked S3 (uncommon) by the AC CDC, but is not listed pursuant to SARA or NB SARA. This sedge is found on sandy and rocky shores in southern New Brunswick (Hinds 2000) and typically goes to fruit in summer (Munro et al. 2014). The August 26, 1985 AC CDC record described the habitat where toothed flatsedge was found within the PDA as a sandy shoreline (AC CDC 2020); and
- **Cursed Buttercup (*Ranunculus sceleratus*)** is ranked S1 (extremely rare) by the AC CDC, but is not listed pursuant to SARA or NB SARA. This buttercup is found in wet ditches, low, damp ground and along upper edge of salt marshes (Hinds 2000) and typically flowers from May to August (Munro et al. 2014). The August 10, 1891 AC CDC record described the habitats where cursed buttercup was found within the PDA as ditches and wet grounds, and the August 15, 1985 AC CDC record described the habitat as wet gravels of backwater (AC CDC 2020).

This evaluation of the potential for vascular and non-vascular priority plant species to occur within the LAA was used to guide field planning efforts for the field survey of vegetation communities completed in summer of 2020. Rare plant, vegetation, and wetland surveys will be conducted concurrently within the LAA during periods that priority species are expected to flower or fruit. At least one priority species with a probable potential to occur within the LAA, hop sedge (*Carex lupulina*), has a narrow fruiting window that is restricted to the month of June. (Note: hop sedge was not observed during the field surveys.) The remaining priority species with potential to occur within the LAA have flowering or fruiting times that overlap in July and August. Therefore, field surveys were planned to be conducted during the months of June and August to ensure the assessment occurs during the times when SOCC are flowering or in fruit, for ease in their identification.

5.7.2.3 Field Surveys

Field Survey Methods

Vegetation and wetland surveys of the PDA and LAA were conducted by a qualified terrestrial ecologist from Boreal Environmental Inc. (Boreal) under contract to Dillon over the full extent of the LAA shown on **Figure 5.7.2**. The Boreal terrestrial ecologist was accompanied by NB Power's Indigenous field liaison during these surveys. Vegetation and wetland surveys were spread out over the length of the growing season in order to capture the optimal survey periods for various species with differing rates of development. Early surveys were conducted on June 18, 19, and 23, 2020, with additional surveys conducted on July 15, August 20, August 31, and September 1, 2020. The spatial extent of the vegetation and wetlands field surveys conducted encompassed approximately 7.7 ha, extending 560 m upstream and 450 m downstream of the Milltown Station along the St. Croix River, on the Canadian side only of the International Boundary Commission's official boundary line.

Figure 5.7.2: Local Assessment Area and Major Vegetation Types

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The surveys were conducted both by water (from a boat) and on land on the Canadian side of the international boundary only, including an island in the river located at the southern extent of the LAA. Land surveys were conducted in a random meandering fashion focusing on unique habitats within the LAA, while shoreline surveys within the headpond were conducted by scanning the shoreline from a boat. Specimens were collected for species that could not be identified in the field for more in-depth examination and identification. During the surveys, all vascular plant species encountered were recorded and specific location data were recorded for each SOCC and/or SAR location. Information on major plant community types and their extent and location were recorded.

During these surveys, any wetlands encountered would be delineated in accordance with the Corps of Engineers Wetland Delineation Manual (Environmental Laboratory 1987) and the Draft Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region (U.S. Army Corps of Engineers 2008). These are the accepted methods for wetland delineations in New Brunswick.

The properties and riparian portions of the River on the U.S.A. side of the international boundary were not included within the scope of the vegetation and wetlands technical field surveys and studies discussed herein, due to the relatively homogeneous nature of the river banks and related habitats on both sides of the international boundary line as well due to border restrictions, specifically a closed international border at the time of the surveys due to the COVID-19 pandemic.

Field Survey Results – Wetlands

As noted in the technical report titled "Terrestrial Environment Report: Vegetation and Wetlands, Milltown Generating Station Decommissioning Project, Milltown, New Brunswick" (Boreal 2020a; **Appendix F**), a desktop review of provincial wetland mapping indicated that no suspected wetlands were present in the PDA or LAA. During the course of fieldwork, no wetlands were encountered within the LAA.

Throughout the LAA, the banks of the Skutik/St. Croix River tend to be steep with an abrupt transition between upland and water so that riparian wetlands are not present. Likewise, the island located at the southern end of the LAA rises abruptly from the water and is well drained and bouldery. Within the PDA, much of the shoreline on the Canadian side of the river is comprised of fill with steep embankments. Outside the PDA, the shoreline tends to be exposed boulders and bedrock where the winter ice scours the shoreline. The river was generally fast moving and there was insufficient aquatic vegetation below the waterline to be considered wetland and any location.

Field Survey Results – Vegetation Communities

As documented in Boreal (2020a; **Appendix F**), during the course of the seven days of fieldwork, a total of 166 plant species were recorded. Of these, 54 species were not native to New Brunswick. There were a total of 10 plant SOCC and one SAR recorded within the LAA (**Table 5.7.1**). The single SAR record was for butternut (*Juglans cinerea*) ranked as S1 (extremely rare) by the AC CDC and listed as Endangered under Schedule 1 of SARA. Butternut were assessed as Endangered due to the spread of an introduce disease that is causing steep population declines in Canada. The location of the single, apparently

healthy butternut tree sapling is shown on **Figure 5.7.2** as being approximately 200 m north of the PDA along the top of the river bank. The individual tree appeared to have been planted there as there were no other larger butternut trees nearby and it was located on the edge of a maintained lawn.

Table 5.7.1: Plant SAR and SOCC Found in the LAA

Scientific Name	Common Name	SARA Status	AC CDD S Rank	Status
Juglans cinerea	Butternut	*Endangered*	S1	At Risk
Arabis drummondii	Drummond's rockcress		S2	Sensitive
Viburnum lentago	Nannyberry		S2	Secure
Viburnum recognitum	Northern arrowwood		S2	Secure
Boehmeria cylindrica	Small-spike false-nettle		S3	Sensitive
Cornus obliqua	Silky dogwood		S3	Sensitive
Salix nigra	Black willow		S3	Sensitive
Carex lupulina	Hop sedge		S3	Secure
Carex tuckermanii	Tuckerman's sedge		S3	Secure
Lobelia cardinalis	Cardinal flower		S3	Secure
Penthorum sedoides	Ditch stonecrop		S3	Secure

**No New Brunswick Species at Risk were found within the PDA or LAA.*

Only two plant SOCC were found within the PDA: small-spike false-nettle (S3, uncommon) and Drummond's rock cress (S2, rare). The Drummond's rockcress is ranked as S2 (rare) by the AC CDC as it is only found in a small number of locations in the province. Its provincial distribution is scattered, with occurrences across the province, typically occurring on rocky shorelines of larger rivers and waterbodies, but occasionally occurring away from water. Within the PDA, 22 individual Drummond's rockcress plants were found in a small area immediately adjacent to the Station, in a rock cut trench near the upstream fishway. The location near the water suggests that this population may disseminate seed by way of water and additional plants may also be located upstream and downstream but there are no prior records of this species occurring in this area.

Small-spike false-nettle was found at one location just above the dam along the shoreline of the impoundment but was also found to be abundant throughout the LAA. This plant is ranked as S3 (uncommon) by the AC CDC and its provincial population is considered secure. A small change in local numbers of individual plants is unlikely to have a measurable effect on the local population.

Other rare plants found within the PDA and LAA are all known to occur frequently along the Skutik/St. Croix River, according to the AC CDC data report (**Appendix A**). Drummond's rockcress, nannyberry, northern arrowwood, and silky dogwood area all species whose provincial range is limited to the southwest corner of the province which represents their northern range limit. Across the border in Maine, they are not considered to be rare.

Many of the plants rely on some combination of ice scouring and water movement to spread, germinate and grow. Drummond's rockcress, small-spike false-nettle, ditch stonecrop, and cardinal flower all tend to occur along the ice scour zone where the soil is thin and gravelly or rocky, and the competition from woody plants in minimal. The shrubs such as silky dogwood, nannyberry, and northern arrowwood tend to grow along the top of the banks just above the scour zone.

While most of the SOCC were found in small numbers at specific locations, small-spike false-nettle was found at numerous locations along the length of the river within the LAA, but mostly outside the PDA (**Figure 5.7.3**).

While there were numerous plant species identified within the LAA that have edible qualities and medicinal qualities, there are a few species present in sufficient quantities to be noteworthy, these include small-spike false-nettle, Jerusalem artichoke, and common boneset. Other traditionally valued but rare species may include silky dogwood, nannyberry, and northern arrowwood. Although a traditional knowledge study was not completed for the Project to date, ongoing consultation with the Peskotomuhkati and other First Nations groups may provide more insight into traditional plant uses within the region.

No critical habitat, protected areas, or unique habitat designation related to vegetation and/or rare plants is present within the LAA.

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Figure 5.7.3: Local Assessment Area and SOCC/SAR Locations

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5.7.3 Assessment of Potential Interactions between the Project and Vegetation and Wetlands

The potential interactions between the Project and vegetation and wetlands are assessed in this section.

5.7.3.1 Potential Interactions

Project activities have the potential to cause adverse environmental effects through the proposed physical destruction or alteration of wetland habitat (if any are present), as well as terrestrial and aquatic vegetation. Though no wetlands are thought to be present within the PDA or LAA, the Project is expected to interact with wetlands (if identified) and vegetation downstream of the Milltown Station throughout the decommissioning activities, and both upstream and downstream of the former location of the dam in years after the removal of the Station. Based on desktop review, no wetlands are known to be present within the PDA or LAA, and the wetland field survey did not identify the presence of any wetlands within the PDA or LAA. Given the steep embankments of the river, the cascading nature of the river at this location, and the fact that lower water elevations in the impoundment are expected following decommissioning compared to currently, there is thought to be limited potential for wetlands to form following completion of the Project. Wetlands are therefore not discussed or assessed further in this report.

The primary possible interactions with vegetation include the direct loss of vegetation communities through Project activities including decommissioning, demolition, and removal of the Station as well as subsequent shoreline stabilization and fill placement and grading in the demolition area. Additionally, indirect loss of vegetation communities may result from changes in hydrology within the LAA and redistribution of sediment downstream of the dam post-removal. More specifically, the Project may interact with vegetation in the following ways:

- Heavy equipment used in decommissioning, demolition, removal, and restoration activities could introduce invasive and/or exotic vegetation species;
- Decommissioning, demolition, removal, or restoration activities have the potential to alter natural drainage patterns and increase erosion rates;
- Decommissioning, demolition, removal, or restoration activities have the potential to destroy rare plans if they are present in the PDA (e.g., Drummond's rockcress population in the PDA);
- Shoreline stabilization, and demolition and restoration activities (e.g., fill placement and grading) may cause a direct loss of vegetation communities;
- Dam removal will result in changes in hydrology both upstream (i.e., decreased water level causing drying of previously wet soils) and downstream (i.e., increased water levels causing wetting of previously dry soils), which may interact with riparian vegetation communities areas;
- Permanent dewatering of the impoundment may allow for wetlands to be created naturally and would increase the area of habitat available for natural vegetation in the impoundment area, over time, thereby benefitting SOCC;

- Though there is reportedly minimal sediment trapped behind the dam since the impoundment is dewatered periodically in order to conduct maintenance activities, any remaining sediments trapped behind the dam are likely to be released during the dewatering of the impoundment to accomplish dam removal. The downstream transportation and deposition of these sediments may cause a direct loss of aquatic vegetation communities within the LAA; and
- A spill or fire or other accidental or unplanned event (refer to **Section 7.0**) which could affect vegetation within the PDA and LAA.

5.7.3.2 Mitigation

Mitigation is identified for each interaction in relation to vegetation and wetlands in an attempt to prevent the interaction from occurring if possible, or to reduce the severity, magnitude, geographic extent, frequency, or duration of the interaction. Best management practices (based on industry guidelines and regulatory guidance documents) have been identified as appropriate mitigative strategies. In addition, several acts, codes, regulations and guidelines may require appropriate actions be conducted as mitigative measures prior to or during the interaction. The following mitigation will be implemented as a part of the Project:

- The area to be disturbed by the Project will be minimized to the extent possible (i.e., limited to the area which is required to accomplish the Project objectives);
- Efforts will be made to maintain mature vegetation along the edges of the site, particularly in riparian areas;
- If applicable, a watercourse and wetland alteration (WAWA) permit for any alterations to watercourses and wetlands (and their 30 m buffers) will be obtained. A WAWA permit is nonetheless required for work within 30 m of the watercourse, despite the lack of wetlands present in the PDA and LAA;
- Decommissioning, demolition, removal, and river improvement activities will comply with the conditions of the WAWA permit;
- Proper erosion and sediment control measures (e.g., check dams, silt curtains) will be installed and checked regularly to ensure they are continuing to operate properly to minimize potential effects to downstream habitat;
- Shoreline stabilization will be installed where the potential for erosion is anticipated and repaired in a timely manner when found to be damaged or deficient;
- All heavy equipment will be properly cleaned prior to mobilizing to site to avoid potential introduction of exotic and invasive species;
- During decommissioning activities, efforts will be made to avoid disturbing areas where SOCC or SAR are present (e.g., Drummond's rockcress), or other management implemented on discussion with applicable regulatory authorities ;

- The removal of the Station will allow ice scour to be reinstated to the PDA area, thereby increasing habitat for rare plants along the shore;
- Vegetation habitats affected by the changes in water levels caused by the Station removal are anticipated to shift habitats toward improved conditions. These changes are expected to cause a loss in habitat for some of the current vegetation communities; however, the changes will also provide habitat opportunities for the re-establishment of vegetation communities; and
- An emergency response plan (ERP) for accidental spills, emergencies, incidents or storm events will be completed and detailed in the PSEMP, and the contractor will be required to provide spill response training to construction personnel.

5.7.3.3 Characterization of Potential Interactions Following Mitigation

The Project will be developed such that the area of disturbance within the PDA is minimized to that which is required to meet Project objectives. Buffers will be maintained, where possible, around watercourses and areas of plant SOCC, if identified, to minimize the loss of valued vegetation communities. If buffers cannot be maintained, additional mitigation will be developed in consultation with applicable regulatory authorities. Although the Project activities will likely result in destroying a local population of Drummond's rockcress in the PDA, the population appears to disseminate seeds by way of water and additional plants may also be located upstream and downstream, such that this plant is likely to be present elsewhere in the LAA and larger St. Croix River system. If the known populations of Drummond's rockcress or other rare species identified during the field surveys cannot be avoided and are affected by the Project, consideration will be given to re-seeding the portions of the PDA where they were identified following the completion of the Project.

Applicable authorization (i.e., WAWA permit and associated compensation) will be secured with NBDELG prior to undertaking activities within 30 m of the watercourse. For heavy equipment mobilizing to the site, contractors will be required to properly clean equipment prior to mobilizing to the site so as to avoid the transfer of exotic or invasive plant species to the area. Given current knowledge as informed by the desktop assessment discussed previously, the loss of SAR/SOCC vegetation communities is not anticipated as a direct result of the Project with the appropriate implementation of the mitigation measures presented. It is possible, though unlikely due to the steep banks of the impoundment, that permanent dewatering of the impoundment may allow for wetlands to be created naturally, thereby increasing the area of habitat available for natural vegetation in the impoundment area, over time, and thus benefitting SOCC.

However, some loss of SAR/SOCC vegetation communities may be unavoidable as a result of new shoreline stabilization infrastructure installation and/or demolition activities. Preventative erosion control measures to stabilize shorelines are considered to have an overall benefit for both aquatic and terrestrial native vegetation communities by preventing shoreline collapse and downstream sedimentation.

The anticipated change to vegetation communities as a result of changing water levels following the dam removal are an anticipated result of the dam removal and river improvement of this stretch of the St. Croix River.

Although sediment quantity is not considered to be substantive, the Project will be planned in a way to minimize the release of sediment trapped behind the dam. The proposed mitigative measures are intended to prevent loss of aquatic vegetation communities downstream of the current dam location.

5.7.4 Summary

Based on the above, with planned mitigation, authorization (with compensation), where applicable, and properly installed environmental protection measures, and given the existing context of the PDA and LAA which do not harbour any wetlands and likely few vegetation SOCC that cannot be avoided, the potential interactions between the Project and vegetation and wetlands are not expected to be substantive.

Surveys for vegetation and wetlands were carried out over several days in June, July, August and September of 2020, where a total of 166 vascular plants species were identified within the LAA. Of these, there were a total of 10 SOCC and one SAR (butternut). Within the PDA, there are only two records of SOCC including Drummond's rockcress (ranked as S2 [rare] by the AC CDC) and small-spike false-nettle (ranked as S3 [uncommon] by the AC CDC). The single SAR found was a healthy butternut sapling located near the edge of a residential lawn downstream of the dam, outside of the PDA. This individual was likely planted. No critical habitat, protected areas, or unique habitat designation related to vegetation and/or rare plants is present within the PDA or LAA. No wetlands were identified within the PDA or LAA.

Lastly, adaptive management measures will be implemented as necessary to address any changes to valued vegetation communities (e.g., SAR or SOCC) as they arise.

5.8 Wildlife and Wildlife Habitat

The potential interactions between the Project and wildlife (including species at risk and birds) and their habitats are assessed in this section.

5.8.1 Scope of VC

Wildlife and wildlife habitat includes wildlife (fauna) and the habitats that support wildlife species. This VC is focused on birds, mammals (including bats), invertebrates, and herptiles (i.e., reptiles and amphibians) within terrestrial components of their lifecycle, as well as the habitats that support them. Wildlife and wildlife habitat has been selected as a VC because, despite the urban/suburban nature of the Milltown setting, in general the environment around the St. Croix River supports terrestrial wildlife and is important to the public for the biodiversity it supports. Although limited, there is the potential for interactions between wildlife, its habitat, and proposed Project activities. Particular focus is placed on wildlife species of conservation interest (i.e., species at risk [SAR] and species of conservation concern

[SOCC], defined below) as identified by provincial and federal regulatory agencies. SAR/SOCC are often susceptible to changes in the environment and are therefore useful indicators of ecosystem health and regional biodiversity.

Both provincial and federal legislation provides protection to designated bird, mammal, herptile, and other species at risk. Most bird species, specifically, are protected under the *Migratory Birds Convention Act*. In addition, SAR are protected under the federal *Species at Risk Act* (SARA) and the New Brunswick *Species at Risk Act* (NB SARA).

In this EIA Registration document, we define "species at risk" (abbreviated SAR) as those species that are listed as "Extirpated", "Endangered", or "Threatened" on Schedule 1 of the federal *Species at Risk Act* (SARA) or the New Brunswick *Species at Risk Act* (NB SARA). We also define "species of conservation concern" (abbreviated SOCC) as those species that are not SAR but are listed in other parts of SARA, NB SARA, COSEWIC, or as regionally rare or endangered by the Atlantic Canada Conservation Data Centre (AC CDC) (i.e., those species with AC CDC S-ranks of "extremely rare" [S1], "rare" [S2] or "uncommon" [S3]).

The wildlife and wildlife habitat VC has connections to the vegetation and wetlands VC because of its relationship with vegetation, hydrology, landform, and soil components. Vegetation communities and wetlands (and plant SAR) which comprise habitat are discussed in **Section 5.7**. Aquatic wildlife/fish are considered in **Section 5.6**.

5.8.2 Existing Conditions

The information regarding the presence and characterization of wildlife and wildlife habitat within the PDA and LAA was derived from several desktop information sources including existing databases and secondary information sources (i.e., desktop analysis). This desktop analysis is supplemented by a site-specific field evaluation of the Project development area (PDA) and the local assessment area (LAA, defined as 500 m upstream and downstream of the Milltown Station) completed on various occasions during the summer of 2020 and as documented in separate technical reports (**Appendices G** and **H**). The LAA for wildlife and wildlife habitat is shown in **Figure 5.8.1**. Specifically, targeted field surveys for nocturnal owls, breeding migratory birds, turtles, and bats were conducted in spring and summer of 2020, combined with incidental observations of other wildlife.

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MILLTOWN GENERATING STATION DECOMMISSIONING PROJECT

ENVIRONMENTAL IMPACT ASSESSMENT REGISTRATION

LOCAL ASSESSMENT AREA WILDLIFE AND WILDLIFE HABITAT

FIGURE 5.8.1

- Species at Risk, Bird
- Hardwood Dominant Stand (>= 70%)
- Mixedwood Stand (>= 40% Tolerant Hardwood)
- Watercourse
- Project Development Area
- Local Assessment Area: Wildlife and Wildlife Habitats
- Canada-USA Border
- Wetland (NBDELG 2019)

OH: Other hardwood -oak, ash, elm, basswood, black cherry, butternut and/or ironwood
RM: Red maple
I: Immature - merchantable layer, accumulating volume slowly

* Location of record within 50 to 100 m
** Location of record within 100 m to 1 km
Locations of species rounded more than 1 km are not mapped

0 50 100 200 m

SCALE 1:6,000

N W E S

MAP DRAWING INFORMATION:
BASEMAP IMAGE SERVICE LAYER CREDITS: ESRI, HERE, GARMIN, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), SWISS TOPO, OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY (2015)
DATA PROVIDED BY: DILLON CONSULTING LIMITED, SNB & NB DEPARTMENT OF NATURAL RESOURCES (FOREST STAND DATA: 2006)
THE ATLANTIC CANADA DATA CONSERVATION DATA CENTRE,
THE INTERNATIONAL BOUNDARY COMMISSION.

MAP CREATED BY: SCM
MAP CHECKED BY: JB
MAP PROJECTION: NAD 1983 CSRS NEW BURNSWICK STEREOGRAPHIC

DILLON CONSULTING

PROJECT: 19-1594

DATE: 2020-01-27

5.8.2.1 Desktop Analysis

Desktop Analysis Methods and Data Sources

Information regarding the use of the LAA by wildlife and presence of wildlife habitat was derived from several sources including existing databases and secondary information sources. To provide information on potential occurrences of rare and endangered wildlife, and unique or sensitive wildlife habitats potentially existing within and/or near the PDA, a review of the following existing data and information sources was conducted:

- Previous background information from other similar assessments completed in the general area;
- Listed species by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC);
- Listed species under the federal *Species at Risk Act* (SARA);
- Listed species under the New Brunswick *Species at Risk Act* (NB SARA); and
- Ranked species by the New Brunswick Department of Natural Resources and Energy Development (NBDNRED).

As part of the desktop assessment, a site-specific AC CDC report (AC CDC 2020) was obtained for the Project area (refer to **Appendix A**). The report provided recorded historical flora and fauna species occurrences, as well as identified environmentally sensitive or managed areas within 5 km of the Project site. Wildlife SAR and SOCC identified as extremely rare (S1), rare (S2), or uncommon (S3) are identified.

Other available background information sources and mapping reviewed to identify and assess wildlife and wildlife habitat presence at the Project location included:

- Ecological Reserves in the Maritimes;
- Environmentally Sensitive Areas database;
- Atlas of Breeding Birds of the Maritime Provinces;
- Important Bird Areas of Canada;
- Federally-designated Migratory Bird Sanctuaries;
- Provincially-identified deer wintering areas; and
- Identified Protected Natural Areas, and Wildlife Management Zones.

As noted previously, the information obtained from this desktop analysis was supplemented by a field survey conducted by Dillon biologists on various occasions during the summer of 2020, to characterize site-specific environmental conditions for wildlife (i.e., nocturnal owls, breeding birds, bats, and turtles), combined with incidental observations of other wildlife, near the Milltown Station. The results of these field surveys are summarized below in **Section 5.8.2.2**, with additional detail in a separate technical report located in **Appendices G** and **H**.

Desktop Analysis Results – Resident and Migratory Birds

The vast majority of bird species found in New Brunswick are migratory and either breed in the province during the summer months, or pass through it during the spring and fall migratory periods. Jurisdiction for many migratory birds is federal, since migratory birds cross both provincial and international boundaries. The *Migratory Birds Convention Act* (MBCA) is the federal law which protects migratory birds in both Canada and the United States. The Act prohibits killing, injuring or harassing migratory birds, their nests, or their young. Migratory birds that are protected under the MBCA in Canada, and that are relevant to the Project, include:

- Waterfowl (e.g., ducks and geese);
- Rails (e.g., coots, gallinules, sora, and other rails);
- Shorebirds (e.g., plovers and sandpipers); and
- Songbirds (e.g., thrushes and warblers).

Furthermore, species listed pursuant the federal *Species at Risk Act* (SARA) or New Brunswick *Species at Risk Act* (NB SARA) are afforded further protection as harm, the destruction of their nest, eggs or young is prohibited.

Birds not addressed under federal jurisdiction include grouse, quail, pheasants, ptarmigan, hawks, owls, eagles, falcons, cormorants, pelicans, crows, jays, and kingfishers. Most birds not included in this list are protected under provincial laws, most notably the New Brunswick *Fish and Wildlife Act*.

The New Brunswick *Fish and Wildlife Act* protects all fish and wildlife species (including all vertebrate animals or birds) from angling, hunting, trapping and other forms of intentional take, except under the authority of permits or licences. The Act also prohibits the disturbance, gathering or collection of the nests or eggs of any bird species, except under the authority of a permit. Under Section 4 of the Act, some wildlife and bird species (including American crow, double-crested cormorant, and European starling) may be taken if they present a risk of injury to landowners, or a risk of property damage, but this requires a separate permit.

Maritime Breeding Bird Atlas

The Maritime Breeding Bird Atlas (MBBA) database (Stewart et al. 2015) provides information on the presence of breeding bird species in counts conducted between 2006 and 2010. Within the MBBA Second Atlas, the PDA lies within Region #11, Charlotte, near the centre of Square #19FL30 (St. Stephen), with the five nearest roadside breeding bird point counts within approximately 1 km of the Project area, to the north, west, and south of the PDA (Stewart et al. 2015; see **Appendix B**). During the MBBA period of 2006-2010, a total of 58 species of birds were recorded within this square. Of these species, 18 were confirmed as breeding, 6 were probable breeders, and 32 were possible breeders. There were seven SAR or SOCC detected during the most recent MBBA period in this square. These species included: chimney swift, bank swallow, barn swallow, cliff swallow, house wren, indigo bunting, and brown-headed cowbird (Stewart et al. 2015).

NBDNRED's *General Status of Wild Species* (NBDNRED 2020) reports that there are 407 extant bird species known to occur in the New Brunswick, of which 143 are considered accidental (NBDNRED 2020). Of the species that regularly occur in the Province during at least part their lifecycle, 12 species are listed as "At Risk", 12 are listed as "May be At Risk", and 49 are considered "Sensitive".

Important Bird Areas

The nearest Important Bird Area (IBA) is the Quoddy Region (NB037) (BSC 2020a; 2020b). This IBA is a body of seawater, primarily in Canadian waters, located approximately 30 km southeast of the PDA. Upwellings and areas of high productivity occur here because of strong currents created by the narrow passages that lead through to Passamaquoddy Bay. This IBA is especially important for herring gulls, black-backed gulls, black-legged kittiwakes, and common eider during the winter season, while scoters are present in the summer (Nature NTNB 2020). Preferred habitat for congregation of these species in high numbers is not present within the LAA.

AC CDC Species at Risk Database Review

A review of the AC CDC database as compiled in a site-specific report requested from the AC CDC (AC CDC 2020) indicated that there were 130 records of 42 avian SAR or SOCC historically observed within 5 km of the PDA; 10 of these species are considered SAR, and the remainder are considered SOCC. The 10 avian SAR includes one "location sensitive" bird species (bald eagle) which intersects the Project area (AC CDC 2020).

Of the 10 bird SAR historically identified by the AC CDC within 5 km of the PDA, nine are listed as "Threatened" pursuant to SARA, and eight of those species are also listed as "Threatened" pursuant to NB SARA (note that some species that are listed under SARA are not listed under NB SARA, and vice-versa). The bald eagle, for instance, is listed as "Endangered" pursuant to NB SARA, but is not listed under SARA. The SAR bird species identified by the AC CDC as having been historically observed within 5 km of the PDA, as well as their habitat requirements and potential to occur within the region, is discussed in **Table 5.8.1**, below. SOCC and regionally rare species lists are provided in **Table B.2** in **Appendix B**.

Table 5.8.1: Bird Species At Risk Historically Observed within 5 km of the Project (AC CDC 2020)

Species	Status[1]	Breeding Habitat	Potential to Occur in Project Area
Bald Eagle (*Haliaeetus leucocephalus*)	**COSEWIC:** Not at Risk **SARA:** Not listed **NB SARA:** Endangered **S-Rank:** S4/1 At Risk	Bald eagles typically nest in large, tall conifers near or adjacent a body of water. They will often re-use nest sites year-after-year.	This species may occur within the PDA/LAA as suitable nesting habitat does exist, however, no raptor nests are known in the vicinity.

Species	Status[1]	Breeding Habitat	Potential to Occur in Project Area
Bank Swallow (*Riparia riparia*)	**COSEWIC:** Threatened **SARA:** Threatened **NB SARA:** Not listed **S-Rank:** S2S3B,S2S3M/3 Sensitive	Bank swallows typically nest in steep embankments along eroding river/ocean shore and forage in open areas (COSEWIC 2013).	This species is likely to use the PDA/LAA as foraging habitat. Steep embankments and vertical anthropogenic structures within the PDA/LAA represent possible nesting sites for this species.
Barn Swallow (*Hirundo rustica*)	**COSEWIC:** Threatened **SARA:** Threatened **NB SARA**: Threatened **S-Rank:** S2B,S2M/3 Sensitive	Barn swallows typically nest on human-made structures such as abandoned buildings or barns and forages in open areas (COSEWIC 2011b).	This species is likely to use the PDA/LAA as foraging habitat. Anthropogenic structures throughout the PDA/LAA represent possible nesting sites for this species.
Bobolink (*Dolichonyx oryzivorus*)	**COSEWIC:** Threatened **SARA:** Threatened **NB SARA**: Threatened **S-Rank:** S3B,S3M/3 Sensitive	Bobolink typically nest in lush meadows, open grasslands, and hayfields (COSEWIC 2010b).	This species is unlikely to occur in the PDA/LAA as no suitable nesting habitat exists within the vicinity.
Canada Warbler (*Cardellina Canadensis*)	**COSEWIC:** Threatened **SARA:** Threatened **NB SARA**: Threatened **S-Rank:** S3B, S3M/1 At Risk	Canada warbler typically breeds throughout Maritimes and southeastern Canada. Typical habitat includes a variety of forest types (COSEWIC 2008b). They prefer wet mixed forest with well-developed shrub layer as well as regenerating areas.	This species may nest and forage within the PDA/LAA as suitable nesting habitat exists along the forested riverbanks.
Chimney Swift (*Chaetura pelagica*)	**COSEWIC:** Threatened **SARA:** Threatened **NB SARA**: Threatened **S-Rank:** S2S3B,S2M/1 At Risk	Historically, the chimney swift used mainly large hallow trees for nesting sites but have adopted chimneys as preferred nesting sites. They are generally associated with urban and rural areas where chimneys are available for nesting and roosting. Chimney swifts are aerial foragers and tend to concentrate near water where insects are abundant (COSEWIC 2007a).	This species is likely to use the PDA/LAA as foraging habitat. It is possible that an as yet discovered roost for this species exists in the vicinity.
Common Nighthawk (*Chordeiles minor*)	**COSEWIC:** Special Concern **SARA:** Threatened **NB SARA**: Threatened **S-Rank:** S3B,S4M/1 At Risk	Common nighthawk typically breeds throughout the Maritimes and nests on the ground in open vegetation free habitats (COSEWIC 2007b; 2018).	This species is likely to use the PDA/LAA as foraging habitat. Nesting habitat for this species does exist within the PDA/LAA in the form of rocky outcrops, forested openings and disturbed, gravelled areas.

Species	Status[1]	Breeding Habitat	Potential to Occur in Project Area
Eastern Meadowlark (*Sturnella magna*)	**COSEWIC:** Threatened **SARA:** Threatened **NB SARA**: Threatened **S-Rank:** S1B, S1M/2 May Be At Risk	Eastern meadowlark typically breed in native grasslands, but they also nest in pastures, hayfields, airports and other open, grassy areas (Cornell 2019).	This species is unlikely to occur in the PDA/LAA as no suitable nesting habitat exists within the vicinity.
Eastern Whip-Poor-Will (*Antrostomus vociferous*)	**COSEWIC:** Threatened **SARA:** Threatened **NB SARA**: Threatened **S-Rank:** S2B,S2M/1 At Risk	Eastern whip-poor-will breeds in mature deciduous and mixedwood forest types, typically with no little or no understory (Cornell 2019).	Although, there is some suitable breeding habitat within the PDA/LAA for the Eastern whip-poor-will, it is unlikely this species would nest in PDA/LAA. However, this species is likely to use the PDA/LAA as foraging habitat.
Wood Thrush (*Hylocichla mustelina*)	**COSEWIC:** Threatened **SARA:** Threatened **NB SARA**: Threatened **S-Rank:** S1S2B,S1S2M/2 May Be At Risk	The wood thrush nests mainly in second-growth and mature deciduous and mixed forests, with saplings and well-developed understory layers. Large forest mosaics are preferred, but they may also nest in small forest fragments (COSEWIC 2012b).	This species may nest and forage within the PDA/LAA as suitable nesting habitat exists along the forested riverbanks.

Note:

[1]AC CDC S-Ranks as follows: S1: extremely rare in province; S2: rare in province; S3: uncommon in province; S4: widespread, common and apparently secure in province; S5: widespread, abundant and demonstrably secure in province S#S# = a numeric range rank used to indicate any range of uncertainty about the status of the species or community. B= Breeding, N = Nonbreeding, M = Migrant, U = Unrankable. (AC CDC 2020)

Environment and Climate Change Canada (ECCC) through its Canadian Wildlife Service (CWS) provides general avoidance information for migratory birds, including regional nesting periods during which most migratory bird species covered under the MBCA are likely to breed. The PDA is located in Breeding Zone C3, where most migratory birds breed from mid-April to late August each year (ECCC 2020c). However, it is noted that some avian species nest outside of this period, including corvids, crossbills, owls and waxwings.

Breeding bird surveys were conducted on May 3, June 19, June 23, and July 15, 2020 in support of this EIA. A summary of the results of the field surveys is provided in **Section 5.8.2.2** below, with full details provided in **Appendices G** and **H**.

Desktop Analysis Results – Mammals (Including Bats)

NBDNRED's "*General Status of Wild Species*" (NBDNRED 2020) reports that there are 52 species of mammals known to occur within New Brunswick, and an additional seven which are extinct, extirpated or unverified. Of these 52 species, Canada lynx is listed as "Endangered" under SARA and NB SARA, Gaspé shrew (*Sorex gaspensis*) is listed as "Special Concern" under Schedule 3 of SARA, and three bat species are listed as "Endangered" under SARA, including the little brown bat (little myotis; *Myotis*

lucifugus), northern long-eared bat (northern myotis; *Myotis septentrionalis*), and eastern pipistrelle (tri-coloured bat; *Perimyotis subflavus*).

A review of GIS layers containing locations of known and potential bat hibernacula (i.e., abandoned mines and caves) in southern New Brunswick indicates that the potential for hibernacula exists within 5 km of the Project site. A review of the AC CDC report (AC CDC 2020) indicated that bat hibernacula, a "location sensitive" feature has been historically reported within 5 km of the PDA. Additionally, a review of the AC CDC report (AC CDC 2020) indicated that there is a record of a federally or provincially protected bat species within 5 km of the Project area – the little brown bat which is listed as "Endangered" under SARA and NB SARA. There were no other records of a federally or provincially protected mammal species within 5 km of the PDA.

The little brown bat, once thought to be the most common bat in Canada, has had its population dramatically reduced by the disease known as White Nose Syndrome (WNS) in recent years. This species is non-migratory, and so it hibernates each year in large groups from approximately mid-October until mid-May each year at winter roost sites known as hibernacula. Hibernacula are chosen for their high humidity and stable, above-freezing temperatures and are generally caves or abandoned mines. In the spring, little brown bats will seek out summer roosts in buildings or hollow trees for use during the daytime. During the night, little brown bats forage in a wide variety of habitats including all forest types and urbanized environments. Given the known proximity of a bat hibernacula to the Project site, it is likely that the little brown bat will hunt for insects above the St. Croix River within the boundaries of the PDA/LAA during nighttime hours. It is also possible that elements of Milltown facility may be used as a summer roost site by individuals of this species (Environment Canada 2014).

Bat surveys were conducted as a part of this assessment by deploying an acoustic bat monitor at the Milltown Station and recording for a five-day period from June 18 to 24, 2020. The results of bat surveys conducted during summer 2020 are presented in summary form below in **Section 5.8.2.2** and with further details presented in **Appendices G** and **H**. Bat surveys targeted both foraging habitat and potential roosting habitat within the PDA. A further assessment of the Milltown Station buildings themselves as a potential summer roost site will also be conducted prior to initiating demolition activities in 2022.

Lastly, the PDA does not provide suitable deer wintering habitat due to the limited amount of canopy cover throughout most of the property, and the relatively developed and urban nature of the PDA.

Desktop Analysis Results – Invertebrates

Lists of butterfly and odonate (dragonfly and damselfly) species in New Brunswick are maintained in the NBDNRED's *General Status of Wild Species* database (NBDNRED 2020). The database currently lists 80 butterfly and 131 odonate species known to occur in the province. Of these species, one (Maritime ringlet) is considered to be an "At Risk" SOCCC, 15 (4 butterflies and 11 odonates) are considered a "May be At Risk" SOCC, and 13 (one butterfly and 12 odonates) are considered "Sensitive" (neither SAR nor SOCC). The cobblestone tiger beetle (*Cicindela marginipennis*), Maritime ringlet (*Coenonympha nipisiquit*, a butterfly), and skillet clubtail (*Gomphus ventricosus*, an odonate) are SAR that are listed as

"Endangered" under SARA, while the monarch butterfly (*Danaus plexippus*) and pygmy snaketail (*Ophiogomphus howei*, an odonate) are considered to be SOCC as they are listed as "Special Concern" under Schedule 1 of SARA. The Maritime ringlet is listed as "Endangered" under the NB SARA.

The skillet clubtail, cobblestone tiger beetle, and the Maritime ringlet have very limited populations in New Brunswick that are not located in the immediate vicinity of the St. Croix River. The cobblestone tiger beetle is endemic to the Saint John River system and Grand Lake (Environment Canada 2013). Similarly, the skillet clubtail is only known in the Maritimes from records along the Saint John River below the Mactaquac Dam (COSEWIC 2010c). Lastly, the Maritime ringlet is restricted to areas around Chaleur Bay in Northern New Brunswick and portions of the Gaspé region of Québec (COSEWIC 2009b).

A review of the AC CDC report (AC CDC 2020) indicates that there are three invertebrate SOCC species previously recorded within 5 km of the Project Area, all of which are odonates. These are: the boreal snaketail (*Ophiogomphus colubrinus*), the forcipate emerald (*Somatochlora forcipata*), and the swamp spreadwing (*Lestes vigilax*), the former two being dragonflies and the latter being a damselfly.

Both the forcipate emerald and the swamp spreadwing are listed as 'S3' (uncommon) in New Brunswick by the AC CDC. Both species have long flight seasons in the summer, typically between the months of June to September, and are most associated with wetland habitat types, shallow streams and slow-moving water (Paulson 2011). The swift current and associated rapids that characterize the St. Croix River within the boundaries of the PDA/LAA, coupled with the lack of any mapped wetlands within the LAA, is not considered suitable habitat for these species. Thus, they are not anticipated to occur within the LAA.

In contrast, the boreal snaketail, which is listed as 'S1S2' (extremely rare/rare) in New Brunswick by the AC CDC, is most associated with clear, rapidly flowing rivers and streams with rocky substrates (Paulson 2011). This species has a similarly long flight season during the summer months as the preceding species, typically beginning in early in July and lasting into late September. Males and females will patrol low over moving water and females will oviposit eggs directly into or above riffle sequences (Paulson 2011). As the swift current and associated rapids that characterize the St. Croix River within the boundaries of the PDA/LAA do represent suitable habitat for the boreal snaketail, it is possible this species occurs and breeds within the LAA.

Desktop Analysis Results – Herptiles

NBDNRED's *General Status of Wild Species* database (NBDNRED 2020) reports that there are 7 reptile and 16 amphibian species known to occur in New Brunswick. Of these species, one (wood turtle) is considered to be "At Risk", and one (dusky salamander, *Desmognathus fuscus*) is considered "Sensitive". Both SARA and NB SARA lists the wood turtle (*Glyptemys insculpta*) as "Threatened" (a SAR) and the snapping turtle (*Chelydra serpentine*) as "Special Concern" (a SOCC).

Wood turtles are generally associated with watercourses and their riparian habitats. Individuals nest on sandy and gravelly riverbanks but will also make use of other features such as sand pits and road embankments near watercourses that provide a sandy or gravelly substrate. Snapping turtles generally inhabit ponds, sloughs, streams, rivers, and shallow bays that are characterized by slow moving water,

aquatic vegetation, and soft, muddy bottoms. Both wood turtles and snapping turtles are known to overwinter in deep pools in larger rivers and in deep ponds. A review of the AC CDC report (AC CDC 2020) indicated that snapping turtle were historically observed within 5 km of the Project area. Snapping turtle is considered a "location sensitive" species by NBDNRED, and therefore precise coordinates of the species observed location(s) is not identified.

The St. Croix River provides the nearest potential turtle overwintering habitat to the Project and it is possible that individuals could forage in areas at or near the PDA during the summer season.

That said, the swift current and associated rapids that characterize the St. Croix River within the boundaries of the PDA/LAA is not considered preferred habitat for snapping turtles, or any other Maritime herptile species. Also, due to the developed nature of the terrestrial portion of the Project area, it is unlikely that snapping turtles would use the PDA/LAA as foraging habitat, as preferential habitat exists nearby and upstream from the PDA/LAA.

A targeted field survey to identify if wood turtles or snapping turtles are present or if suitable habitats exist within the PDA and LAA was conducted on June 23, 2020. No wood turtles or snapping turtles were observed, and given that they generally favour sandy/gravelly substrates as opposed to the rocky/bedrock nature of the St. Croix River and its embankments at the Milltown Station, the habitats in the PDA and LAA are not likely suitable for turtles. Further details are provided in **Section 5.8.2.2** below.

Desktop Analysis Results – Environmentally Sensitive Areas

A site-specific AC CDC report (AC CDC 2020) was obtained for the Project that provides historical flora and fauna species occurrence, as well as environmentally sensitive or managed areas within 5 km of the PDA's centre point.

According to the AC CDC records review and desktop analysis conducted to support this EIA Registration document, there are two biologically significant areas within 5 km of the Project footprint. The Dennis Stream Environmentally Significant Area (ESA) and St. Croix River ESA are both located approximately 1 km to the east, and downstream, of the Project area (AC CDC 2020). There are also no provincially identified deer wintering areas. There are no Protected Natural Areas (PNAs) within 5 km of the Project site.

The PDA is not known to provide identified unique or limited habitat and is not located within a defined Environmental Sensitive Area or other provincially regulated or protected area.

5.8.2.2 Field Surveys

The methods used to carry out the various field surveys during spring and summer 2020, and a summary of the results of these field surveys, are provided below. Further details are provided in **Appendices G** and **H**.

Field Survey Methods and Results – Breeding Birds

Area searches within the LAA shown on **Figure 5.8.2** were conducted on June 22 and July 15, 2020 for a duration of approximately 3 hours on each day. The surveys were conducted by an experienced

terrestrial ecologist from Boreal Environmental Inc. (Boreal) subcontracted to Dillon for these and other surveys, accompanied by NB Power's Indigenous field liaison. Area searches started no later than 1 hour after sunrise and continued for approximately 3 hours. Surveys were conducted on days when the weather conditions were favourable (i.e., light winds and no precipitation). The location of each bird detected within the LAA was recorded. Evidence of breeding birds such as nests, territorial displays, alarm calling, individuals flushed, mating, and aggressive defending of territories was recorded. In addition to the area searches, incidental surveys were conducted on July 15, August 20, and September 1, 2020, concurrently with plant and fish habitat surveys. Further details on the methods and results of these surveys are provided in **Appendix G**.

Species observed or heard singing in suitable nesting habitat were classified as possible breeders. Species exhibiting the following behaviours were also classed as probable breeders:

- courtship behaviour between a male and female;
- birds visiting a probable nest site;
- birds displaying agitated behaviour; and
- male and female observed together in suitable nesting habitat.

Species were confirmed as breeding if any of the following items or activities were observed:

- nest building or adults carrying nesting material;
- distraction display or injury feigning;
- recently fledged young;
- occupied nest located; and
- adult observed carrying food or fecal sac for young.

The total size of the LAA is approximately 7.7 ha and consists of lawn and weedy vegetation, immature mid-successional hardwood forest, and anthropogenic habitat (i.e., structures and roads). The surrounding forested landscape (i.e., outside of the LAA) consists of low density residential and commercial development.

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Figure 5.8.2: Local Assessment Area Showing Bat Detector Location, and Generalized Location of SAR and SOCC

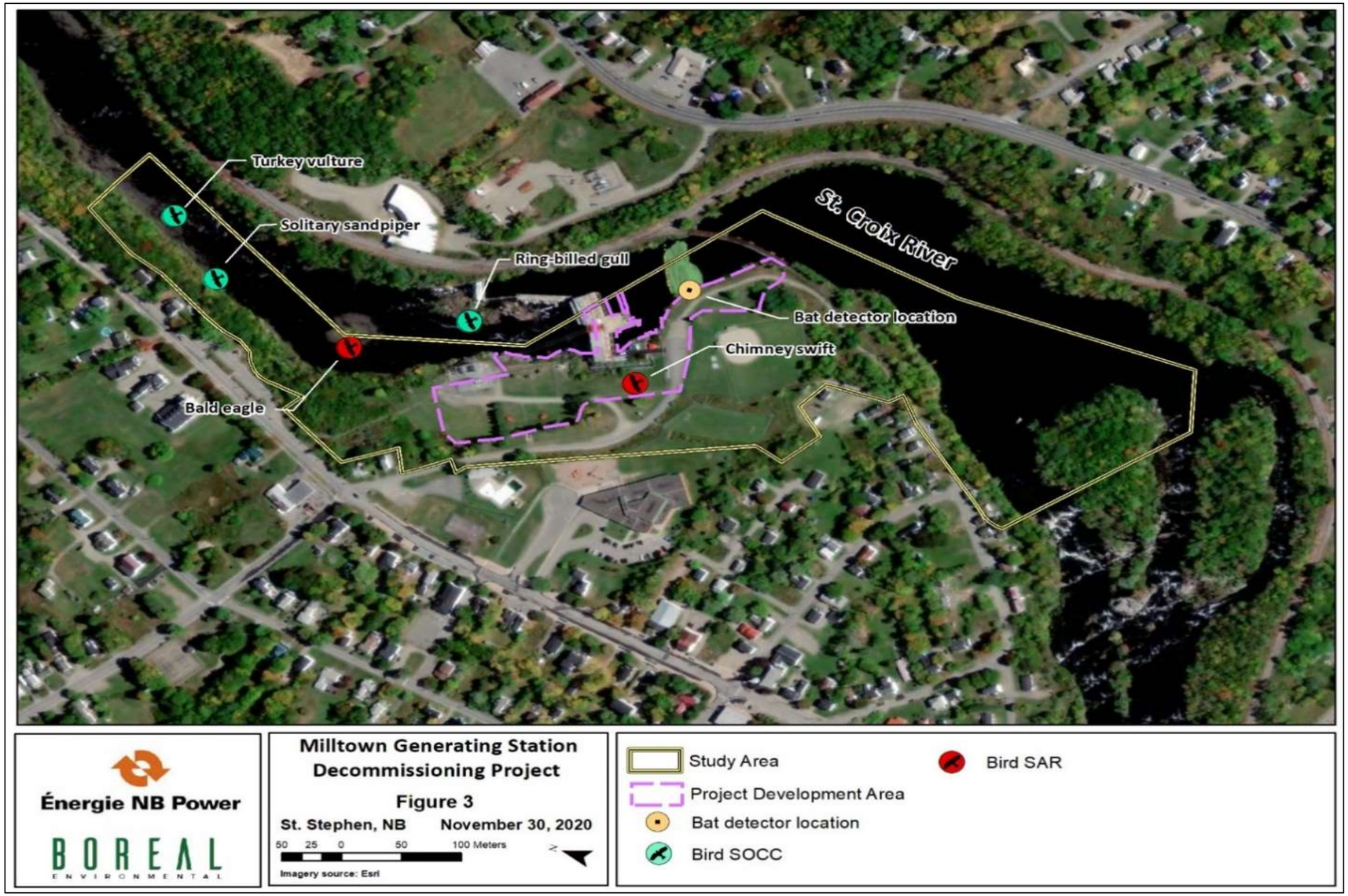

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Table 5.8.2 provides a summary of habitat types by area and percentage of the LAA occupied by each type. Habitat types identified in the NBDNRED forest inventory were verified in the field during the field surveys and adjusted accordingly where the forest inventory differed from the field survey.

Table 5.8.2: Summary of Habitat Types by Area and Percent Cover

Stand Type	Area (ha)	Percent of LAA (%)
Anthropogenic habitat	0.44	5.7
Lawn and weedy roadside habitat	1.86	70.3
Immature hardwood habitat	5.41	24.2
Total	**7.71**	**100**

A total of 33 bird species comprised of 407 individuals, including two SAR (Bald Eagle and Chimney Swift) and three additional SOCC (Turkey Vulture, Ring-billed Gull, and Solitary Sandpiper), were recorded during the field surveys for this Project. The most frequently recorded species were European Starling, Ring-billed Gulls, Turkey Vulture, Common Grackle, Chimney Swift, Cedar Waxwing, Double-crested Cormorant, and Song Sparrow. These species were characteristic of mid-successional forest and suburban habitats that are typical of the region. No raptor nests were noted in the LAA.

When birds were visually detected, they were observed for evidence of nesting behaviour (e.g., agitation, distraction displays, pairs in suitable habitat, etc.). The most compelling evidence of breeding observed for each species was recorded in **Table 5.8.3** below. Raw data can be viewed in **Appendix G**.

Table 5.8.3: Summary of Bird Species Recorded During the Summer 2020 Breeding Bird Surveys

Common Name	Scientific Name	AC CDC S-Rank	SARA or NB SARA Status	NBDNRED Status	Highest breeding status	Number Recorded
American Crow	*Corvus brachyrhynchos*	S5	-	Secure	PO	12
American Goldfinch	*Carduelis tristis*		-	Secure	PO	12
American Kestrel	*Falco sparverius*	S4B S4S5M	-	Secure	PO	2
American Redstart	*Setophaga ruticilla*	S5B S5M	-	Secure	CO	17
American Robin	*Turdus migratorius*	S5B S5M	-	At Risk	PO	7
Bald Eagle	*Haliaeetus leucocephalus*	S4	Endangered (NB SARA)	Sensitive	OB	9
Barn Swallow	*Hirundo rustica*	S2B S2M	Threatened	Secure	OB	1
Black and White Warbler	*Mniotilta varia*	S5B S5M	-	Secure	PO	2
Black-capped Chickadee	*Poecile atricapilla*	S5	-	Secure	PO	5
Cedar Waxwing	*Bombycilla cedrorum*	S5B S5M	-	At Risk	PO	21

Common Name	Scientific Name	AC CDC S-Rank	SARA or NB SARA Status	NBDNRED Status	Highest breeding status	Number Recorded
Chimney Swift	*Chaetura pelagica*	S2S3B S2M	Threatened	Secure	PO	23
Common Grackle	*Quiscalus quiscula*	S5B S5M	-	Secure	CO	24
Double-breasted Cormorant	*Phalacrocorax auritus*	S5B S5M	-	Secure	PO	21
Downy Woodpecker	*Picoides pubescens*	S5B S5M	-	Secure	OB	2
Eastern Phoebe	*Sayornis phoebe*	S5	-	Secure	PR	2
European Starling	*Sturnus vulgaris*	S5B S5M	-	Exotic	OB	71
Gray Catbird	*Dumetella carolinensis*	SNA	-	Secure	PO	7
Herring Gull	*Larus argentatus*	S4B S4M	-	Secure	OB	2
Mourning Dove	*Zenaida macroura*	S5	-	Secure	PR	5
Northern Cardinal	*Cardinalis*	S5B S5M S4N	-	Secure	PO	2
Osprey	*Pandion haliaetus*	S4	-	Secure	CO	2
Purple Finch	*Haemorhous purpureus*	S4S5B S5M	-	Secure	PO	1
Red-eyed Vireo	*Vireo olivaceus*	S4S5B SUN S5M	-	Secure	PO	10
Ring-billed Gull	*Larus delawarensis*	S5B S5M	-	Secure	PO	49
Rock Pigeon	*Columba livia*	S3S4B S5M	-	Exotic	OB	2
Solitary Sandpiper	*Tringa solitaria*	SNA	-	Secure	OB	1
Song Sparrow	*Melospiza melodia*	S2B S5M	-	Secure	CO	20
Spotted Sandpiper	*Actitis macularius*	S5B S5M	-	Secure	OB	2
Tree Swallow	*Tachycineta bicolor*	S3S4B S5M	-	Secure	OB	4
Turkey Vulture	*Cathartes aura*	S4B S4M	-	Secure	OB	38
Veery	*Catharus fuscescens*	S3B S3M	-	Secure	PO	3
White-breasted Nuthatch	*Sitta carolinensis*	S4B S4M	-	Secure	PO	1
Yellow Warbler	*Dendroica petechia*	S4	-	Secure	PR	13
						Total: 407

Breeding Status Codes:
OB = observed
PO = possible breeder
PR = probable breeder
CO = confirmed breeder

Field Survey Methods and Results – Nocturnal Owls

A nocturnal owl survey was conducted by Dillon's biologist, accompanied by NB Power's Indigenous field liaison, on the evening of May 3, 2020, approximately 30 minutes after sunset, for a duration of approximately 30 minutes at each survey location shown on **Figure 5.8.3**, as follows:

- A Silent Listening Station along Mill Lane, adjacent to the access road leading to the Milltown Station;
- A Playback Calling Station located to the south of the Milltown Station, adjacent to the baseball diamond, with playback calls directed towards the upstream (south) reaches of the St. Croix River; and
- A Playback Calling Station located to the north of the Milltown Station, towards the northernmost extent of property owned by NB Power northwest of the electrical substation and picnic area, with playback calls directed towards the downstream (north) reaches of the St. Croix River.

Further details on the methods and results of this survey are provided in **Appendix H**.

The field survey was conducted using methods based on the "New Brunswick Nocturnal Owl Survey: Guide for Volunteers" (BSC 2007) and the "Guideline for Nocturnal Owl Monitoring in North America" (Takats et al. 2001). As mentioned above, three locations were selected for the surveys, two of which were playback calling stations and one was a silent listening station. Recordings were made at each survey location using a Song Meter (SM4) Acoustic Recorder.

At each playback calling station, the surveyor set up the Song Meter acoustic monitoring system and quietly recorded (both electronically and hardcopy) any owls (or other bird sounds) vocalizing naturally by species. If no sounds were heard, a sequence of owl sounds was broadcast using a moderately-powered speaker (since playback sounds are intended to be of a similar volume as a real owl) to attempt to elicit a call-back from nearby owls. Any owls (or other birds) detected were recorded according to species. At the remaining silent listening station, the surveyor only set up the acoustic monitoring station and quietly recorded any owls (or other bird sounds) vocalizing naturally by species.

None of the playback calling station or the silent listening station resulted in any owls or other birds being detected or recorded, despite multiple efforts to elicit a response. This result may be because the available habitat in the immediate area is simply less ideal for foraging or hunting due to the industrial/urbanized nature of the Project area, especially given more suitable habitat can be found nearby both upstream and downstream. The Project area also does not represent preferred nesting habitat for nocturnal owls as it mostly lacks the larger, older-growth trees that are needed to develop cavities suitable for nesting.

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MILLTOWN GENERATING STATION DECOMMISSIONING PROJECT

Nocturnal Owl Survey Technical Report

NOCTURNAL OWL SURVEYS

FIGURE 5.8.3

- Project Location
- Silent Listening Station
- Playback Calling Station
- Playback Calling Direction
- Canada-USA Border

0 10 20 40 m

SCALE 1:2,162

N W E S

MAP DRAWING INFORMATION: CANVEC
SERVICE LAYER CREDITS: ESRI, HERE, GARMIN, INTERMAP, INCREMENT P CORP, GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), SWISS TOPO, OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY
DATA PROVIDED BY: DILLON CONSULTING LIMITED, NB DEPARTMENT OF NATURAL RESOURCES, INTERNATIONAL BOUNDARY COMMISSION

MAP CREATED BY: GAM
MAP CHECKED BY:
MAP PROJECTION: NAD 1983 CSRS New Brunswick Stereographic

DILLON CONSULTING

PROJECT: 19-1594

DATE: 2020-11-30

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Field Survey Methods and Results – Bats

The acoustic surveys for bats were conducted by an experienced terrestrial ecologist from Boreal Environmental Inc. (Boreal) subcontracted to Dillon for these surveys, accompanied by NB Power's Indigenous field liaison. An acoustic data recorder was deployed along the bank of the impoundment near to the west of the dam and was shown on **Figure 5.8.2**. This position was chosen to capture any activity of bats that might be active near the generating station and foraging activity over the water (i.e., impoundment) where insect prey availability tends to be high.

The acoustic data was recorded using a single Anabat Swift™ passive bat detector, deployed on the Milltown Station property adjacent to the impoundment on the Canadian side. The detector ran continuously between June 18, 2020 and the morning of June 24, 2020. The microphone was pointed downward above a 20 x 20 cm metal sheet mounted at a 45° angle to deflect sound upward into the microphone. The detectors were programmed to record bat passes from a half hour before sunset to a half hour after sunrise in order to determine relative activity patterns by species or species groups over time. Further details on the methods and results of the acoustic bat monitoring are provided in **Appendix G**.

A total of 18 identifiable bat calls were recorded between the evening of June 18 and the morning of June 24, 2020. All calls were identifiable as big brown bats and were of sufficient quality that identification to species was possible with reasonable level of certainty.

Most of the calls (11 of 18) were recorded on the evening of June 20/21, 2020 but there were not enough calls recorded over the four-night period to show meaningful temporal patterns of activity as all calls recorded in a given night could have been made by a single individual bat.

While the presence of *Myotis spp.* and tri-colored bats in the area cannot be ruled out based on the four days of recording, it can be assumed that the impoundment area is not a highly important foraging area for those species. Given how low their remaining numbers are in the province, it is unlikely that they are present in this area. Compared to bat activity levels prior to white nose syndrome (WNS) decimating resident bat numbers, the recorded activity is very low for a site of this type. When bats were abundant in the province, recording at a similar larger watercourse in southern New Brunswick would have yielded hundreds of *Myotis spp.* calls in a single night (Broders, Findlay, and Zheng 2004).

The presence of some big brown bat activity is unsurprising given the location of the detector in southern New Brunswick near two towns, each with a large number of old buildings that would support overwintering and maternity colonies for this species. While the data do not provide proof that the area is not used by other species, they do suggest that it is not of high importance to any species.

Field Survey Methods and Results – Herptiles (Turtles)

The field surveys for wood turtles and snapping turtles were conducted by an experienced terrestrial ecologist from Boreal Environmental Inc. (Boreal) subcontracted to Dillon for these surveys, accompanied by NB Power's Indigenous field liaison. The LAA, shown on **Figure 5.8.2**, was traversed on foot and by boat over the course of terrestrial surveys conducted on June 18, 19, and 23, 2020, with additional surveys conducted on July 15, August 20, August 31, and September 1, 2020. The June

surveys were more heavily focused on detecting presence of actual turtles as wood turtles are likely to occur within 10 m of the waterbody prior to July and when the ambient air temperature exceeds the temperature of the water (Flanagan et al. 2013).

The AC CDC report in **Appendix A** (AC CDC 2020) shows that there is a previously known record of snapping turtle within 5 km of the PDA, but the location is unknown. There are no previously known records of wood turtles within 5 km of the PDAQ, which is evidence that they do not likely occur in this area. No critical habitat for wood turtles in present within the LAA.

Over the course of six field days, no turtles were found on the land or in the water, and no evidence of turtle nesting activity was found. The impoundment is generally too deep for both species with unsuitable substrate and the periodic water level fluctuations in the impoundment further reduce the quality of overwintering habitat. Some suitable aquatic habitat for both species exists in the impoundment near the shores where there is shallow water, but the habitat of the lower Skutik/St. Croix River system in general is not suitable in that it flows too swiftly and water levels fluctuate greatly. The location of the impoundment within the developed areas of St. Stephen and Calais further diminishes the habitat suitability for these species due to the hazards posed by the many roadways and higher densities of predators such as raccoons. Roadside habitats are frequently used for nesting, but nests in developed areas along roadsides have high rates of predation. Therefore, the LAA is not likely to be important for wood turtles or snapping turtles.

Field Survey Results – Incidental Observations of Other Wildlife

Other SAR and SOCC wildlife species were not directly observed within the LAA during any of the field surveys. Direct and indirect (scat and tracks) observations of common wildlife species included white-tail deer (*Odocoileus virginianus*), raccoon (*Procyon lotor*), red-tailed fox (*Vulpes vulpes*), groundhog (*Marmota monax*), and chipmunk (*Tamias striatus*). Although not observed, it is highly likely that striped skunk (*Mephitis mephitis*) is present on occasion along with several species of rodent (i.e., voles and mice). All of these species are common and would be expected to occur in fragmented suburban habitats. A few small patches of common milkweed (*Asclepias syriaca*) were encountered during the surveys and were checked for eggs, caterpillars, and chrysalis, and none were found. No amphibian species or monarch butterfly (*Danaus plexippus*) were recorded during surveys.

5.8.3 Assessment of Potential Interactions between the Project and Wildlife and Wildlife Habitat

As part of the desktop assessment, the habitat requirements of wildlife species identified as potentially occurring within and/or near the Project area were compared to the range of environmental conditions within the Project area to determine if suitable habitat was present for these taxa. Knowledge of the habitats present within the Project area was determined through an interpretation of aerial photography, topographic and geological mapping. In instances where appropriate habitat was present for a particular species, that taxon was considered to be potentially present in the Project area, mitigation identified and potential impacts assessed, and the habitat was identified as a target for 2020 confirmatory field surveys.

5.8.3.1 Potential Interactions

A number of activities (i.e., heavy equipment operation) related to the Project have the potential to interact with wildlife and wildlife habitat. Potential interactions on wildlife or their habitats include direct mortality, habitat loss, and fragmentation. These potential interactions are discussed in this section.

Migratory Birds

The primary possible interactions with birds due to the Project include habitat loss, destruction of nests, direct mortality due to collision, and noise disturbance. The purpose of the desktop review was to refine constraints mapping by identifying protected species, habitats or features (such as a colony tree or raptor nest) to ensure effective mitigation in order to be compliant with federal and provincial legislation.

The Project may interact with birds and bird habitat in the following ways:

- Direct mortality via collision with equipment and materials during the demolition activities;
- Demolition activities may alter or destroy migratory bird habitat;
- Activities may destroy or alter habitat for bird SAR or SOCC;
- Noise from Project demolition activities may deter birds from migrating into and using the Project area;
- Noise from Project demolition activities may result in the abandonment of nests or increased rates of predation and exposure of hatchlings and eggs during temporary abandonment; and
- There is the potential for bank swallows to establish colonies in vertical banks or areas of stockpiled soils or other species (i.e., barn swallows, cliff swallows, etc.) to nest on or within the Milltown facility itself and to be directly disturbed by demolition activities.

In addition, the Project may result in sensory disturbance to and avoidance by birds due to noise and human activity, and incidental bird collisions with vehicles travelling around the Project area.

Mammals

The Project may interact with wildlife (fauna) and their habitat in the following ways:

- The Project footprint will cause loss of immature (and limited mature) vegetation that provide habitat for wildlife;
- Disturbance from vehicles and heavy equipment may cause wildlife avoidance or disruption of wildlife activity (such as breeding and/or feeding);
- Noise, dust, fuel emissions, and vibration may cause a disturbance to wildlife species during the Project;
- Mobile equipment use during project activities may cause direct injury or death of wildlife, particularly to small wildlife such as rodents and shrews, through collisions or destruction of dens and food sources; and

- Medium and large sized mammals are unlikely to suffer direct mortality from Project activities (with a low potential for accidental vehicle collisions; see **Section 7.0,** accidents, malfunctions, and unplanned events) as they would likely avoid the area in response to human presence and noise. However, such avoidance or behaviour could result in changes to normal movements, migrations, and other life cycle processes.

In addition, the Project may result in incidental wildlife encounters, sensory disturbance to and avoidance by wildlife due to noise and human activity, and incidental wildlife collisions during Project activities.

Herptiles

The Project may interact with herptiles and their habitat in the following ways:

- Direct mortality via collision/excavation/grubbing; and
- There will be local habitat fragmentation during the decommissioning phase, making it difficult for herptiles to move from one side of the PDA to the other due to lack of cover and increased risk of predation. There may also be a short-term restriction in access to riparian areas.

Despite not being identified during the field surveys for this Project, it is possible that snapping turtles could be present within the PDA to forage during the summer season. The main threat to these species is from vehicular collisions which affects adult survivorship, which in turn greatly influences population sizes.

5.8.3.2 Mitigation

The following mitigation measures are planned to reduce environmental effects on wildlife and wildlife habitat.

- The size of the PDA will be limited to that necessary to accomplish the Project purpose;
- Activities that may harm or harass migratory birds will be scheduled to the extent possible outside of the normal migratory bird breeding season (April 8 to August 28) to ensure that eggs and flightless young are not inadvertently harassed or destroyed. At a minimum, if complete avoidance of these activities during the specified timeframe is not feasible, nest searches will be undertaken by a qualified biologist and avoidance setbacks will be established around active nests. Nest searches will only be completed following consultation with CWS and turtle nest searches undertaken by a qualified biologist if preferential habitat is identified;
- If encountered, turtle nesting areas will not be disturbed during the late May to mid-July period;
- Existing infrastructure and previously disturbed areas (e.g., roads, mowed areas, parking areas, etc.) will be preferentially used where feasible to reduce ground disturbance;
- All machinery and equipment will be inspected to ensure no species have occupied them and maintained in good working order to limit emissions, including noise generation;

- All machinery and equipment will be cleaned prior to entering the site to limit the potential spread of exotic or invasive plant species;
- All food and food waste will be stored and disposed of properly to avoid attracting wildlife;
- On-site workers will receive training and reference material that will help them identify bird species that could be attracted to habitats created by Project operations (e.g., common nighthawk and bank swallow). If workers encounter birds that they suspect may be nesting within the Project area, a biologist will be contacted to determine whether nesting is occurring and to locate the nest. Note: nests should not be flagged since this increases the probability of predation;
- If a nest is found within Project area, an appropriate setback developed in consultation with the CWS will be established around the nest in which humans activities will be restricted until the young fledge and leave the area or until the nest naturally fails;
- Given their age, the Milltown Station buildings themselves will be subjected to a nest search prior to their demolition to ensure that bird or bat species are not nesting in the structures, and any nests that are found will be relocated in consultation with ECCC and NBDNRED; and
- If a species at risk is encountered, contact will be made to a Species at Risk Biologist at NBDNRED at (506) 453-5873 to discuss immediate actions and future mitigation.

5.8.3.3 Characterization of Potential Interactions Following Mitigation

Development of the Project will result in the temporary loss of wildlife habitat, and may interact with wildlife through noise, vibration, or increased traffic in the immediate Project area. Although the Project site may provide some less-than-preferential habitat for some wildlife species due to its industrial nature, the Project is located within a highly developed area, and as such, the habitat offered by the Project site is not likely preferred by valued wildlife species.

Following site reclamation, wildlife will be able to return to the site and some wildlife habitat will be restored through revegetation, providing a positive effect.

AC CDC historical records indicate that one mammal and one herptile species at risk (SAR) have been historically observed within 5 km of the Project location. These were the little brown bat and the snapping turtle, respectively. Project activities, such as the operation of heavy machinery and active demolition, are likely to result in such sensory disturbance that most wildlife are likely to avoid the areas where Project activities are to take place, thereby limiting the potential for wildlife encounters, injury, or mortality of wildlife species. Furthermore, the vegetation in the PDA may provide some less-than-preferential habitat for many bird species, including SAR such as the wood thrush, Canada warbler and eastern wood-pewee. Field studies for breeding birds identified a total of 33 bird species comprised of 407 individuals, including two SAR (Bald Eagle and Chimney Swift) and three additional SOCC (Turkey Vulture, Ring-billed Gull, and Solitary Sandpiper), but the PDA is not likely to offer preferred habitat for any species. Additionally, the Project is situated in a larger surrounding area that offers ample natural habitat, such as forests and wetlands, as well as alternative suitable anthropogenic habitat types, such

as agricultural land and other industrial structures, for bird species to use as preferential habitat rather than that affected by the Project. Decommissioning of the facility's infrastructure is likely to result in such sensory disturbance to birds and thus most bird species are likely to avoid the areas where construction activities are to take place, thereby limiting the potential for injury or mortality of bird species.

Acoustic surveys for bats identified the potential presence of big brown bat (a secure species) in the LAA, and a survey within the buildings of the Milltown Station will be conducted prior to demolition to identify and remove any bats or their nests, subject to consultation with NBDNRED and ECCC. The PDA is not likely to provide suitable habitat for wood turtles or snapping turtles.

Given the relatively limited area of disturbance associated with the Project, the environmental setting, past use of the project footprint, and implementation of the mitigation measures outlined in **Section 5.8.3.2**, substantive interactions between the Project and birds and bird habitat are not anticipated.

Following the completion of the Project, the PDA will be reclaimed and restored to as near natural conditions as possible, thereby returning the Project site to a state where it can, over time, provide an improvement in habitat for wildlife species.

5.8.4 Summary

Assuming the proper and adequate application of the mitigation measures described above, including conducting intrusive Project activities outside of the ECCC-recommended timing window for the Project location to facilitate compliance with the MBCA, the potential interactions between the Project and wildlife and wildlife habitat are not expected to be substantive.

5.9 Socioeconomic Environment

The potential interactions between the Project and the socioeconomic environment are assessed in this section.

5.9.1 Scope of VC

The Project has the potential to interact with the socioeconomic environment, which includes land and resource use, employment, and the local economy. These potential interactions concern regulatory agencies, non-governmental organizations, and the general public because they can have a direct influence on the lives of those living and working in the vicinity of a project. Furthermore, the Milltown Station itself is an important fixture of the Town of St. Stephen and holds intrinsic value through its designation as a local historic place in association with the former Cotton Mill.

The main components of the socioeconomic environment, in relation to this assessment, are defined as follows:

- **Land and Resource Use** refers to current and future uses of public and private land and resources. It includes uses such as industrial, commercial, and residential use, property ownership (including potential nuisance effects), and the use of land and resources for recreational purposes, among others; and
- **Employment and Economy** refers to the labour market and availability, employment, employment income, business income, and their aggregate influence on the local, regional, and provincial economies.

The scope of this VC includes potential interactions of the Project with residential, agricultural, forestry recreation, and transportation land uses; and the employment and economic conditions that may change as a result of the Project, including anticipated potential changes upon permanent decommissioning and removal of the Station and improvement of Salmon Falls to allow for multi-species volitional fish passage. The scope of the assessment is based on applicable regulations and policies, anticipated issues and concerns, existing knowledge of the area, and anticipated potential interactions.

5.9.2 Existing Conditions

Existing socioeconomic conditions in the Project development area (PDA, defined in **Section 2.1.1**) and local assessment area (LAA, defined as the Town of St. Stephen) are described in this section.

5.9.2.1 Land and Resource Use

The Project is located within the neighbourhood of Milltown in the Town of St. Stephen ("the town"), in Charlotte County, New Brunswick. Milltown, originally its own municipality incorporated in the early 1800s, was amalgamated with the Town of St. Stephen in the 1970s. As a whole, the Town of St. Stephen's land use generally represents residential, commercial, industry, agriculture, aquaculture, recreation, and institutional uses in varying degrees. The following sub-sections outline the specific local government structure, land use planning, and land uses currently present in the town by land use type, as well as discusses current land use and employment within the PDA and NB Power-owned property.

Local Government Structure

There are twelve service regions in New Brunswick directed by Regional Service Commissions (RSCs) formed under the New Brunswick *Community Planning Act* that are responsible for the delivery of local land use planning, solid waste management, and sports and recreation services. Each commission is made up of representatives from the area's incorporated municipalities and incorporated Local Service Districts (LSDs) (NBDELG 2020a).

The PDA and LAA are located within RSC 10, which is comprised of 21 LSDs as well as the Towns and Villages of: St. Stephen, St. Andrews, St. George, Blacks Harbour, Campobello, Grand Manan, Harvey, and McAdam (NBELDG 2020b). Refer to **Figure 5.9.1** for an illustration of the boundaries of RSC 10. The Project is located within the LSD of St. Stephen.

The Town of St. Stephen is represented by a municipal council that consists of an elected Mayor, an elected Deputy Mayor, and five elected Councillors, and is provided its authority pursuant to the New Brunswick *Local Governance Act*. Municipal elections are held every three years as directed by the New Brunswick *Municipal Elections Act*, with the next municipal election to be held in May 2021 (note: the municipal election was originally to be held in May 2020, but was deferred for a year due to the COVID-19 pandemic). The municipal council is supported by various departments operating under its direction, including water and sewage, parks and recreation, planning, promotion, and tourism, and public works.

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Énergie NB Power

MILLTOWN GENERATING STATION DECOMMISSIONING PROJECT

ENVIRONMENTAL IMPACT ASSESSMENT REGISTRATION

REGIONAL SERVICE COMMISSION 10

FIGURE 5.9.1

Regional Service Commission 12

Regional Service Commission 11

Regional Service Commission 8

Southwest New Brunswick Service Commission (Regional Service Commission 10)

Fundy Regional Service Commission

Project Location

Regional Service Commission 10

Canada-USA Border

Regional Service Commission Boundaries

0 50 100 200 km

SCALE 1:600,000

N W E S

MAP DRAWING INFORMATION: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community
DATA PROVIDED BY: DILLON CONSULTING & NB DEPARTMENT OF NATURAL RESOURCES, INTERNATIONAL BOUNDARY COMMISSION

MAP CREATED BY: SCM
MAP CHECKED BY: JAB
MAP PROJECTION: NAD 1983 CSRS NEW BRUNSWICK STEREOGRAPHIC

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PROJECT: 19-1594

DATE: 2020-01-27

Land Use Planning

Development in the Town of St. Stephen is guided by the Town of St. Stephen Municipal Plan (Town of St. Stephen 2011). The Municipal Plan outlines policies that address a range of issues, including: housing, businesses, transportation, infrastructure, and the environment to ensure that a balanced approach is applied to growth/changes within the community. All by-laws and strategic land use planning must adhere to the Municipal Plan, which is reviewed every 10 years.

The Town is currently in the process of updating its Municipal Plan and Zoning By-law, which should be approved in 2020. There are no significant changes planned for the update; however, industrial lands expansion, residential land use intensification and downtown revitalization and development are considered. It is also worth noting that, although the Town of St. Stephen is within RSC 10, the municipality administers its own planning regulations, through designated Development Officer, Planning Advisory Committee, and Council, as per the *Community Planning Act, 2017.* Planning in the unincorporated areas outside of the municipal boundaries are administered by the RSC; however, currently no local planning regulations are in place, so provincial regulations provide planning direction in the area outside of the municipal boundaries of the Town of St. Stephen. Existing land use designations within the LAA are depicted on **Figure 5.9.2**.

Residential Land Use

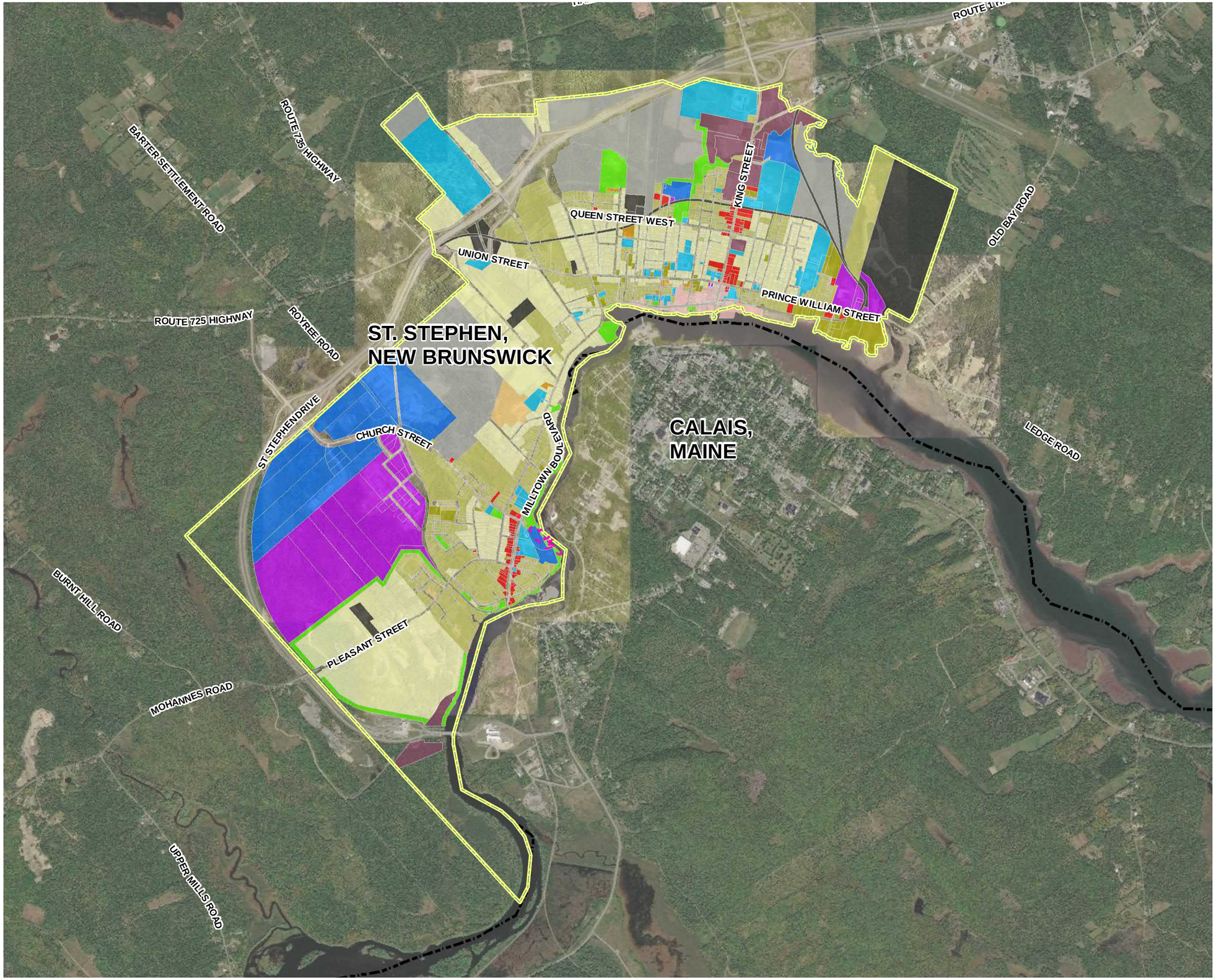
Residential land use within the LAA is the most dominant land use designation within the LAA (refer to **Figure 5.9.2**). The community of Milltown is dominated by a mix of single, two family, and multiple unit residential areas. Statistics Canada's 2016 Census for the Town of St. Stephen (including Milltown) indicates that the number of dwellings occupied by "usual residents" is 769, while the total number of private dwellings is 820 (Statistics Canada 2017).

Commercial Land Use

There are three major concentrations of commercial development in the Town of St. Stephen, including:

- the areas adjacent to Milltown Boulevard and King Street, below Union Street;
- the downtown portion of Milltown, adjacent to the intersection of Milltown Boulevard and Church Street; and
- a cluster of 'big box' retail development along King Street, north and south of Route 1 (refer to **Figure 5.9.2**).

The majority of the commercial operations in these areas are retail- and service industry-related. According to the local Business Directory (St. Stephen Area Chamber of Commerce 2018), health and wellness, accommodations, arts, entertainment and recreation, restaurants, and transportation and warehousing are the most numerous small businesses located within the town. A service station (Milltown Garage) and petroleum retail outlet (Irving Oil Limited) are located to the northwest within 2 km of the PDA, along Milltown Boulevard.



Énergie NB Power

MILLTOWN GENERATING STATION DECOMMISSIONING PROJECT

ENVIRONMENTAL IMPACT ASSESSMENT REGISTRATION

LAND USE DESIGNATIONS IN THE LOCAL ASSESSMENT AREA

FIGURE 5.9.2

- Project Development Area
- Local Assessment Area: Socioeconomic Environment
- Canada-USA Border

St. Stephen Land Use Designations

- LFR (Large Format Retail) Zone
- DT (Downtown) Zone
- NC (Neighbourhood Commercial) Zone
- Utility
- I2 (Light Industrial) Zone
- RLL (Land Lease Residential) Zone
- FD (Future Development) Zone
- R1 (Single and Two Family) Zone
- R3 (Multiple Unit Residential) Zone
- CM (Commercial Mix) Zone
- R2 (Residential Mix) Zone
- OS (Park and Open Space) Zone
- INST (Institutional) Zone
- I1-Heavy Industrial

0 50 100 200 km

SCALE 1:30,000

N W E S

MAP DRAWING INFORMATION: ESRI, DIGITALGLOBE, GEOEYE, EATHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS,AEROGRID, IGN, AND THE GIS USER COMMUNITY
DATA PROVIDED BY: DILLON CONSULTING & NB DEPARTMENT OF NATURAL RESOURCES, INTERNATIONAL BOUNDARY COMMISSION
Town of St. Stephen

MAP CREATED BY: SCM
MAP CHECKED BY: JAB
MAP PROJECTION: NAD 1983 CSRS NEW BRUNSWICK STEREOGRAPHIC

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PROJECT: 19-1594

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Institutional Land Use

The St. Stephen Volunteer Firefighter Hall is located at 199 Union Street in St. Stephen, approximately 3 km from the PDA. A Royal Canadian Mounted Police (RCMP) detachment and the St. Stephen Fire Department in St. Stephen provide the policing and fire services, respectively, for the local area. The Town Hall, Service New Brunswick, and Service Canada are all located in the downtown area of St. Stephen to provide public services to the population. The town also borders Calais, Maine, U.S.A. and contains three Canada Border Services Agency (CBSA) international border crossings.

Education is provided by two elementary schools (i.e., Milltown Elementary School and St. Stephen Elementary School), St. Stephen Middle School, and St. Stephen High School, all within the Town of St. Stephen. Milltown Elementary School is located directly southwest of the PDA, within 1 km. Refer to **Figure 5.9.2**.

Emergency medical services are provided by Ambulance New Brunswick (ANB) with a station located along Route 170, at the northeast end of the town. Health Services are provided by the Horizon Health Network. The nearest hospital to the PDA, Charlotte County Hospital, is located in the east end of the town.

Industrial Land Use

In addition to the Milltown Station itself, industrial land uses in the general vicinity of the PDA include the Ganong Company, a producer of chocolates and other candies located at the northern extent of the Town of St. Stephen (Ganong 2015). Additionally, the town's industrial park is home to Arauco North America, a producer of medium-density fibreboard (current) and particleboard (until at least 2019) (Kester 2019), is located approximately 1.5 km northeast of the PDA. Sticks and Stones Fabricating Incorporated, a producer of granite and marble countertops, and Stewart Farms, an indoor vertical aquaponics cannabis producer, are both located approximately 1 km northeast of the PDA. Refer to **Figure 5.9.2**.

The PDA and other NB Power-owned properties' land use designation is currently listed as "heavy industrial". The land use of the PDA has been of an industrial or commercial nature since the late 1700s (lumber industry) and late 1880s (cotton mill industry). As further discussed within **Section 5.10** (heritage resources), a portion of the Milltown Station is also a locally-recognized historic site in the Municipal Register of Local Historic Places within the New Brunswick Local Historic Places Program, as a result of the long-standing and important role that the former St. Croix Cotton Mill played within the Town's history.

Agricultural Land and Resource Use

Agricultural uses in the general vicinity of the LAA are limited and consist of primarily pasture and/or hay fields or occasional small livestock farms.

Aquaculture Land and Resource Use

Two aquaculture companies are located in the St. Stephen area, including:

- Magellan Aqua Farms, a farmer of scallops, sugar kelp, and sea lettuce in a practice known as integrated multi-trophic aquaculture (IMTA) (Jones 2019), whose office is located in downtown St. Stephen; and
- Cooke Aquaculture, a salmon hatchery located in Oak Bay, approximately 14 km from the PDA.

Aquaculture, commercial fishing, and fish processing are major economic drivers in Charlotte County generally.

Forestry Land and Resource Use

Forestry has historically been an important industry for the Town of St. Stephen and surrounding area since the 1700s; however, it is no longer a dominant industry and now occurs in varying small scale operations throughout outer regions of the LAA. Forest harvesting is carried out on Crown and private land and timber is supplied to local and regional sawmills for transformation. The Arauco North America medium-density fibreboard plant in the St. Stephen Industrial Park remains one of the town's largest employers and a key user of forest and sawmill residuals from forestry land and resource use.

Recreational Land and Resource Use

Adjacent to the PDA is the St. Croix River, which forms the international boundary between Canada and the U.S.A. The St. Croix River starts at East Grand Lake and flows south through other lakes, including Spednic Lake. These lakes are part of the Chiputneticook chain of lakes, which also include Spednic, North, and Palfrey Lakes, and form the headwaters of the St. Croix River. Formerly they were called the Shoodic Lakes. The St. Croix River ends at the Town of St. Stephen, and flows into the St. Croix River estuary which opens into the Passamaquoddy Bay and the Bay of Fundy (refer to the St. Croix River watershed on **Figure 3.2.1**).

The St. Croix River has been a well-known paddling route for recreational paddlers and it is maintained by the St. Croix International Waterway Commission (SCIWC 2020b). The St. Croix River is also a recreational resource for angling and is located within Recreational Fishing Area (RFA) 7 – Southwest (NBDNRED 2019a). Sportfish species found in waters in RFA 7 include brook trout, lake trout, brown trout, Atlantic salmon, and smallmouth bass (NBDNRED 2019a).

The PDA is situated in Wildlife Management Zone (WMZ) 20 and hunting, trapping and snaring are permitted in the area, with the exception of within any Protected Natural Areas (NBDNRED 2019b).

Within the LAA, St. Stephen offers a number of recreational activities/areas including: the Garcelon Civic Center, Ganong Nature Park, Downtown "Chocolate" Park, Soccer/Football/Baseball fields, Dover Hill Park, and a Skateboard Park. A number of all-terrain vehicle and snowmobile trails are also likely present in the LAA.

A portion of the NB Power owned property (i.e., directly adjacent to the PDA) is leased to the Province of New Brunswick for recreational purposes (i.e., a baseball field), and the general public is known to

use other parts of the property for recreational purposes (i.e., accessing Riverside Drive and the St. Croix River). A soccer field associated with Milltown Elementary school is located directly adjacent to the baseball field, and the W.T. Booth Centennial Public Swimming Pool is located 1.5 km west of the PDA. The former location of the St. Croix Cotton Mill, owned by NB Power, features green space and picnic tables for general public use. A commemorative monument to the former cotton mill is situated along Milltown Blvd., overlooking the Station and the former cotton mill location.

Importantly, prior to the use of the land for industrial or commercial purposes (beginning in the late 1700s), the NB Power property (including the PDA) as well as other adjacent areas were the site of the traditional "Siqoniw Utenehsis", also known as "Springtime village" or "Passamaquoddy village" by the Peskotomuhkati (Passamaquoddy) First Nation at Skutik (St. Croix). The Peskotomuhkati First Nation completed annual traditional fishing activities along Salmon Falls at the location of the Milltown Station. For further details regarding traditional land and resource use of the PDA and LAA, refer to **Section 5.11** (traditional land and resource use).

Transportation Land Use

New Brunswick Route 1 is the primary, regional transportation route through St. Stephen, and extends from the northernmost CBSA crossing directly south of St. Stephen, through Saint John and connects to Route 2 (Trans-Canada Highway) west of Salisbury, New Brunswick. Secondary routes include: Route 3, Route 725, Route 735, Route 740, and Route 750 which connect to areas nearby and around St. Stephen.

There is a municipally-owned and operated airport (i.e., Giddens Memorial Airport), at the eastern boundary of the town. The airport is not serviced by commercial airlines, but is used for commercial and private charters. A 19 km railway line owned by the Woodland Rail, LCC is located in the State of Maine and the province of New Brunswick. The railway connects the Woodland pulp mill in Baileyville, Maine with the Milltown Spur, owned by the New Brunswick Southern Railway (NBSR), at the midpoint of the Salmon Falls Railroad Bridge, which crosses the St. Croix River and Canada-U.S.A. border between Calais, Maine and St. Stephen, just south of the Station.

5.9.2.2 Employment and Economy

Population

According to the Statistics Canada 2016 Census Profile for the Town of St. Stephen Census Subdivision (Statistics Canada 2017), the total population of the Town of St. Stephen in 2016 was 4,415, down 8.3% from 4,817 in 2011. The population density of the town is 326.6 persons per square kilometre, compared to 10.5 persons per square kilometre for the province.

Table 5.9.1 illustrates the distribution by age category for the 2011 and 2016 census years.

Table 5.9.1: Age Group Distribution for Town of St. Stephen for 2011 and 2016

Age Group	2011 Census Year	% of Total	2016 Census Year	% of Total	Change 2011-2016
0-24	1,377	28.59%	1,205	27.29%	-172
25-54	1,875	38.92%	1,595	36.13%	-280
55-64	660	13.7%	640	14.49%	-20
65+	905	18.79%	975	22.08%	+75
Total	**4,817**		**4,415**		

Note:
Age group totals differ from population totals. Source: Statistics Canada (2012); Statistics Canada (2017).

The age distribution of people living in the Town of St. Stephen for the 2016 Census indicates that the largest proportion of the population is in the 25-54 age group, followed by the 0-24 age group. Both of those age groups have decreased between the 2011 and 2016 Census years, while the number of people aged 65 and over have increased (Statistics Canada 2017).

Employment and Economy

The Project is located in the Southwest Economic Region which includes Saint John, Kings, and Charlotte Counties. The City of Saint John, located approximately 110 km east of St. Stephen, is the economic centre of the region and holds the largest population in the Southwest Economic Region.

Within the Town of St. Stephen, the majority (76%) of residents remain within the town to work, and approximately 23% commute outside of Charlotte County to work (Statistics Canada 2017). Statistics Canada employment figures for the 2016 Census indicate that the manufacturing industry is the largest employment sector for the Town of St. Stephen at 16%, followed by retail trade, then health care and social assistance care at 14% and 11%, respectively (Statistics Canada 2017).

The Milltown Station currently employs three full-time equivalent positions related to operation and maintenance of the facility.

5.9.3 Assessment of Potential Interactions between the Project and the Socioeconomic Environment

The assessment of potential interactions between the Project and the socioeconomic environment in the absence of mitigation, as well as the proposed mitigation to be implemented as part of the Project, and the characterization of interactions following the implementation of mitigation, is presented below.

5.9.3.1 Potential Interactions

Without mitigation, the mechanisms by which the Project could interact with the socioeconomic environment are discussed below.

Interactions with Residential Land Use

The Project has potential to interact with nearby residences as a result of light noise disruption and modest emission of particulate matter/air contaminants generated by construction equipment during decommissioning, demolition, removal, and river improvement activities. This interaction is expected to be limited and given the industrial setting of the Station, air contaminant emissions and noise levels are not expected to be substantive, and intrusive activities will be carried out between 7:00 a.m. and 7:00 p.m., Monday to Saturday and excluding statutory holidays. The potential interactions between the Project and the atmospheric environment are discussed in **Section 5.2**, and the potential interactions between the Project and the acoustic environment (noise) are discussed in **Section 5.3**.

The Project will also interact with the residents of the LAA through the ultimate removal of the Milltown Station and particularly with the removal of the remnants of the former St. Croix Cotton Mill site (Powerhouse A; New Brunswick Register of Historic Places record number 1279, as well as the ultimate change in land use from heavy industrial to inactive lands. The future land uses of the property are currently unknown and are outside of the scope of the Project and this EIA Registration (including further improvement of the site beyond providing volitional fish passage). Discussion with key stakeholders around the property's future use is ongoing and will continue.

Interactions with Commercial Land Use

Interactions with commercial businesses in Milltown are expected to be limited and similar to those with residences in the vicinity throughout the decommissioning, demolition, removal, and improvement activities (i.e., with respect to noise disturbance and minor emissions). Due to the relatively shielded location of the PDA on Mill Lane, there are very limited traffic related interactions anticipated with respect to the businesses, with the exception of a momentary increase in construction traffic on main roadways (including Milltown Boulevard) during mobilization and de-mobilization to and from the site during decommissioning activities.

Interactions with Institutional Land Use

As discussed in **Section 3.3.1**, the PDA is located adjacent to Milltown Elementary School (i.e., located within 1 km of the PDA). Therefore, the Project has the potential to interact with the students and staff of the elementary school in similar means as with nearby residents. Additionally, the proximity of the school to the Project may result in increased accessibility, and therefore potential frequency, of visitors to the site.

Accidents or malfunctions associated with the Project have the potential to result in an increase in calls for the St. Stephen Fire Department, as well as other emergency response organizations whose geographic area of response includes the preferred transportation route. Accidents, malfunctions, and unplanned events are assessed in **Section 7.0**.

Interactions with Industrial Land Use

The Project will interact with industrial land use through the change in land use of the PDA itself as a result of the decommissioning of the Milltown Station. It is anticipated that the NB Power property

(potentially with the exception of small portions of land comprising the required substation) would change from heavy industrial land use to inactive vacant land following completion of the Project. As discussed above, discussions with key stakeholders are ongoing and will continue, and the future uses (including further improvement work beyond providing volitional fish passage) of the property are outside of the scope of the Project and this EIA Registration. No interactions are anticipated as a result of the Project on industrial land use within the LAA.

Interactions with Agricultural Land and Resource Use

The Project may indirectly affect local agriculture if surface or groundwater resources are adversely affected as a result of Project activities as those water sources may be used for irrigation or livestock consumption.

Interactions with Aquaculture Land and Resource Use

Interactions between the Project and aquaculture land use within the LAA are not anticipated.

Interactions with Forestry Land and Resource Use

Interactions with forestry land and resource use within the LAA are not anticipated.

Interactions with Recreational Land and Resource Use

The Project will result in potential increased availability of the PDA for recreational use (e.g., greater access for fishing, paddling, and other recreational activities within the St. Croix River, of course within the confines of international border security laws and regulations) following the decommissioning of the Station. As discussed above, discussions with key stakeholders are ongoing and will continue, and the future uses (including further improvement work beyond providing volitional fish passage) of the property are outside of the scope of the Project and this EIA Registration.

Additionally, through the removal of the human-made impediment/barrier to fish passage (i.e., the dam), it is expected that the productivity of fisheries resources in the St. Croix River system would improve and that the recreational fish species could experience growth in diversity, richness and/or abundance (refer to **Section 5.6**, fish and fish habitat). However, the Project could temporarily interact with recreational fishing activities in the event that sediment-laden water was to escape water control/sediment control structures and enter the St. Croix River during decommissioning activities. Sediment deposition may alter fish habitat by affecting spawning beds, rearing habitat, winter or summer refuge or by affecting food species.

Interactions with Transportation Land Use

Potential interaction with the Project and transportation land use is anticipated to be of a limited nature. Traffic volumes on local roads are not expected to change significantly during the Project. Heavy equipment will be mobilized to the site at the start of decommissioning and demobilized at the completion of the Project.

Interactions with Employment and Economy

The Project and ultimate removal of the Milltown Station will displace three current full-time equivalent NB Power positions associated with the current operation and maintenance of the Station. These employees will either chose to retire or will be offered employment elsewhere within NB Power's operations such that no net loss of permanent employment to NB Power employees at the Station occurs.

The Project itself will generate temporary employment through the contracting of third party companies to complete the Project activities. This interaction may modestly affect the local economy of the Town of St. Stephen through the temporary increase of expenditures (local accommodations and commodities) related to the Project's workforce, including the workforce required for field studies related to the EIA and other regulatory permitting requirements.

5.9.3.2 Mitigation

Mitigation measures or best management practices to reduce potential environmental effects as a result of interaction between the Project and the socioeconomic environment are identified below.

Residential Land Use

- NB Power has been and will continue to engage with local residents prior to and throughout the Project to identify and consider concerns.
- Vehicles and equipment will be equipped with mufflers and maintained, and dust suppression will be applied to stockpiled soil during dry periods.
- Working hours will conform to local by-laws, and should work be completed during night time conditions within allotted working times, directional lighting will be used on site with a downward lateral focus to minimize light leaving the site.
- Noise-intrusive activities will be conducted exclusively between the hours of 7:00 a.m. to 7:00 p.m., Monday to Saturday, excluding statutory holidays.
- Refer to the mitigation measures outlined for the atmospheric environment (**Section 5.2.3**) and acoustic environment (**Section 5.3.3**).

Commercial Land Use

- The Project is anticipated to interact with commercial businesses in a similar manner to residential land use, the mitigation proposed above for residential land use will be applied to the Project; no additional mitigation is proposed for commercial land use.

Institutional Land Use

- In addition to applying the mitigation outlined for residential land use and transportation land use, NB Power will commit to engaging with Milltown Elementary School prior to commencement of the Project to inform them of the Project activities and timelines and to

discuss potential interactions with Milltown Elementary School so that they are well informed prior to the start of the Project.

- The Local Historic Places Designation Program falls under the legislation of the New Brunswick *Heritage Conservation Act*. NB Power will adhere to the *Heritage Conservation Act* and the Local Historic Places Designation Program. NB Power will continue to engage with the Town of St. Stephen and local residents through the public consultation process and take concerns regarding the locally designated heritage place designation into consideration throughout the Project.
- Regarding potential effects on emergency response services related to the PDA or LAA, refer to **Section 7.0** for a discussion of mitigation related to accidents, malfunctions, and unplanned events.

Industrial Land Use

- Though there are some industrial operations located in the LAA, there are no anticipated interactions between industrial land and operations and the Project; thus no mitigation is proposed.

Agricultural Land and Resource Use

- The mitigation measures outlined for the surface water VC (**Section 5.5**) or fish and fish habitat VC (**Section 5.6**) should mitigate interactions between the Project and small scale agricultural operations within the LAA, should they be using the St. Croix River as a means of water irrigation. No other mitigation is proposed.

Aquaculture Land and Resource Use

- Though there are some aquaculture operations located in or near the LAA, there are no anticipated interactions between these operations and the Project; thus no mitigation is proposed.

Forestry Land and Resource Use

- Though there are some small scale forestry operations located in or near the LAA, there are no anticipated interactions between these operations and the Project; thus no mitigation is proposed.

Recreational Land and Resource Use

- Refer to the mitigation outlined for residential, commercial, and institutional land use, above, as well as the mitigation outlined in **Section 5.5** (surface water) and **Section 5.6** (fish and fish habitat).The future land use (including further site improvement) is outside of the scope of the Project and this EIA Registration; thus no additional mitigation is proposed.

Transportation Land Use

- A transportation plan will be developed for the Project.
- Truck drivers will adhere to posted speed limits and warning signage and adjust driving to meet weather and road conditions (especially within areas in close proximity to Milltown Elementary School).
- It is possible that oversized loads (very wide or heavy loads) will be required for equipment used during decommissioning. Transportation of these loads on public roads may require special permits from the New Brunswick Department of Transportation and Infrastructure (NBDTI) and may require special markings, lead-and-follow vehicles, and temporary traffic interruptions.
- Although not anticipated, all necessary permits will be obtained and industry best practices will be followed for special moves or traffic interruptions on public roads.
- Transportation accidents and collisions are addressed in **Section 7.0**.

Employment and Economy

- NB Power will assure that current employees affected by the closure of the Station are provided alternate employment positions of a similar nature within the organization so that no net loss of permanent employment to current NB Power employees at the Station occurs.
- NB Power will contract local contracting companies whenever possible for the completion of the Project, unless specialized services that are not offered within the town or province are required to carry out an activity.
- Workers will use appropriate personal protective equipment and follow industry safety procedures.
- Refer to **Section 7.0** for a discussion of mitigation related to accidents, malfunctions, and unplanned events.

5.9.3.3 Characterization of Potential Interactions Following Mitigation

The Project may result in modest emission of dust, air contaminants, and noise emissions that could cause a temporary nuisance to off-site receptors, thereby affecting residential land use. However, given the nature of the Project and the current conditions of the heavy industrial operation at the Station, the distance of the Project operations to the nearest residences, and in consideration of the mitigation to be employed (particularly avoiding intrusive work during the evening, nights, weekends, and statutory holidays), the Project is not expected to result in the undue emission of air contaminants or noise at nearby residential properties.

It is anticipated that the NB Power property (potentially with the exception of small portion(s) of land comprising the substation that will remain in place) would change from heavy industrial land use to inactive lands owned by NB Power following completion of the Project. Although the future land use or continued improvement of the property (beyond providing volitional fish passage) is outside of the scope of this Project, it is anticipated that through collaboration with many stakeholders, this may be a

positive interaction through the increased accessibility and potential for continued improvement of the property for recreational activities such as fishing or paddling (within the confines of the international boundary security laws) or for the increased availability for traditional activities (refer to **Section 5.11** for a discussion on traditional land and resource use). Furthermore, as a result of the removal of the Station as a barrier to fish and the restoration of Salmon Falls, it is anticipated that there will be positive interactions with fish populations, including recreational fish species and their populations. Nevertheless, the Project will result in the loss of the physical buildings (powerhouses) that are a locally designated historic place, and which provide a sense of place to residents in the community due to their long-standing presence and identity in the area, are tied to the rich local history of Milltown and greater St. Stephen, and hold intrinsic personal value for the some residents of the area. Although removal of these buildings is currently planned as a part of the Project discussions on future land use(s) for the property will continue through the completion of the Project, and that other key stakeholders, organizations and members of the general public may take involvement and/or ownership of other plans to develop and execute property based land use and improvement plans in the future, if they so choose.

Although the Project will result in the loss of three full-time equivalent employment positions associated with the operation and maintenance of the Station, NB Power will ensure that the employees who do not wish to retire are provided an alternate position within the organization so that no net loss of employment occurs for current NB Power employees at the Station. Furthermore, there may be a temporary positive interaction through employment and local expenditures as a result of the contracting of third-party local companies to carry out the Project activities (whenever possible and unless specialized services that are not offered within the town or province are required to carry out an activity).

Given the nature of the Project, the distance of the Project operations to the nearest residences, the mitigation to be employed, and the environmental benefits of the Project, and the potential for social benefits in the future, the Project is not expected to result in substantive adverse interactions with the socioeconomic environment, and may in fact provide some positive interactions with respect to recreational land use or other uses.

5.9.4 Summary

In summary, the Project will result in a change of land use of the PDA from active heavy industrial use to inactive land owned by NB Power (subject to change following decision-making and consultation); however, plans for the future land use following the Project are not currently defined and discussions with key stakeholders are ongoing.

During the Project, temporary nuisance to nearby residents may be possible, but is not expected due to the location of the Station and the current industrial operations within the PDA. NB Power will communicate with Milltown Elementary School to ensure that staff are aware of the Project activities and timelines. Substantive interactions with commercial, institutional, industrial, agricultural, forestry,

recreation, or transportation land uses are not expected. There may be modest and temporary positive interactions with employment and economy as a result of the Project.

Importantly, it is anticipated that through continued engagement with residents, stakeholders and rights holders, measures to help retain the intrinsic value of the locally designated historic site can be identified and a strategy can be established by these parties for implementation following the completion of the Project (i.e., outside of the scope of the Project itself) to address the loss of the physical building of Powerhouse A or any other common sense of loss that may be felt by residents as a result of the Project. It is also anticipated that, as with increased accessibility of the PDA for recreational purposes, and the positive environmental benefits the PDA would become more accessible for the enjoyment of residents and provide new opportunities as a result of the removal of an industrial facility and barrier to fish passage within the St. Croix River.

In light of the above, and in consideration of planned mitigation and best practices aimed at reducing environmental effects, the potential interactions between the Project and the socioeconomic environment are not expected to be substantive.

No specific follow-up or monitoring is required, nor proposed, for the socioeconomic environment.

5.10 Heritage Resources

The potential environmental interactions between the Project and heritage resources, which includes archaeological resources (e.g., artifacts, features, structures), palaeontological resources (e.g., fossils), and built heritage resources (e.g., historic buildings, complexes), are assessed in this section.

5.10.1 Scope of VC

Heritage resources, both naturally occurring and human-made, are those resources related to the past that remain to inform present and future societies of that past. Heritage resources includes archaeological resources (e.g., artifacts, features, structures), palaeontological resources (e.g., fossils), and built heritage resources (e.g., historic buildings, complexes). Heritage resources are highly delicate features of the environment and their integrity is susceptible to ground-disturbing activities. Any Project activity related to surface or sub-surface ground disturbance has the potential for interaction with heritage resources, where they are present.

Heritage resources has been selected as a valued component (VC) because of its importance to the people of New Brunswick and because these resources are recognized and managed by provincial and federal regulatory agencies. In addition, Indigenous peoples are very interested in the preservation and management of heritage resources, particularly those resources that relate to their individual identities as well as their community history, culture, or traditions. Importantly, the Project is located on and within 30 m of the St. Croix River, which, like with all major watercourses, increases the potential for harbouring heritage resources.

Other than the Milltown site itself (a registered historic place in the New Brunswick Register of Historic Places record number 1279 and thus considered a built heritage resource), the greatest potential for

the Project to interact with heritage resources is in surface soils or rocks due to earth moving soil disturbance associated with the decommissioning, demolition, removal, and restoration activities associated with the Project.

Heritage resources in New Brunswick are protected under the *Heritage Conservation Act*, which is administered by the Archaeology and Heritage Branch (AHB) of the New Brunswick Department of Tourism, Heritage and Culture (NBDTHC), and are considered to be very important and highly valued by the people of New Brunswick (GNB 2020c). The *Heritage Conservation Act* outlines the Province's ownership of all archaeological, palaeontological, and burial site heritage objects (GNB 2020c). Any such objects determined to be of Indigenous origin are specifically held 'in trust' on behalf of Indigenous people and their communities (GNB 2020c). The Act also protects provincially designated heritage places. The following definitions for selected heritage resources are derived from the provincial *Heritage Conservation Act*:

- **Archaeological Object:** "*an object which shows evidence of manufacture, alteration or use by humans that may provide information about past human activities and which meets any criteria set by regulation, and includes a sample collected from that object*".
- **Archaeological Site:** "*a place where evidence of past human activities, such as archaeological objects and features, is discovered on, buried or partially buried beneath the land, or submerged or partially submerged beneath the surface of a watercourse or permanent body of water*".
- **Burial Ground:** *"a place that has been used for the placement of human remains or burial objects, but does not include a cemetery regulated under the Cemetery Companies Act".*
- **Burial Object:** *"an object that is directly associated with the interment of a human, but does not include human remains".*
- **Palaeontological Object:** *"a work of nature consisting of or containing any remains, trace or imprint of a multicellular plant or animal or a stromatolite preserved in the Earth's crust since some past geologic time; does not include human remains".*
- **Palaeontological Site:** "*a place where evidence of palaeontological objects is discovered in rock or unconsolidated sediment, exposed at the surface, buried or partially buried beneath the land, or submerged or partially submerged beneath the surface of a watercourse or permanent body of water".*

Archaeological resources (i.e., burial objects or archaeological objects) tend to be found in surficial soils, whereas palaeontological objects (i.e., fossils) tend to be found in bedrock. The discovery of these resources can provide valuable information about the history of human activity or use in the distant past (in the case of archaeological objects), or natural history and evolution of wildlife and vegetation in earlier eras (in the case of palaeontological objects).

The Province of New Brunswick provides guidance for conducting heritage assessments under its "Guidelines and Procedures for Conducting Professional Archaeological Assessments in New Brunswick" (Archaeological Services 2012).

5.10.2 Existing Conditions

Existing conditions with respect to the overall historical context of the Milltown site as well as for archaeological resources, palaeontological resources, and built heritage resources, are discussed in this section.

5.10.2.1 Historical Background

The following has been adapted from background research conducted by Cultural Resource Management Group Ltd. in the course of carrying out a preliminary archaeological impact assessment (AIA) for the Project under the *Heritage Conservation Act* (CRM Group 2020).

The history of human use by Indigenous peoples of the St. Croix River watershed generally, and at the Milltown site specifically, can be traced back thousands of years. The site of Salmon Falls would have been an attractive site for Indigenous peoples due to its access to water, its proximity to the Passamaquoddy Bay estuary, and its topography and geography as a natural waterfall located near the head of tide (and the abundance of aquatic resources there as a result of those features) (CRM Group 2020). The surrounding areas was also an attractive site for early European explorers and settlers. The first known non-Indigenous visitors to the area were Samuel de Champlain and Pierre Dugua, Sieur de Monts, in the early 1600s when they landed at what is now known as St. Croix Island, in the St. Croix River estuary. Permanent French settlements in the area began in 1684 (CRM Group 2020). The area also has a long history of colonial settlement and conflict. The area was the site of British raids in the early 1700s and the Acadian deportation in the mid-1700s (CRM Group 2020). The area also saw the immigration of British loyalists in 1783 after the American Revolution (CRM Group 2020). In the early 1800s, the area was formally allocated to the Parish of St. Stephen and the Indigenous population, who had continued to utilize and live in the area, were moved to reservations in Maine (CRM Group 2020). It was during this time, that the early mills and dams were built along the St. Croix River. This involved the construction of a variety of dams to redirect and hold water as well as one timber sluiceways in the PDA. Many of these structures were in operation from the late 1700s until the 1870s (CRM Group 2020). Historical maps of the area show portions of the City of Calais and Milltown as being part of an Indigenous reserve.

During the late 1800s, Milltown (and in particular the Milltown Station site) began to experience a period of intensive industrial and residential development. With the lumber industry along the St. Croix River beginning to decline, the local business community developed plans for an industrial cotton mill at the Milltown site (CRM Group 2020). The St. Croix Cotton Mill and dam were built between 1881 and 1882 at Salmon Falls on the St. Croix River (CHP 2020). In addition, there were dozens of other sawmills in Milltown, and across the river in what is now Calais, Maine, which were in operation throughout the late 1700s and 1800s (CRM Group 2020). The St. Croix Cotton Mill operated and was expanded throughout its operating life until it was closed in 1957, and NB Power purchased the Milltown Station in 1958. The majority of the St. Croix Cotton Mill was demolished in 1972, with only the dam and the associated hydroelectric infrastructure (owned by NB Power) remaining (CHP 2020). At that time, the remaining building foundations of the St. Croix Cotton Mill were filled in (CRM Group 2020; CHP 2020).

In the early 1980s, a new fishway was constructed along the west side of the Milltown dam to allow fish to bypass the dam.

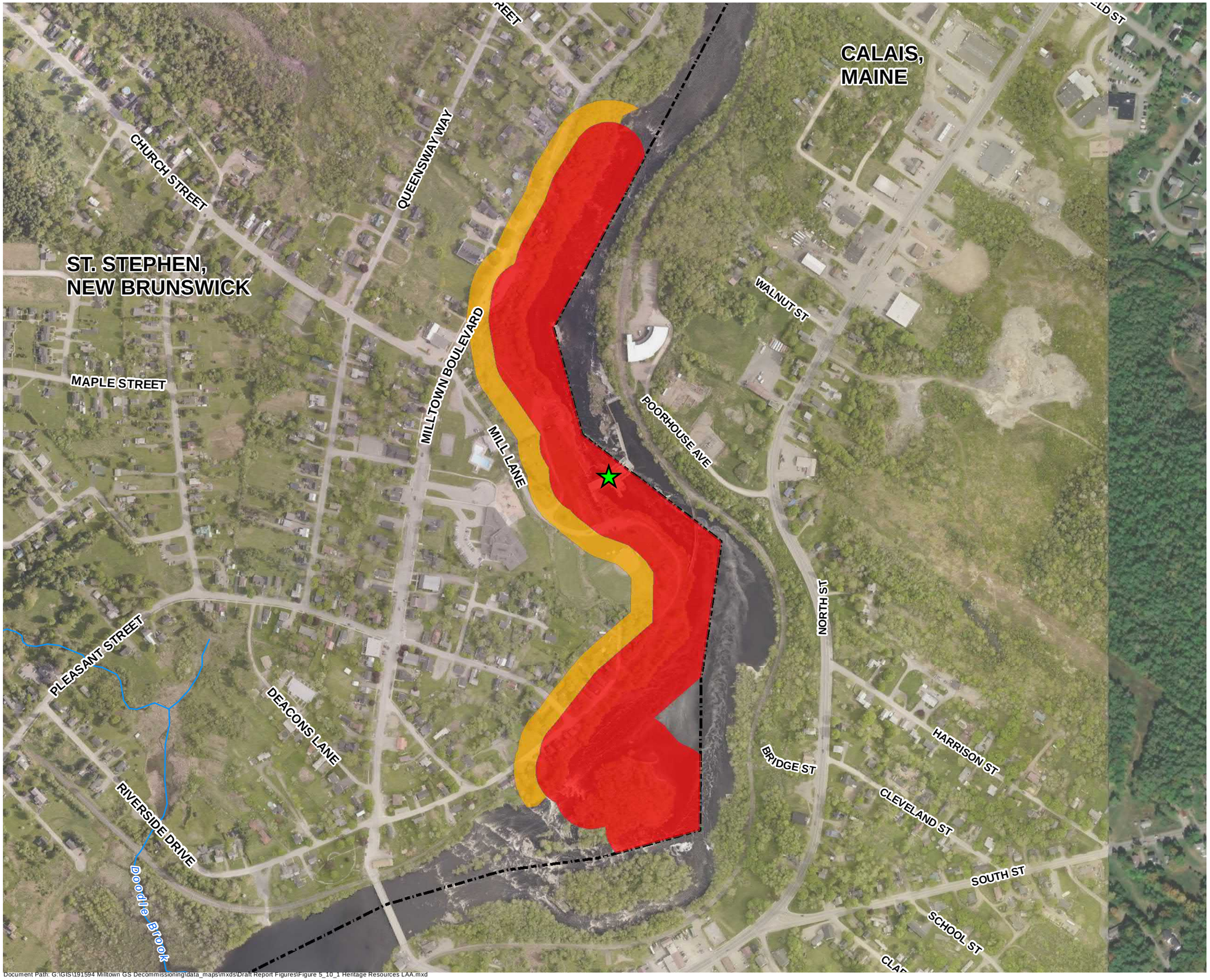
Today, the hydroelectric station, fishway, associated transmission infrastructure, retaining walls, and evidence of filled-in building foundations are the only visible remnants of the original St. Croix Cotton Mill site within the PDA. A commemorative installation located downstream of the site, overlooking the site, provides information on the history of St. Croix Cotton Mill site and the extent of former buildings. The Milltown site has been a registered historic site since 2006 (CHP 2020; CRM Group 2020). The site is generally manicured lawn with wooded areas to the north and south and includes a community baseball field, and is adjacent to a local school yard and soccer field and residential housing (CRM Group 2020).

5.10.2.2 Context and Methods for Archaeological Impact Assessment

For heritage resources, which includes archaeological resources, the local assessment area (LAA) includes 500 m upstream and 500 m downstream of the Milltown site, as well as 80 m of riparian area along the Canadian side of the St. Croix River (**Figure 5.10.1**). The "Guidelines and Procedures for Conducting Professional Archaeological Assessments in New Brunswick" (Archaeological Services 2012) consider the first 50 m away from a watercourse as well as 100 m from the confluence of watercourses to be of high archaeological potential; the next 30 m (from 51 m to 80 m from the watercourse) is considered to be of medium archaeological potential. Under these guidelines, a systematic AIA, acceptable to the AHB should be undertaken to confirm whether archaeological resources are likely to be present.

In December 2019, an archaeological impact assessment (AIA) was initiated to characterize and describe the existing conditions of the PDA and the LAA. Dillon retained Cultural Resource Management Group Ltd. (CRM Group) of Bedford, Nova Scotia to conduct the AIA to support the EIA Registration. The AIA assists in the assessment of the potential project related interactions with heritage resources, especially given the PDA proximity to a major watercourse (i.e., the St. Croix River) and important topographical features (i.e., Salmon Falls and Passamaquoddy Bay estuary).

An AIA consists of two components. The first component is the completion of a preliminary investigation to determine the potential for heritage resources to be affected by a particular development or project using desktop research, consultation with knowledgeable locals and groups, and a site walkover. This informs the second component of the AIA, which is the development and implementation of a subsequent systematic field evaluation and shovel testing strategy to confirm the presence of potential heritage resources in the PDA and LAA. The findings form these two components, in turn, help to inform the development and implementation of mitigation measures designed to protect these heritage resources.



Énergie NB Power

MILLTOWN GENERATING STATION DECOMMISSIONING PROJECT

ENVIRONMENTAL IMPACT ASSESSMENT REGISTRATION

LOCAL ASSESSMENT AREA HERITAGE RESOURCES

FIGURE 5.10.1

- ProjectLocation
- Watercourse
- Local Assessment Area: Heritage Resources Lower Potential
- Local Assessment Area: Heritage Resources High Potential
- Canada-USA Border

0 25 50 100 m

SCALE 1:5,000

N W E S

MAP DRAWING INFORMATION:
BASEMAP IMAGE SERVICE LAYER CREDITS: ESRI, HERE, GARMIN, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), SWISS TOPO, OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY (2015)
DATA PROVIDED BY: DILLON CONSULTING LIMITED, SNB & NB DEPARTMENT OF NATURAL RESOURCES, THE ATLANTIC CANADA DATA CONSERVATION DATA CENTRE, THE INTERNATIONAL BOUNDARY COMMISSION.

MAP CREATED BY: SCM
MAP CHECKED BY: JB
MAP PROJECTION: NAD 1983 CSRS NEW BRUNSWICK STEREOGRAPHIC

DILLON CONSULTING

PROJECT: 19-1594

DATE: 2020-01-27

Document Path: G:\GIS\191594 Milltown GS Decommissioning\data_maps\mxds\Draft Report Figures\Figure 5_10_1 Heritage Resources LAA.mxd

Archaeological Impact Assessment: Preliminary Investigation Methods

The first component of the AIA in New Brunswick is a preliminary investigation which includes: preparing an Archaeological Field Research Permit (AFRP) application, completing a desktop assessment (i.e., documentary research), consultation/engagement with local individuals and/or groups (note: Indigenous engagement is being undertaken separately), and a site walkover (CRM Group 2020). The current "Guidelines and Procedures for Conducting Professional Archaeological Assessments in New Brunswick" (Archaeological Services 2012) state that an AFRP is required to begin an AIA (CRM Group 2020).

Archaeology Field Research Permit (AFRP) Application and Desktop Assessment

CRM Group obtained an AFRP (Permit Number 2019NB169 issued to CRM Group Staff Archaeologist Robert Shears) on December 13, 2019, which permitted the AIA preliminary investigation and site walkover to be conducted on December 16, 2019. For the application process, CRM Group requested the most recent Archaeological Predictive Model/Recorded Sites Mapping of the project area from AHB. This documentation must then be included as part of the AFRP application.

After receiving the model/mapping from the AHB, a robust desktop assessment was initiated to gather historical and environmental information that will contribute to the identification of archaeological potential within the project area and to provide a historical and cultural context to evaluate the significance of any archaeological resources (CRM Group 2020).

The desktop assessment included a review of relevant databases and sources to the project area and these included (CRM Group 2020):

- Heritage Branch records (including the New Brunswick Archaeological Site Files, the Borden Map Files, the Archaeological Projects Manuscripts and the Private Collections Files, the New Brunswick Plane Crash Inventory, the New Brunswick Cemeteries Database, etc.);
- The Canadian Inventory of Historic Buildings;
- Maine Archaeological Survey Reports;
- Legal land survey records; and
- St. Stephen Public Library, the Saint John Library, and the New Brunswick Provincial Archives.

Relevant published and unpublished reports of heritage investigations or surveys within or adjacent to the project area, local and regional history, Precontact history, architectural history, ethnography, cultural geography and other pertinent disciplines.

Consultation and Engagement with Local Individuals and/or Groups

Consultation and engagement with local groups and knowledgeable local individuals was intended to gather information on the location, distribution and significance of reported and unreported heritage resources. This consultation and engagement included contacting and conducting interviews with the following individuals (CRM Group 2020):

- Representatives from the Archaeology and Heritage branch (AHB) of the New Brunswick Department of Tourism, Heritage, and Culture (NBDTHC);
- A St. Stephen amateur historian provided local historical information;
- Provincial archivists from the New Brunswick Archives were contacted to provide cartographical and photographic information about the site; and
- A Senior Archaeologist from the Maine Historic Preservation Commission provided archaeological site report information from site located in Maine.

Site Walkover

A walkover of the site was conducted on December 16, 2019 by CRM Group under snow-free ground conditions in order to provide exposure to the topography and geographical setting of the Project area. This exposure will facilitate the development of a systematic field evaluation and testing strategy to complete the AIA. During the site walkover, archaeologists from CRM Group examined the PDA for potential resources that were identified during the desktop assessment, background research, and local engagement. The site walkover was recorded using field notes, global positioning system (GPS) coordinates and track logs, and photographs (CRM Group 2020).

5.10.2.3 Archaeological Impact Assessment Results: Preliminary Characterization

Overall, the LAA and PDA are considered to have high potential to harbour heritage resources. The LAA and PDA are in close proximity to a major watercourse, the topography associated with the waterfall at Salmon Falls is significant, and there is a significant archaeological history of Precontact human use and of contemporary human use and development. The PDA and LAA are areas that are known to have been used for traditional purposes (**Section 5.11**) by Precontact Indigenous communities, as evidenced by a number of registered archaeological sites in the PDA and LAA, and this traditional use continues today by some members of Indigenous communities. This area has also been the site of intense human-made development since colonization, as evidenced by the remaining powerhouse, remnant building foundations, and historical records and photographs. In addition, the Milltown property has been a registered archaeological site since 1984 (Borden Number BhDt-03) and holds historical significance to the local community.

Characterization of Archaeological Resources

As noted in the AIA report for the preliminary investigation at the Milltown site (CRM Group 2020), the PDA and the LAA are considered to have a high potential to harbour archaeological heritage resources, as evidenced by the nine registered Precontact archaeological sites within a 10 km radius of the Milltown site. One of these sites, Salmon Falls (Borden Number BhDt-03), is located within the PDA, and another is within 150 m of the PDA on the Maine side of the river (Site 96.7 Maine Archaeological Survey) (Shears, R., pers. comm., 2020). The Salmon Falls site was recorded during a 1984 archaeological survey as a multi-component Indigenous burial site and historic manufacturing site. The exact location and spatial extent of the Indigenous burial component of this registered site is unknown, but it is anticipated to be partially situated in the PDA. There have also been historical accounts of

Indigenous burial sites. In approximately 1840, human remains, including skeletons, breast plates, knives and other burial objects, were encountered during the construction of the James Albee house. Today, this area is at the intersections of Milltown Boulevard and Church Street. In addition, in 2018 there was an incidental recovery of three lithic flakes, which were thought to have eroded from the St. Croix River bank, within the PDA, just north (downstream) of the Milltown site (CRM Group 2020).

Characterization of Palaeontological Resources

The PDA is anticipated to have a low potential for palaeontological resources due to the recent geological history of the area. There is the potential for Project activities to incidentally uncover palaeontological resources during construction activities and dam demolition and removal activities, which may require the excavation of soil to the underlying bedrock within the PDA. The soil within the PDA and LAA is comprised of streamlined glacial till that was deposited by advancing glaciers and ranges in depth from 1 m to 10 m in thickness (CRM Group 2020). The subsurface bedrock in the St. Stephen area is characterized as intrusive plutonic igneous rock from the late Silurian (GNB 2008), which by their nature are unlikely to harbour significant palaeontological resources. As the glaciers receded, approximately 13,000 years before present (BP), the area would have been inundated by the ocean, which would have caused erosion of landscape features, and deposition of sand and other materials (CRM Group 2020). Palaeontological resources are thus not discussed further in this assessment.

Built Heritage Resources

The PDA is anticipated to have a high potential for built heritage resources due to the site being designated a local historic site (CHP 2020). This designation includes the Salmon Falls, the remnants of the former St. Croix Cotton Mill site (New Brunswick Register of Historic Places record number 1279), and the existing hydroelectric complex (CHP 2020). Historic research also indicates that resources related to an early nineteenth century residential neighbourhood, pre-dating the cotton mill, may also still exist within the PDA. The historic St. Croix Cotton Mill was built in 1881 and, at the time, included the construction of seven structures, including six buildings and the dam. These were: the Main Mill Building; the Picker Building; the Dye House; the Boiler Building; the Wheel House Building; the Machine Shop Building; and, the Milltown dam (CRM Group 2020). From 1887 through to 1934, the cotton mill was expanded to include a Mill Office, a new Powerhouse, Weaving Room Building, a number of storehouses and the replacement of the wooden dam with one made of concrete. By 1957, when the cotton mill was finally closed, there were a total of 12 buildings at the site (CRM Group 2020). These included: The McAllister Brothers Grist Mill to the south of the property; the hydroelectric power house addition to the dam; and, the Weave Room Building. Today, the hydroelectric powerhouses and dam are still in operation and are the only remaining buildings associated with the St. Croix Cotton Mill (CHP 2020; CRM Group 2020).

5.10.3 Assessment of Potential Interactions between the Project and Heritage Resources

This section details the assessment of the potential interactions between the Project and heritage resources. This will include characterizing the potential interactions between Project activities and

heritage resources and identify key mitigation measures to reduce these interactions. The assessment will also include the characterization of any residual interactions that may exist after the implementation of mitigation measures. For this section, heritage resources include archaeological resources (e.g., artifacts, features, structures), palaeontological resources (e.g., fossils), and built heritage resources (e.g., historic buildings, complexes).

5.10.3.1 Potential Interactions

The preliminary results of the desktop assessment and site walkover indicated that there is a high potential for heritage resources to be located within the PDA and there is high potential for interaction between Project activities and heritage resources (CRM Group 2020). This will necessitate the development and implementation of the AIA field evaluation and testing strategy (with systematic shovel testing) to confirm this potential. This strategy will be developed by CRM Group in consultation with AHB staff and reflect provincial and First Nations heritage resource protection priorities[1].

The potential interactions between the Project and heritage resources are anticipated to arise from all Project-related activities involving ground disturbance, including those related to: the site and laydown area preparation; construction of the cofferdam and temporary road; powerhouse, gate house, dam, spillway and fishway demolition; shoreline stabilization; and, site improvement activities. These interactions are anticipated to be refined as Project plans are development but generally these interactions will be localized to the boundaries of the Milltown Station property which is located within the PDA. An important and substantive interaction between Project activities and built heritage resources will arise from the demolition and removal of buildings and structures. In addition, there is also the potential for encountering other unanticipated archaeological and palaeontological heritage resources during the Project activities (i.e., excavations, water drawdown, and other soil disturbances).

5.10.3.2 Mitigation

Key mitigation measures to minimize the potential for the discovery of a heritage resource include conducting an AIA preliminary investigation and, if required, field evaluation to confirm preliminary investigation conclusions regarding heritage resources. If heritage resources are discovered through the completion of the AIA, further mitigation including additional testing, archaeological monitoring during the decommissioning activities, archaeological excavation, or other measures would be considered. Appropriate strategies would be developed by CRM Group in consultation with AHB staff and reflect provincial and First Nations heritage resource protection priorities. Additionally, a PSEMP with defined contingency and emergency response procedures in the event of the accidental discovery of a heritage

[1] At the time of submission of this EIA Registration to the NBDELG, the shovel testing program that was planned to be conducted in the summer of 2020 was deferred due to the ongoing COVID-19 pandemic. If possible, the shovel testing will occur in 2021. The results of the shovel testing will be documented in a separate AIA permit report to be submitted to AHB following the completion of the program.

resource will be developed and implemented. The PSEMP will include contingency and emergency response procedures to be implemented in the event of a chance find of a heritage resource.

The following mitigation measures, through careful design and planning, are recommended to avoid or reduce the potential for adverse interactions with heritage resources:

- Minimize the extent of disturbance of the Milltown site by planning as small a PDA as possible (in this case, a 1.4 ha PDA on land within the 5.86 ha Milltown Station site on the Canadian side);
- Planned avoidance of known areas of elevated archaeological potential, to the extent practical;
- Undertake an archaeological impact assessment (AIA) of areas proposed for ground breaking and/or earth moving including an appropriate field evaluation strategy (e.g., shovel testing, archaeological monitoring) to identify archaeological resources that might be present;
- For any areas where shovel testing is recommended, following the archaeological field survey guidelines and implement this work as per AHB Guidelines (Archaeological Services 2012);
- Obtaining a Site Alteration Permit for any disturbance within 100 m of a registered archaeological site, or areas that are confirmed through shovel testing to contain archaeological resources that cannot be avoided by the Project, and following the recommendations from HASB in these areas (e.g., systematic archaeological excavation);
- Implement archaeological construction monitoring for any ground breaking or earth moving activities where shovel testing is not possible;
- Conduct archaeological monitoring and examination of all soil material removed from the river for any artifacts that may have been deposited in the river after eroding from the shoreline areas; and
- A PSEMP with defined contingency and emergency response procedures will be developed and implemented.

If any archaeological resources are accidentally identified at any point over the course of the Project, the following mitigation measures will be employed:

- Work in the area must cease immediately and the area secured;
- AHB must be contacted at (506) 453-2738 for further direction;
- Until a qualified archaeologist arrives at the site, no one shall disturb, move or re-bury any uncovered object; and
- Activities at the site may resume only when authorized by Archaeological Services and once mitigation measures have been completed.

Other contingency and emergency response procedures to be implemented in response to the accidental discovery of heritage resources will be documented and implemented as part of the PSEMP for the Project. In addition to the above and in the event that evidence of burials or human remains are encountered during the Field Evaluation or other development activities associated with Project area:

- Contact and Inform the Lead Police Agency (RCMP or municipal police force) in accordance with AHB Guidelines (Archaeological Services 2012, pg. 57).

5.10.3.3 Characterization of Potential Interactions Following Mitigation

There are a variety of potential Project and heritage resource interactions that may persist beyond the implementation of proposed mitigation measures. These include the demolition and removal of heritage buildings and infrastructure relating to the Milltown Station and the potential for discovering previously undiscovered (or unknown) archaeological or palaeontological objects. Archaeological resources could be found in the surficial soils (including topsoil and overburden) or in areas dewatered during decommissioning activities associated with the Project. Any ground breaking, earth moving, or dewatering activity has the potential to uncover previously undiscovered or unknown heritage resources.

The PDA and the LAA have a high potential for harbouring heritage resources due to its proximity to a major watercourse and the presence of known heritage resources at the site. However, the combination of completing an AIA (i.e. the preliminary investigation already completed, and the planned implementation of an archaeological field evaluation and testing strategy) and the implementation of the other mitigation measures (i.e., archaeological monitoring and archaeological contingency and emergency response planning) will reduce the likelihood of substantive interactions between the Project and archaeological resources following the implementation of mitigation methods. Consequently, the residual interactions between the Project and heritage resources are not anticipated to be substantive.

5.10.4 Summary

Based on the AIA preliminary investigation (i.e., desktop assessment and site walkover) conducted by CRM Group, the PDA and LAA are considered to exhibit high potential for harbouring heritage resources, particularly archaeological and built heritage resources. Consequently, there is a high potential for interaction between the Project and archaeological and built heritage resources and a low potential for interaction with palaeontological resources. The interactions will be associated with the preparation of the site and laydown areas, the construction of the cofferdam/temporary access road, and the demolition and removal (except for the transformer substation and associated transmission lines which will be maintained) of all existing buildings and structures. The Project is also anticipated to interact with the hydroelectric facility and the dam (built heritage resources), which will be permanently removed as part of the Project. The residual Project interactions with built heritage are expected to be substantive, given these buildings are anticipated to be completely removed, but are unavoidable in the context of the Project purpose.

All earth moving and ground breaking activities have the potential to interact with archaeological and palaeontological resources buried in the soil or subsurface bedrock of the PDA. However, pre-construction archaeological evaluations and surveys, and archaeological monitoring or examination during all ground breaking activities, should result in the identification of any archaeological resources,

and development of appropriate mitigation in the event that any archaeological resources are present in areas identified for ground disturbing activities. Therefore, in consideration of this mitigation, the residual potential interactions between the Project and archaeological and palaeontological resources are not expected to be substantive given appropriate mitigation and monitoring. A systematic shovel testing investigation of areas to be disturbed as part of the Project, with further mitigation defined in consultation with AHB in the event of any discovery of heritage resources, will improve the level of confidence of this prediction.

5.11 Traditional Land and Resource Use

The potential interactions between the Project and Indigenous traditional land and resource use are assessed in this section. It is important to note that information presented herein is intended to provide a general high-level overview of traditional land and resource in the general area of the Project. The information provided below is based on publicly-available literature and general knowledge and information on Indigenous traditional land and resource use in the Project area, and is not intended to supersede traditional knowledge or specific information that may be shared as part of ongoing consultation with Indigenous communities. Although a traditional knowledge study was not completed for the Project to date, ongoing consultation with the Peskotomuhkati and other First Nations groups may provide more insight into traditional land and resource use within the region.

5.11.1 Scope of VC

Traditional land and resource use refers to the activities undertaken by Indigenous peoples that were carried out dating back to Precontact periods (GNB 2011). These activities may have included the building and settling of encampments, seasonal travel, hunting, fishing, trapping, gathering of food and medicines, practicing ceremonial traditions, and burial activities. Evidence of these traditional land and resource uses can be found in archaeological evidence (i.e., archaeological sites, burial sites, and associated objects) and through Indigenous traditional knowledge.

Traditional land and resource use has been selected as a valued component (VC) in order to:

- Acknowledge the lands and resources that have been used, and continue to be used, for traditional purposes by Indigenous persons;
- Assess the potential interactions between Project activities and traditional land and resource use which is required under the New Brunswick EIA Regulation; and
- Assist the NB Power (the Crown) in fulfilling its duty to consult with First Nation communities regarding the Project.

This section is intended to provide information about the potential interaction of Project activities on traditional land and resource use in the PDA and a LAA, and to identify appropriate mitigation measures to remove or reduce negative interactions. For the purposes of this EIA Registration document, Indigenous traditional activities practiced on Crown, publicly owned, or certain private lands will be considered.

The LAA is defined as the St. Croix River extending from the U.S.A. shoreline to the Canadian shoreline, plus a 30 m riparian area on each side of the watercourse. This extends from the Milltown site upstream approximately 16 km to the Woodland Dam (i.e., next hydroelectric dam on the St. Croix River) located near Baileyville, Maine, and downstream approximately 1-2 km to tidewater in the St. Croix River estuary (**Figure 5.11.1**). The LAA also includes a section of Mohannes Stream, which is a tributary of the St. Croix River, up to its intersection with Mohannes Road in New Brunswick. The Project is anticipated to alter river water levels in the impoundment area and provide fish species unimpeded upstream access to approximately 16 km of river habitat.

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Énergie NB Power

MILLTOWN GENERATING STATION DECOMMISSIONING PROJECT

ENVIRONMENTAL IMPACT ASSESSMENT REGISTRATION

LOCAL ASSESSMENT AREA (LAA) FOR TRADITIONAL LAND AND RESOURCE USE

FIGURE 5.11.1

- Project Location
- Canada-USA Border
- Local Assessment Area: Tradtional and Resource Use

500 250 0 500 Metres

SCALE 1:30,000

N W E S

MAP DRAWING INFORMATION:
SERVICE LAYER CREDITS: ESRI, HERE, GARMIN, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), SWISS TOPO, OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY (2015)
DATA PROVIDED BY: DILLON CONSULTING LIMITED, NB DEPARTMENT OF NATURAL RESOURCES, INTERNATIONAL BOUNDARY COMMISSION

MAP CREATED BY: SCM
MAP CHECKED BY: JAB
MAP PROJECTION: NAD_1983 CSRS New Brunswick Stereographic

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PROJECT: 19-1594

DATE: 2020-01-30

5.11.2 Existing Conditions

Historically, the lands of southwestern New Brunswick have been used by Indigenous communities and people for traditional land and resource uses such as hunting, fishing, gathering (i.e., for food or medicinal uses), trapping, subsistence, and related purposes (Goddard 1996). The Wabanaki Confederacy was an alliance between the Atlantic region's Indigenous nations, namely the Mi'kmaq, Wolastoqey (Maliseet), Peskotomuhkati (Passamaquoddy), and Penobscot Nations, which facilitated a peace treaty with the Mohawk Nations further to the west (GNB 2020b; PNS 2020a). Although the Wabanaki Confederacy Nations were largely nomadic people, their movements were largely focused around waterbodies.

The St. Croix River, including the tributaries that combine with it to discharge into the Passamaquoddy estuary, then into the Passamaquoddy Bay and eventually into the Bay of Fundy, is a significant water feature in the region. The dam at the Milltown Station, which spans the St. Croix River, is situated on top of a natural waterfall, Salmon Falls. The St. Croix River is recognized to hold significant value for Indigenous people due to its recreational and natural heritage use over thousands of years (CHRS 2017).

The Indigenous peoples of the Wabanaki Confederacy would have used different areas of the PDA and LAA for traditional purposes at different times of the year. The area around St. Stephen, New Brunswick and Calais, Maine, including Salmon Falls, was called "Siqoniw Utenehsis" meaning "springtime village" or "Passamaquoddy village"; an 1874 map depicts the presence of an ancestral Passamaquoddy tribal village at Milltown/Calais, as shown in **Figure 5.11.2** (PPTG 2000). The Salmon Falls area would have been an ideal location because of the falls, and the ease of fishing in the river and estuary usually in the late spring and summer (CRM Group 2020; PNS 2020b). Similarly, watercourses, such as the St. Croix River, would have been used extensively for travel and movement by Indigenous communities.

There is significant archaeological evidence to support the use of Indigenous traditional land and resources use in the PDA and LAA. There are eight registered Precontact and one post-contact archaeological sites within 10 km of the Project site, with one Precontact site within or in close proximity to the PDA (also see **Section 5.10**). The registered archaeological site in the PDA includes a multi-focal campsite, shell midden, with archaeological objects dated to the Middle Woodland Period, 2200-1050 years before present (BP) (CRM Group 2020). The number of Precontact archeological sites, combined with the inferred use at the sites, indicate the frequent use of the area by Indigenous people for settlement, hunting, fishing, and gathering in the river and estuary and the lands that surround them.

Following first contact with Europeans Sieur des Monts and Samuel de Champlain in 1604, and in the settlement years that followed, Indigenous communities continued to utilize the area for traditional land and resource use, and those traditional uses continue to be practiced to this day (although to a much lesser extent than historically due to modern societal advancements and amenities). The first permanent French settlements in the area began in the late 1600s, and in the early 1700s the area was the site of a British raid. The British account of this raid described the raiding party as being spotted by two Indigenous men building a fish weir in the St. Croix River estuary area. The British soldiers pursued

Figure 5.11.2: Historical Map of St. Stephen-Calais at Salmon Falls Showing the Location an Ancestral Tribal Village, Circa 1874 (Source: PPTG 2020)

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the two men and followed the St. Croix River up to the village at the "falls" and exchanged gunfire with the Indigenous community who had retreated the far side of the river. The British recounted that they pillaged the Indigenous village for food and other goods. These Indigenous community continued to utilize the area as a settlement, fishing, hunting, gathering, and for agricultural purposes until the early 1800s. It was at this time that the land was formally allocated to the Parish of St. Stephen and the Indigenous population was moved to reservations in Maine (CRM Group 2020).

Today, there are 15 officially recognized First Nations communities within the province of New Brunswick (**Figure 5.11.3**). They consist of six Wolastoqey Nation communities and nine Mi'kmaq Nation communities. Wolastoqey communities and their traditional territory are generally located along the Saint John River valley, while the Mi'kmaq communities are predominantly located along the northern and eastern coastal regions of the province. Today, there are no formally recognized Peskotomuhkati communities in New Brunswick, but the Peskotomuhkati Nation has begun the process of seeking this recognition with the Government of Canada (PNS 2020a). Though the Project is generally thought to be located in Peskotomuhkati traditional territory, First Nations peoples migrated through the entirety of the lands in New Brunswick for millennia and as such, it is possible that the Penobscot, Wolastoqey, Mi'kmaq Nations and peoples might have also used the lands and resources of southwestern New Brunswick. As shown in **Figure 5.11.3**, according to secondary literature, Wolastoqey traditional territory is generally understood to be comprised of the greater Saint John River watershed as far north as the Gulf of St. Lawrence to Québec City, east through the state of Maine where it meets the Passamaquoddy territory, south to the Bay of Fundy, and west where it meets the neighboring Mi'kmaq nations whose traditional territory in New Brunswick generally extends from the coastlines in the north, east, and southeast of the province and extending inland (Goddard 1996). This interpretation of the traditional territories of New Brunswick originates from the "Ganong line" proposed by W.F. Ganong (a botanist, historian, and cartographer) in 1901. However, this line is not widely accepted by First Nations as an accurate description of First Nations territory in New Brunswick. While it has been common practice for these principles to be applied in understanding the traditional territories of the First Nations of New Brunswick, the Wolastoqey and Mi'kmaq peoples have asserted that all of New Brunswick makes up part of their traditional territories.

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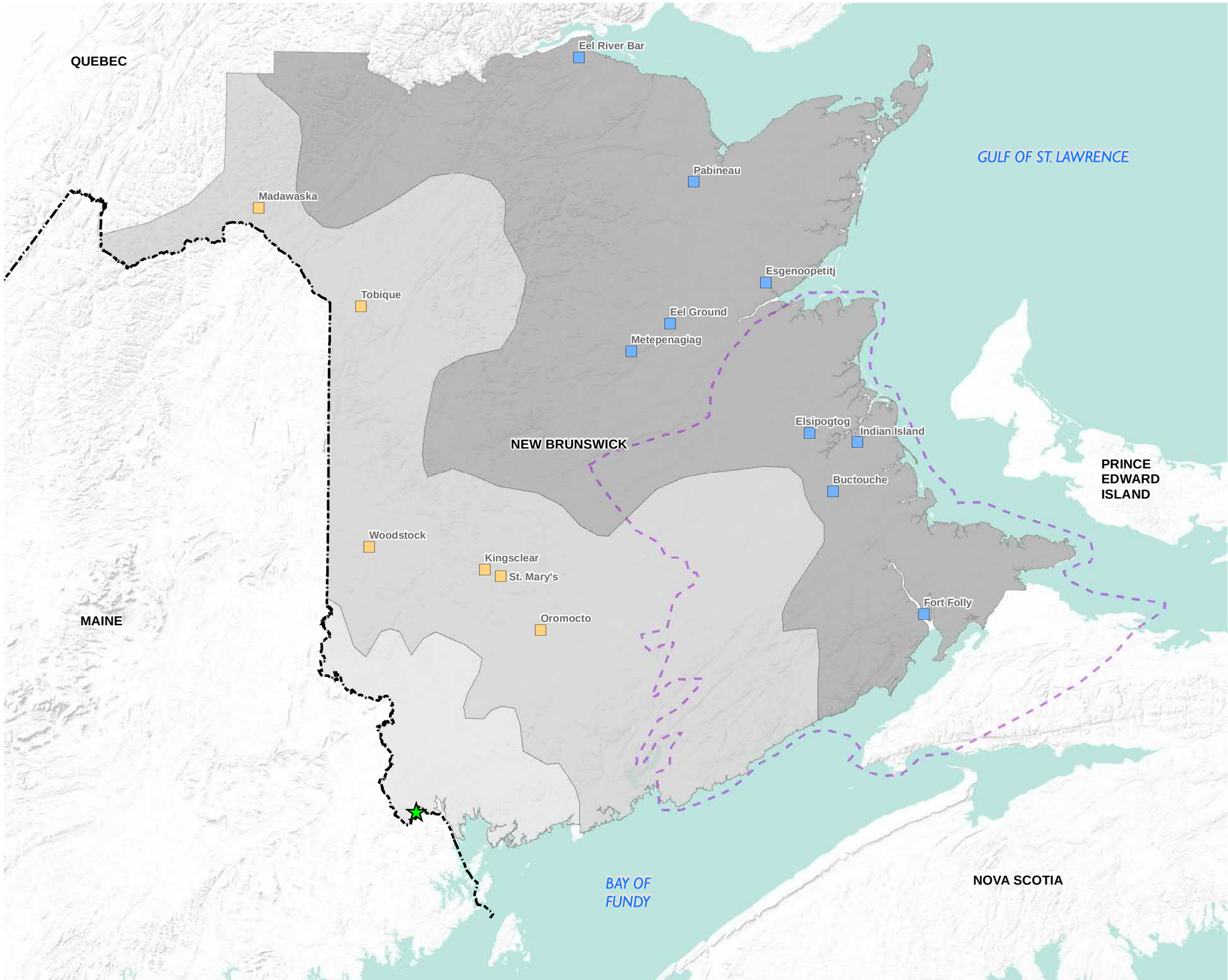

Énergie NB Power

MILLTOWN GENERATING STATION DECOMMISSIONING PROJECT

ENVIRONMENTAL IMPACT ASSESSMENT REGISTRATION

FIRST NATION COMMUNITIES IN NEW BRUNSWICK IN RELATION TO THE MILLTOWN PROJECT

FIGURE 5.11.3

- Project Location
- Canada-USA Border
- Maliseet (Wolastoqey)
- Mi'kmaq
- Elsipogtog Title Claim
- Passamaquoddy
- Maliseet
- Mikmaq

20 10 0 20 Kilometres

SCALE 1:1,550,000

MAP DRAWING INFORMATION:
SERVICE LAYER CREDITS: ESRI, USGS, NOAA
DATA PROVIDED BY: DILLON CONSULTING LIMITED, NB DEPARTMENT OF NATURAL RESOURCES, NB DEPARTMENT OF ABORIGINAL AFFAIRS, INTERNATIONAL BOUNDARY COMMISSION

MAP CREATED BY: SCM
MAP CHECKED BY: JAB
MAP PROJECTION: NAD_1983 CSRS New Brunswick Stereographic

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PROJECT: 19-1594

DATE: 2020-02-26

Despite the PDA and LAA being largely occupied today by residential, commercial, industrial, and agricultural development, parts of these areas are likely still used by Indigenous people for traditional practices such as hunting, fishing, ceremonial, and gathering purposes. Within the PDA, hunting is not permitted or feasible given the urban density surrounding the site, but fishing, ceremony, and gathering could take place (except in fenced in areas of the Station, for which access is prohibited for safety and security purposes). It is more likely that hunting, fishing, ceremony, and gathering would also take place within other more natural areas of the larger LAA and beyond, as these areas are more forested with less human-made development.

A traditional land and resource use (TLRU) study has not been completed for the Project; furthermore, specific and documented details on how and where traditional activities have been or are taking place may exist, but they are normally held confidential by First Nations. This knowledge is both valuable and private to the rights holders (land users), and as such there is an expectation that this knowledge should not be freely available for the purposes of development of traditional territories. As such, information presented within this section has been collected from reliable secondary sources and will be confirmed with First Nation knowledge over the coming months, should the Nations decide to do so. However, data collected for other field disciplines (e.g., wildlife and wildlife habitats, vegetation and wetlands, fish and fish habitat, and heritage resources) will also be used to inform the availability of land and resources that could be used for traditional purposes within the LAA and PDA.

First Nation Community Context

New Brunswick's First Nations assert Aboriginal and treaty rights under Section 35(1) of the *Constitution Act, 1982*. The Supreme Court of Canada has held in several important decisions that the Crown (federal and provincial) has a duty to consult with potentially affected First Nations in respect of decisions made by the Crown that might affect these constitutionally-protected Aboriginal or treaty rights, including those that might relate to their current use of the land and resources for traditional purposes. The Province of New Brunswick has a duty to consult policy which is administered by the New Brunswick Department of Aboriginal Affairs (GNB 2011). NB Power, as a Crown corporation of the Province of New Brunswick, has been delegated the duty to consult of the Province of New Brunswick for the purpose of this Project.

Population Demographics

The 2016 Census (Statistics Canada 2017) identified approximately 4% of the New Brunswick population self-identified as having an Indigenous or Aboriginal identity, or the equivalent of 29,385 persons. The total population of registered status First Nation band members in New Brunswick was 16,509 with a total of 9,677 residing on-reserve, as reported by Indigenous and Northern Affairs Canada (INAC 2020 and **Table 5.11.1**). It is important to note that the Peskotomuhkati and the Penobscot Nations do not have formal recognition in Canada under the *Indian Act, 1985* and currently have no registered First Nation reserves, or membership, in Canada. Consequently, there is no official information on the registered on or off-reserve populations of these latter Nations and are thus not included in **Table 5.11.1**.

Table 5.11.1:New Brunswick First Nation Total Registered Population and Registered Population On-reserve

First Nation Community	2019 Registered Population	2019 On-reserve Population
Wolastoqey (Maliseet) First Nations in New Brunswick		
Oromocto First Nation	743	329
St. Mary's First Nation	1,961	878
Kingsclear First Nation	1,053	742
Woodstock First Nation	1,122	296
Tobique First Nation	2,544	1,583
Madawaska Maliseet First Nation	374	154
Wolastoqey First Nations Sub-total	**7,797**	**3,982**
Mi'kmaq First Nations in New Brunswick		
Eel River Bar First Nation	766	346
Pabineau First Nation	326	104
Esgenoopetitj First Nation	1,940	1,342
Metepenagiag First Nation	696	442
Eel Ground First Nation	1,068	584
Indian Island First Nation	206	110
Elsipogtog First Nation	3,451	2,649
Buctouche First Nation	126	83
Fort Folly First Nation	133	35
Mi'kmaq First Nations Sub-total	**8,712**	**5,695**
Total First Nation Population in New Brunswick (2016)	**16,509**	**9,677**

Source: INAC (2020)

There are currently no registered First Nation reserves located within or immediately near the PDA or LAA. The closest recognized First Nation reserve to the Project is the Kingsclear First Nation reserve, which is located approximately 95 km (straight-line distance) to the northeast of the PDA. In addition, there is an additional reserve – The Brothers #18 – which consists of three small islands located within the Kennebecasis Bay, 4 km north of the City of Saint John and approximately 95 km (straight-line distance) east of the PDA. The Brothers #18 Reserve is a reserve jointly managed by Kingsclear, Madawaska, Tobique, and Woodstock First Nations. The Brothers #18 Reserve is a traditional gathering place, but contains no permanent residences.

There is a local Peskotomuhkati community group in the local area, and this group is currently seeking official recognition as a First Nation in Canada.

5.11.3 Assessment of Potential Interactions between the Project and Traditional Land and Resource Use

The assessment of potential interaction between the Project and traditional land and resource use by Indigenous persons within the PDA and LAA is provided in this section.

5.11.3.1 Potential Interactions

In general, potential interactions between the Project and traditional land and resource use are associated with any Project activity that could result in change in the amount of land or water that would be available to Indigenous persons for practicing traditional activities, or Project activities that would restrict access to an area or limit an area's use for traditional practices. Project activities associated with decommissioning, demolition, removal, and river improvement may affect traditional land and resource use in the following ways.

- Access to the PDA will be temporarily restricted during Project activities. Currently, and during the Project, access to the Project site is and will be restricted and controlled for safety and security purposes to prevent injury to individuals while Project activities are taking place. This restriction is anticipated to only be in place for the PDA, while the remaining LAA is anticipated to be available for use throughout the Project. The access restrictions to the PDA will continue until all Project activities have been completed and the final site improvement activities have been completed, at which time a determination will be made to ensure it is safe to reopen the Project site.
- Site preparation within the PDA will be prepared with a laydown area, and a temporary cofferdam/road. The laydown area will be covered with suitable non-native gravel to protect the integrity of underlying soils of the PDA, potentially affecting plants and wildlife that may have been used for food, medicinal, ceremonial use, or other traditional purpose. The construction of the cofferdam/temporary road will similarly cover a portion of the river bed such that some limited fish habitat will be altered on a temporary basis. Outside the PDA, it is not expected that these Project activities will interact or affect plant or wildlife use for traditional purposes. It is expected that these disturbed areas will be reseeded or vegetated as part of site improvement and will naturally be repopulated over time, once the Project is completed.
- Once the removal of the instream portions of the Milltown dam and associated infrastructure is completed, additional access for fish species will be provided to access approximately 16 km of upstream river habitat in the St. Croix River which, in turn, may provide additional opportunities for traditional land and resource use by Indigenous communities in the future.

5.11.3.2 Mitigation

It is important to note that traditional land and resource use is also connected to other VCs. The discussion of the potential interactions between the Project and other VCs (i.e. **Section 5.5** surface water; **Section 5.6** fish and fish habitat; **Section 5.7** vegetation and wetlands; **Section 5.8** wildlife and

wildlife habitat; and, **Section 5.10** heritage resources) and their associated mitigation measures are applicable to this section. In addition, the following mitigation measures will be employed to avoid or reduce the potential environmental effects of the Project on traditional land and resource use within the PDA and LAA:

- Minimize the size of the PDA to that which is necessary to accomplish the Project objectives while minimizing environmental disturbance to the extent possible.
- Maintain natural vegetation along wetlands and watercourses, as well as along the property boundaries, to minimize effects on natural resources and to provide a buffer for reducing effects of the Project that could cause sensory disturbance to wildlife (i.e., noise, dust).
- Conduct ongoing consultation and engagement of First Nations throughout the Project to exchange information and address question, concerns, and emerging issues during the Project.
- Carry out a TLRU study to determine historical and current traditional uses within the LAA and larger St. Croix River watershed, if so desired by Indigenous communities.
- If requested, and if the Project schedule allows, Indigenous communities or individuals will be provided the opportunity to harvest and gather species of importance to traditional activities within the PDA prior to the commencement of Project activities. If possible, given the Project schedule, these harvesting and gathering opportunities should be timed to coincide with the seasonality of the species of interest.
- Engage Indigenous monitors and Indigenous archaeological technicians during the archaeological surveys and to monitor Project activities associated with other VCs, if so desired by Indigenous communities.
- Avoid known archaeological sites identified during archaeological impact assessment, and follow the procedure if archaeological objects are accidently encountered as well as contacting and updating First Nations as well.
- Fish and fish habitat will be monitored during the Project to ensure that water flows are appropriate to allow fish passage and to mitigate bank erosion.
- Any fish rescue will require by a qualified biologist prior to initiating demolition activities and fish will be removed and relocated as per DFO guidance and consultation.
- Wildlife and wildlife habitats within the PDA will be re-vegetated upon site improvement, which will partially restore habitat conditions in the PDA, over time.

5.11.3.3 Characterization of Potential Interactions Following Mitigation

While the majority of interactions between the Project and traditional land and resource use can be considered temporary and can be mitigated effectively, there are some interactions that will not be mitigated. The majority of these temporary interactions will be confined to the PDA, and are associated with the decommissioning, demolition, removal, and site and shoreline improvement activities for the Project. However, a residual positive interaction between the Project and traditional land and resource

use will result from the return of the river to a more natural (pre-Milltown dam) condition that will allow traditionally important fish species (e.g., Atlantic salmon and American eel) access to more critical upstream habitat. This, in turn, could provide additional opportunities for Indigenous communities to practice traditional activities (i.e., fishing, gathering, or ceremony) in the PDA and LAA and in the upstream reaches of the St. Croix River.

Ground and water disturbance during Project activities will result in a temporary localized loss of vegetation and potential displacement of species (i.e., wildlife or fish) used for traditional purposes due to altered habitats or sensory disturbance. This site and shoreline will be restored to ensure soil and shoreline stability after the completion of the Project, as well as reseeding or re-vegetating these areas as part of site improvement. Additional natural vegetation is anticipated to regrow naturally and other species are anticipated to return to these areas, over time. It is important to note that important diadromous fish species will also have unrestricted access to areas upstream areas of the LAA (up to the next human-made barrier) once the Project is complete. This may provide additional traditional land and resource use opportunities for Indigenous communities and individuals in the future.

A residual interaction between the Project and traditional land and resource use is expected from the change associated with upstream water levels and flows immediately upstream of the PDA. Water levels in the area of the current impoundment extending 450-500 m upstream of the dam are expected to return to a more natural (pre-Milltown dam) state, and remain in this state indefinitely. While this will slightly reduce the available habitat for fish in the immediate area (due to a reduction in wetted perimeter where the impoundment currently extends), this loss is more than counterbalanced by the unimpeded additional access to approximately of 16 km of stream habitat for migrating fish species such as Atlantic salmon and gaspereau.

It is anticipated that ongoing consultation and engagement with the Indigenous communities will continue throughout the Project. An Indigenous monitor position will be created by NB Power to monitor Project activities and provide communication and Project updates. Where practical, Indigenous communities and individuals will be provided with the opportunity to harvest and gather species before the Project activities commence. This consultation and engagement will also provide opportunities for these indigenous groups to share information, ask questions, and discuss concerns about unanticipated interactions between the Project and traditional land and resource use. This would also provide additional opportunities for Indigenous participation in monitoring activities as well as the development of management and reclamation plans at the Project site or to support additional site improvement activities at the site.

5.11.4 Summary

The Project is not anticipated to result in a permanent loss of access by Indigenous communities to practice traditional land and resource use activities in the PDA or LAA. In fact, the Project will restore access to the portions of the Project site that are currently fenced off for safety and security purposes, and additional fish habitat will be made available upstream of the Station by the removal of this human-made barrier that will, in turn, provide greater opportunities for practicing traditional activities

upstream as fish productivity improves. The removal of the Milltown dam and its associated infrastructure is expected to permanently lower water levels and flow rates of the St. Croix River in the vicinity of the PDA, particularly in the impoundment area. While this will slightly reduce the amount of overall habitat for fish by the loss of some wetted perimeter in the impoundment area, it will, importantly, increase access to quality stream habitat for important fish species in the St. Croix River.

On land, the Project is anticipated to reduce access to the PDA during Project activities, which will limit fishing, ceremony, or gathering activities near the PDA (but not likely much of the LAA) until all Project activities have been completed. However, this restriction is anticipated to be temporary and only required until Project activities have been completed. There are no expected restrictions to traditional land or resource use in the remaining portions of the LAA during Project activities.

In light of the above, and in consideration of the Project planning and mitigation to be employed to reduce or minimize environmental impacts, the potential interactions between the Project and traditional land and resource use are not expected to be substantive.

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6.0 Effects of the Environment on the Project

The effects of the environment on the Project are discussed in this section.

6.1 Scope of VC

Effects of the environment on the Project are those effects related to risks of natural hazards and influences of the natural environment that might affect the normal conduct of the Project or cause damage to infrastructure as part of it. Potential effects of the environment on any project are a function of project or infrastructure design in the context of its receiving environment, and ultimately how the project is affected by the natural environment. These effects may arise from physical conditions, land forms, and site characteristics or other attributes of the environment which may act on the project such that the project components, schedule, and/or costs could be substantively and adversely changed.

Based on the nature of the undertaking, the following environmental attributes have been selected for consideration in this assessment:

- climate and climate change;
- severe weather events, including wind, precipitation, floods, hail, electrical storms, and tornadoes;
- acid rock drainage;
- seismic activity; and
- forest fires resulting from causes other than the Project.

6.2 Existing Conditions

6.2.1 Climate and Climate Change

Climate is defined as the statistical averages of precipitation, temperature, humidity, sunshine, wind velocity, and other phenomena such as fog, frost and hail storms for a particular region and time period, generally taken over a 30 year period (NASA 2017). Climate change is an acknowledged change in climate that has been documented over two or more 30 year periods. According to the Intergovernmental Panel on Climate Change (IPCC), climate change may be due to natural internal processes or external forces, or to persistent anthropogenic changes in the composition of the atmosphere or in land use (IPCC 2014). The United Nations Framework Convention on Climate Change (UNFCCC) makes a distinction between climate change attributed to human activities and climate variability attributable to natural causes, by defining climate change as a change of climate directly or indirectly attributed to human activity that alters the composition of the global atmosphere, and which is in addition to natural climate variability observed over comparable time periods (IPCC 2014).

The definition of climate change dictates the context in which the effects of those changes are discussed. While it is appropriate to examine the effects of projected climate change on projects with long anticipated life spans, it may not always be fitting to consider the effects of climate change projections on projects which will only take place over a relatively short period of time (e.g., weeks, months, or a few years), and to be initiated in the near future. In the case of this Project, with an anticipated lifespan of only 10 to 16 months, rather than considering the effects of long-term climate change on the Project, it is more appropriate to consider the effects of recent climatological conditions, especially the potential adverse effects of weather variability and weather extremes (e.g., change in precipitation).

The technical boundaries for the establishment of climate conditions include the spatial coverage of weather stations across New Brunswick, the number of parameters monitored at each station, and the temporal coverage of data collection at each station. Technical boundaries for the prediction of effects of climate change relate to the inherent uncertainty of global climate models in predicting future changes in climate parameters, and specifically their application of global-scale prediction algorithms to a relatively localized scale through “downscaling”. Global climate models can provide relatively useful information for predicting and preparing for global and macro-level changes in climate, but their ability to pinpoint location-specific changes to climate on a localized level is limited.

6.2.1.1 Climate Normals

Current climate conditions are generally described by the most recent 30 year period for which Environment and Climate Change Canada has developed statistical summaries. These summaries are typically referred to as “climate normals”. The closest weather station to the Project with available historical data is the Pennfield weather station, located approximately 50 km (straight-line distance) east of the PDA. The Pennfield weather station provides historical data for temperature and precipitation, amongst a limited number of other variables, but does not provide historical data for wind. The nearest available wind data is from the Saint John A weather station, located approximately 110 km (straight-line distance) east of the PDA. The most recent 30-year period for which climate normals data are available from both the Pennfield and Saint John (A) weather stations is for the period of 1981 to 2010. This period has been chosen as the most applicable period for summarizing current climate conditions for the Project (GOC 2020b).

Monthly mean wind speeds measured at the Saint John (A) weather station range from 11.3 km/h to 17.5 km/h, with an annual mean wind speed of 15.2 km/h. From May to August, the dominant wind direction is from the south, with winds predominantly blowing from the southwest and northwest from September to February (GOC 2020b). Maximum hourly wind speeds, averaged from 1981 to 2010 for each month, range from 61 km/h to 111 km/h, while maximum wind gusts for the same period range from 96 km/h to 148 km/h. Occurrences of extreme winds are relatively uncommon at the reference weather station. From 1981 to 2010, there has been an average of 17.3 days per year with winds greater than or equal to 52 km/h, and 3.8 days per year with winds greater than or equal to 63 km/h (GOC 2020b).

Temperature at the Project site is influenced and moderated by the region's relative location to the Bay of Fundy. On average, temperatures are lowest in the winter and early spring, and highest during the summer months. Daily averages range from a low of -7.1°C in January to a high of 15.6°C in both July and August. The recorded extreme maximum in the region was 37.2°C in May 1977 and the extreme minimum was -36.5°C, recorded in January 1982. Precipitation at the Project site, on average, is highest from the middle of fall to late winter. Based on precipitation data from the Pennfield station, from 1981 to 2010, the region has received an average of 1,429.7 mm of precipitation per year, of which 1,237.7 mm was rain and 192.0 mm was snowfall (as water equivalent). Extreme daily precipitation in the past century has ranged from 60.0 mm (May 1990) to 111.0 mm (August 1981). On average, there have been 11.7 days each year with rainfall greater than 25 mm, and snowfalls greater than 25 cm occur on average 0.63 days each year (GOC 2020a).

6.2.1.2 Severe Weather Events

Extreme precipitation and storms can occur in New Brunswick throughout the year but tend to be more common and severe during the winter. Winter storms generally bring high winds and a combination of snow and rain, especially in low lying areas near the Bay of Fundy.

Extreme rainfall events occur when 50 mm or more rain falls over a 24-hour period. Environment Canada issues a rainfall warning when this is forecast to occur. In the 2000s, Fredericton and Moncton had more extreme rainfall events than any other decade on record, while Saint John had the highest number of events during the 1960s. The trends were different in all three communities. Recently, extreme storm events in December 2010 affected much of New Brunswick, where some areas, including St. Stephen received as much as 200 mm of rain. In July 2013, St. Stephen also experienced considerable localized flooding following 165 mm of rainfall during a short period (GOC 2020a). These types of events threatened public safety and transportation systems, and damages were estimated to be approximately $50 million (NBDELG 2019).

In New Brunswick, river valleys and flood plains can pose a risk because of ice jams, harsh weather and the floods of annual spring thaw. Flooding in New Brunswick is rather common, especially along the Saint John River (ECCC 2017). The St. Croix River watershed, as noted in **Section 5.4.3**, is also subject to spring freshet flood events due to snow melt and, to a lesser extent, increased flows due to intense rainfall.

Electrical storms, or thunderstorms, which are more frequent in New Brunswick than the rest of Atlantic Canada, occur on average 10 to 20 times a year (NAV Canada 2001). Generally, only one of these storms (per year) is extreme enough to produce hail. Thunderstorms can produce extremes of rain, wind, hail and lightning; however, most of these storms are relatively short-lived.

Tornadoes are rare in New Brunswick, but can occur. According to Environment and Climate Change Canada, western New Brunswick is considered part of Canada's Tornado zone, a region that stretches from the B.C.-Alberta border to the western portion of New Brunswick. The Project site is located within this area. However, no tornadoes have been documented at or near the PDA.

6.2.2 Acid Rock Drainage

Some bedrock contains minerals that can generate acid rock. Acid rock drainage (ARD) and metal leaching (ML) occur when sulphide minerals react with oxygen, ferric iron, and water to produce sulphuric acid (i.e., the exposure of sulphide-rich rocks in oxidizing environments). The acidic runoff can mobilize metals, including heavy metals, such as iron, arsenic, manganese, and copper from the surrounding bedrock, releasing them into aquatic environments. Similarly, ARD can develop from exposed surficial material and soils containing weathered sulphide-bearing bedrock.

While exposing and physically disturbing sulphide-bearing rocks is most often a concern encountered during activities such as mining, any exposure or physical disturbance causing ARD can negatively impact the environment, human health and infrastructure. Characterized by pH levels as low as 3.0, ARD can be harmful for aquatic habitats (e.g., causing fish kills), and has the potential to contaminate drinking water supplies with increased concentrations of toxic and carcinogenic heavy metals. Over time, the acidity also has the potential to corrode and degrade metal water mains, metal culverts and pipes further leaching lead, copper and zinc into water bodies. The bedrock geology in the localized PDA is known to be gabbro (major rock type), which is a sulphur-bearing rock.

6.2.3 Seismicity

Seismic activity is dictated by the local geology of an area and the movement of tectonic plates comprising the Earth's crust. Natural Resources Canada monitors seismic activity throughout Canada and identifies areas of known seismic activity in order to document, record, and prepare for seismic events that may occur. The Project area is located in the Northern Appalachians Seismic Zone, which includes most of New Brunswick and extends into central and western Nova Scotia, as well as the northeastern United States, as far south as Boston, Massachusetts. Historical seismic data recorded throughout this zone has identified clusters of earthquake activity. However, in general, historical seismic activity is considered low (Natural Resources Canada 2020a). Earthquakes in New Brunswick generally cluster in three regions: the Central Highlands (near the Miramichi) region, the Moncton region, and the Passamaquoddy Bay region (within which the Project is located).

The largest recorded earthquake ever recorded in New Brunswick was a magnitude of 5.7 (on the Richter scale) event on January 9, 1982, located in the north-central Miramichi Highlands. Aftershocks following this earthquake reached a magnitude of 5.1 and 5.4. Between 1855 and 1937, other moderate earthquakes in these three regions ranged from 4.5 to 6.0 (Basham and Adams 1984). There are records of one magnitude 5.0 earthquake in the Passamaquoddy Bay region, as well as three magnitude 4.0 earthquakes. The maximum credible earthquake magnitude for the Northern Appalachians Seismic Zone is estimated to be magnitude 7.0, based on historical earthquake data and regional tectonics (Adams and Halchuk 2003). It is noted that there is potential for large earthquakes of up to an estimated magnitude 7.5 along fault zones in the St. Lawrence River region. However, any such events in this region would be close to 500 km from the Project site, and therefore the amplitude of ground motions at the Project site would be low due to attenuation over a large distance.

In summary, a review of historical earthquake records and regional tectonics indicates that the Project area is situated in a region of moderate seismicity.

6.2.4 Forest Fires

The Fire Weather Index is a component of the Canadian Forest Fire Weather Index System. The index provides a numeric rating of fire intensity, and is the general index of fire danger throughout the forested areas of Canada (Natural Resources Canada 2020b).

The mean Fire Weather Index in St. Stephen, New Brunswick for July (i.e., normally the driest month of the year), when risk of forest fire is typically greatest, is rated from 0-5, as shown in **Figure 6.1.1**, which is the lowest rating on the scale of possible fire risk. This risk is based on Fire Weather Normals data, representing the average value of a fire weather code or index over the 30-year period from 1981 to 2010 (Natural Resources Canada 2020b).

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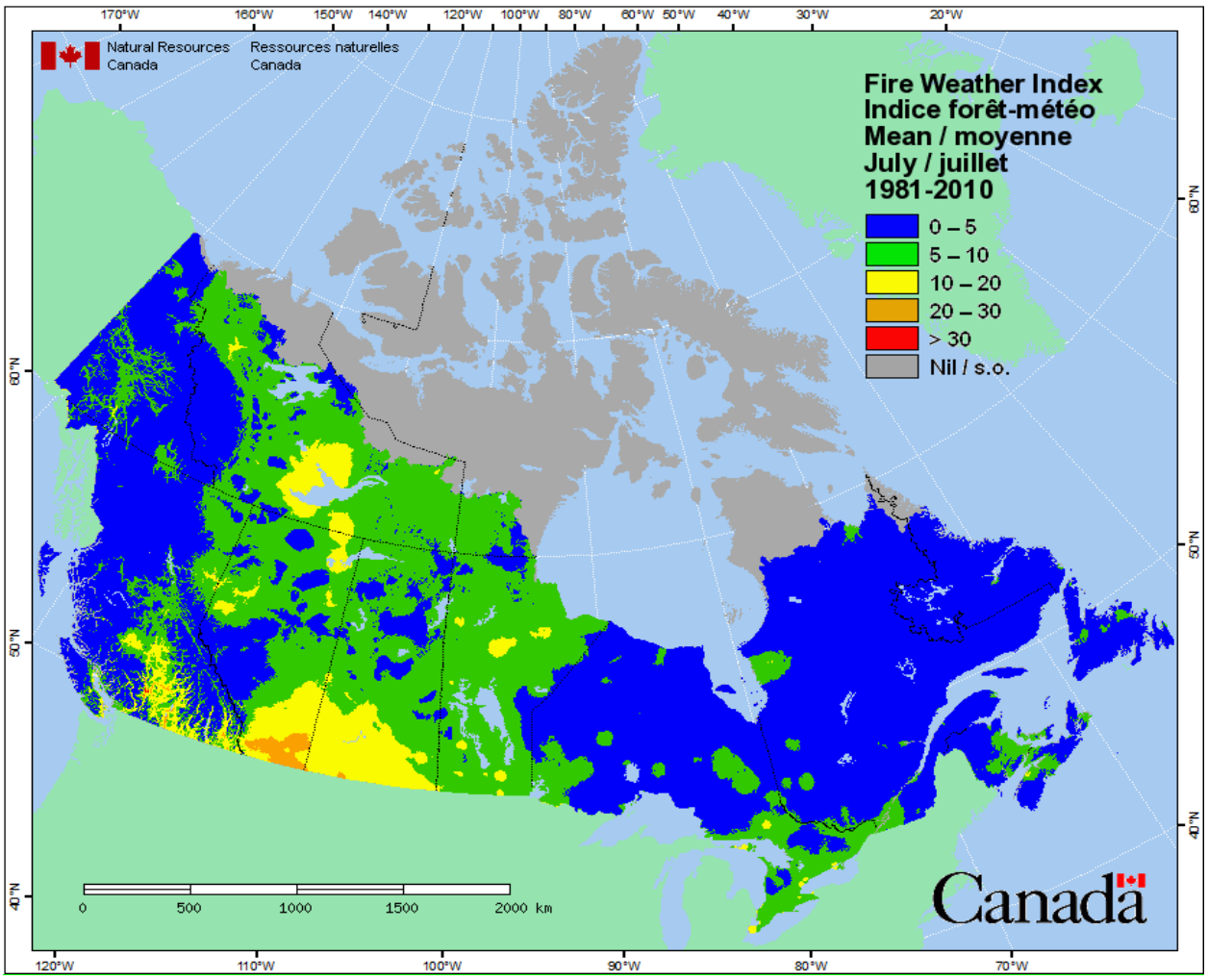

Figure 6.1.1: Natural Resources Canada Fire Weather Index

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6.3 Assessment of Potential Interactions between the Environment and the Project

As a factor of safety, and a matter of responsible engineering practice, the design and materials to be chosen for the Project will be selected so that the Project will withstand environmental stressors that could occur from various natural and environmental phenomena (e.g., extreme storms, flood events, acid rock drainage). The EIA has been carried out in parallel to decommissioning design, and the results of the EIA have informed the design of the Project such that any potential concerns are addressed and the potential for significant adverse effects of the environment on the Project are minimized.

6.3.1 Potential Interactions

6.3.1.1 Effects of Climate and Extreme Weather on the Project

To assess the environmental effects of climate on the Project, current climate must be considered. Current climate conditions have been established by compiling relevant historical data and establishing a climatological background for the St. Stephen area. Since the Project has an anticipated lifespan of only 10 to 16 months, it is most appropriate to consider the effects of recent climatological conditions, especially the potential adverse effects of weather variability and weather extremes (e.g., change in precipitation), rather than considering longer term climate change projections in project planning.

Recent climate trends (1981-2010 averages and extremes) have been assessed to determine the likelihood of, and effect of severe and extreme weather events on the Project so that they may be accounted for in both the detailed engineering design, as well as timelines of demolishing the Project components. The most relevant climate changes that could potentially have effects on the Project include:

- increased frequency and magnitude of heavy precipitation events; and
- increased frequency of extreme storms accompanied by heavy and/or freezing precipitation, thunderstorms, and strong winds; and increased incidence of flooding and erosion.

Each of these effects must be considered in terms of how they may adversely affect the Project if they are not planned, engineered, and designed to account for such effects. The environmental attributes described have the potential to affect the Project in several ways, including but not limited to:

- delays in carrying out decommissioning activities as a result of severe weather;
- a reduction in visibility and an inability to manoeuver heavy equipment;
- changes to the ability of workers to access the work site; and
- damage to heavy equipment and site infrastructure.

Extreme snowfall can also affect winter Project activities by causing a delays in the movement of materials in and out of the PDA, and resulting in additional effort for snow clearing and removal. This additional effort, however, would not substantially change the Project schedule. Extreme snowfall contributing to unusual flooding during snowmelt and extreme rainfall events could also potentially lead to flooding and erosion. It is noted in **Section 5.5.3**, that the upstream reach of the St. Croix River

may be prone to increased erosion due to higher flow velocities as a result of the Project. However, flood risk vulnerability both upstream and downstream of the dam is not expected to be impacted by dam removal; in fact, the removal of the water retaining structures at this location may well reduce the potential for upstream flooding. Heavy rain, snowfall and/or freezing rain events could also cause an interruption to services, such as communications or electricity.

During lightning storms, fault currents (defined as a current that is several times larger in magnitude than the current that normally flows) may result from a lightning strike and could result in danger to personnel and damage to infrastructure (e.g., powerhouse, control rooms, instrumentation). Lightning strikes could also result in power outages from damage to power lines.

Some effects, such as damage to infrastructure, can also result in consequential effects on the environment. These types of environmental effects are addressed as accidents, malfunctions, and unplanned events in **Section 7.0**.

6.3.1.2 Effect of Acid Rock Drainage on the Project

To assess the potential effects of acid rock drainage on the Project area, it is necessary to examine the nature of project activities and how they interact with potential sulphide bearing bedrock. Since the proposed project primarily involves decommissioning activities over a short term period (10 to 16 months), and no major excavation or blasting of bedrock materials is planned, it is not expected that bedrock will be exposed outside of the St. Croix River channel.

Based on the identified areas proposed for decommissioning, the underwater nature of most of this area during the majority of the year, and the short-term nature of the project, acid rock drainage is not likely to have any adverse effects on water quality or construction equipment during or after the completion of the decommissioning activities.

6.3.1.3 Effects of Seismic Activity on the Project

The Project area is geographically situated within an identified seismic zone where historical earthquake activity has been identified (within the Passamaquoddy Bay region). There are historical records of one magnitude 5.0 earthquake in the Passamaquoddy Bay region, as well as three magnitude 4.0 earthquakes. As previously discussed, the maximum credible earthquake magnitude for the Northern Appalachians Seismic Zone is estimated to be magnitude 7.0, based on historical earthquake data and regional tectonics (Adams and Halchuk 2003). It is noted that there is potential for large earthquakes of up to an estimated magnitude 7.5 along fault zones in the St. Lawrence River region. However, any such events in this region would be close to 500 km from the Project site, and therefore the amplitude of ground motions at the Project site would be low due to attenuation over a large distance.

Although the level of historical seismic activity near the PDA is considered to be moderate, past occurrence of seismic activity in an area is not necessarily an indicator that a significant seismic event could or could not occur in the near future. Based on the low frequency of recorded earthquakes in the region, and therefore low probability that a major seismic event would occur in the immediate vicinity

of the Project during the 10 to 16 month project period, major Project damage or interruption to activities due to earthquakes during any phase of the Project is considered to be low.

6.3.1.4 Effects of Forest Fires on the Project

The developed residential areas located to the west of the PDA, and the St. Croix River to the east provides a safety and fire buffer, decreasing the likelihood of a forest or brush fire causing substantive damage to the Project. In the unlikely event that a forest fire encroaches on the PDA, New Brunswick has a forest fire control program in place to identify and control fires, minimizing the potential magnitude and extent of any forest fire, and their potential consequential effects on the Project. Local and provincial emergency response crews will provide for rapid detection and response to any identified fire threat. This includes fires that could start within the Project site perimeter as well as fires approaching from outside the area (i.e., forest fires).

With respect to the effects of forest fires on the Project, the facility structures being decommissioned are constructed primarily of concrete, asphalt, metal and steel (e.g., powerhouse, dam, spillway), which are not typically affected by fire, and considering the fact that these structures will be demolished, the potential for forest fires affecting the infrastructure is not an important consideration for this EIA Registration. Petroleum products, explosives, and other flammable substances that may be required by contractors decommissioning the facility will be stored within secondary containment to reduce likelihood of flammability.

6.3.2 Mitigation

Mitigation strategies for minimizing the likelihood of a significant effect of the environment on the Project are inherent in: the planning process being conducted, the application of engineering design codes and standards, decommissioning practices, and monitoring. To address these environmental effects, proactive design, planning, and maintenance are required in consideration of the potential normal and extreme conditions that might be encountered throughout the life of the Project.

6.3.2.1 Mitigating Effects of Climate and Extreme Weather on the Project

- Disruption of Project activities and delays to the Project schedule will be avoided by scheduling tasks that require precise and/or timely movements (e.g., Salmon Falls restoration, fishway demolition) for periods when the weather conditions are favourable. A disruption allowance will be considered in Project and operational scheduling.
- Extreme precipitation events are an expected work condition and the Project schedule allows for weather conditions typical for the southwestern New Brunswick region. Site water management features and erosion and sediment control structures will be in place early in the Project to manage any potential increased site run-off from precipitation events that could occur.
- Erosion as a result of extreme precipitation and potential flooding is not anticipated to have a substantive adverse effect on the Project due to standard mitigation measures that will be

implemented (e.g., collection and management of site water, use of erosion and sedimentation control structures, construction methods that stabilize erodible soils as early as possible after ground has been disturbed). Following construction, exposed soils will be stabilized, roadways will use suitable gravel bases and sub-bases to prevent erosion, and exposed areas will be vegetated where possible to prevent surface erosion.

- Any temporary structures required for demolition (e.g., cofferdams, access road) will be designed such that they will be able to withstand extremes of temperature, wind, rain, snow, and ice events through the life of the Project. Structures will be designed to withstand these weather-related factors and loads.

As described above, environmental stressors potentially associated with severe weather would be more than adequately addressed by engineering design, and careful equipment and materials selection for decommissioning Project-related infrastructure.

6.3.2.2 Mitigating Effects of Acid Rock Drainage on the Project

Since the primary Project purpose is decommissioning the Station and its related facilities, there are no proposed activities planned that will involve exposing large areas of potential sulphide-bearing bedrock in either the short-term or long-term.

If unanticipated areas of sulphide-bearing bedrock are located during the decommissioning activities, activities that expose or break it up, such as blasting and excavating will be avoided and/or minimized. If disturbance is unavoidable, rocks and surficial materials with sulphide content equal or greater than 0.3 weight percent must be managed in accordance with provincial regulations. The primary approach to prevent and mitigate ARD and ML is to minimize the supply of the primary reactants for sulphide oxidation and/or maximize the availability of acid neutralizing minerals.

6.3.2.3 Mitigating Effects of Seismic Activity on the Project

Temporary infrastructure (e.g., construction offices) required to support Project activities will be designed to the applicable standard in consideration of the maximum credible earthquake magnitude for the region. Since the primary Project purpose is decommissioning the Station and its related facilities, there is no development of long-term or permanent infrastructure planned as part of the Project. Also, based on the nature of site improvement activities, it is not anticipated that they would be impacted by seismic activity. Therefore, seismicity is not considered to have the potential to substantively damage Project infrastructure or components during all phases of the Project, due to planned design mitigation, generally low seismicity of the area, and a general absence of permanent infrastructure at the site.

6.3.2.4 Mitigating Effects of Forest Fires on the Project

The Project and associated infrastructure, including the dam facility structures that will be decommissioned consist primarily of concrete, asphalt, metal and steel. These types of materials are not typically affected by fire since they are not flammable and since these facilities are slated for

decommissioning, the risk of forest fires is not a relevant consideration for this EIA Registration. Petroleum products, explosives, and highly flammable substances that may be required by contractors decommissioning the facility will be stored within secondary containment to reduce likelihood of flammability.

Through integrated and coordinated emergency response capabilities at the local and provincial levels, project personnel will mobilize away from the PDA if forest fires are affecting the local area, and will only return under clear and safe conditions, as determined by emergency response agencies in the province.

6.3.3 Characterization of Potential Interactions Following Mitigation

The potential effects of the environment on all Project phases will be considered in the planning and design of the Project and in the scheduling of Project activities to limit delays, prevent damage to infrastructure and the environment, and to maximize the safety of staff. Compliance with detailed design engineering completed for the Project will account for weather extremes, seismicity, and forest fire threats through built-in factors of safety to prevent undue damage to infrastructure from such events. Although it is possible, even likely, for the PDA to experience extreme environmental conditions during the Project lifecycle, a substantive delay (e.g., a delay for more than one season) is not anticipated.

Further, no substantial damages to Project infrastructure are anticipated as a result of natural environmental conditions due to the design and type of activities proposed. Therefore, the effects of the environment are not expected to adversely affect the Project in a manner that cannot be planned for or accommodated through design and other mitigation and adaptive management strategies. As a result, the effects of the environment on the Project are not expected to be substantive.

6.4 Summary

For the Project, short term (10 to 16 month decommissioning phase) and medium term (16 to 36 months site stabilization period), environmental management are inherent considerations in the best management practices of the design and associated Project risk management. Equipment and materials that are able to withstand severe weather and other influences will be used. Environmental stressors, such as those that could arise as a result of severe weather, seismic events, acid rock drainage or other factors (e.g., fires), would more than adequately be addressed by good engineering design, materials selection, best practices, and engineering foresight. The Project schedule will provide allowances so as to not adversely be affected by a potential delay caused by effects of the environment. While there is potential for natural forces to affect the Project, it is not likely to have a substantive effect due to planned mitigation and design.

Throughout the duration of the Project, NB Power will monitor changing information and implement adaptive management so that the effects of the environment on the Project will be mitigated if new situations develop.

7.0 Accidents, Malfunctions, and Unplanned Events

This section identifies the potential accidents, malfunctions, and unplanned events that could occur as part of the Project. The assessment focuses on events that are considered credible, based on the Project description and the experience of the EIA team in assessing similar projects.

7.1 Approach

The general approach to assessing the potential environmental interactions of the selected potential accident, malfunction, or unplanned event scenarios involves the following:

- describing the potential accident, malfunction, or unplanned event;
- considering if the potential accident, malfunction, or unplanned event could occur during the life of the Project, and during which activity(ies);
- determining with which valued component(s) (VCs) the potential accident, malfunction, or unplanned event may interact;
- describing the Project planning, safeguards, and mitigation established or proposed to minimize the potential for such occurrences to happen;
- considering of the contingency or emergency response procedures applicable to the event; and
- in consideration of the above, assessing the potential interactions of accidents, malfunctions, and unplanned events on related VCs following mitigation.

Spatial and temporal boundaries for considering residual environmental effects of potential accidents, malfunctions, and unplanned events that may arise as a result of the Project are the same as those for each VC to which they apply, presented in **Section 4.1** of this document.

7.2 Description of Potential Credible Accidents, Malfunctions, and Unplanned Events

Based on the nature of the Project, general knowledge of the environment within which the Project is located, as well as the experience of the Proponent and the EIA team, the following credible accidents, malfunctions, and unplanned events have been selected for this assessment, and are described in greater detail in the following sections:

Failure of Erosion and Sediment Control (ESC) Measures: Erosion and sedimentation control (ESC) measures prevent exposed soil from mobilizing and entering undisturbed areas as a result of rainfall or spring runoff. A failure of an ESC measure could result in mass wasting of soil or siltation of receiving watercourses (i.e., the St. Croix River).

Failure of a Cofferdam: Failure of a cofferdam structure is considered separately from erosion and sediment control measures because the cofferdams serve not only to isolate the work area from the river, but also as a work platform during the Project. Failure of a cofferdam could result in a sudden release of water into the work area and possibly that could cause siltation of the watercourse, fish injury or mortality, or pose a risk of injury to workers on site.

Vehicle Accident: A vehicle accident is possible at the Project site or while Project-related vehicles are in transit on provincial roads. A vehicle accident includes a collision with other vehicles, pedestrians, wildlife, or structures/objects, and potentially cause damage to property or pose a risk to the health and safety of workers, the public, or wildlife. A fire or fuel spill could also occur as a consequence of a vehicle collision, compounding the initial effects by potentially threatening surface water, groundwater, fish and fish habitat, wildlife and wildlife habitat, vegetation, and wetlands.

Accidental Release of a Hazardous Material: An accidental release of fuel used in vehicles or mobile equipment on-site may occur during refuelling of machinery or trucks as a result of human error or equipment malfunction, potentially affecting surface water, groundwater, fish and fish habitat, wildlife and wildlife habitat, vegetation, and wetlands.

Discovery of a Heritage Resource: Previously undiscovered archaeological resources (i.e., artifacts) could be uncovered during excavation as well as from other intrusive activities on the site during demolition and river improvement. Based on the bedrock geology (i.e., Gabbro, an intrusive igneous rock) underlying the Project site, it is unlikely that palaeontological resources (i.e., fossils) could be uncovered during the Project.

Stranded Migratory Fish: There is the potential that, once removal of the instream components of the station and improvement of Salmon Falls as intended by NB Power is complete, the hydrological evaluation of the restored Salmon Falls could reveal that some or all fish may still not be able to ascend the falls without further human intervention. Although NB Power's commitment is limited to removing the human-made structures that impede fish passage so that volitional fish passage can be achieved, some further intervention beyond this commitment may be required in such a case to enable volitional fish passage to occur. The loss of volitional fish passage during the migration period could adversely affect fish populations as well as other valued components that rely on those fish populations.

7.3 Potential Interactions between Accidents, Malfunctions, and Unplanned Events and Related Valued Components

Based on the nature of the above credible events and the EIA team's knowledge of their potential to interact with the environment, the VCs with a reasonable potential to interact with these potential accidents, malfunctions, or unplanned events are identified in **Table 7.3.1**.

Table 7.3.1: Potential Interactions of Accidents, Malfunctions, and Unplanned Events with Valued Components

Accident, Malfunction, or Unplanned Event	Atmospheric Environment	Acoustic Environment	Groundwater	Surface Water	Fish and Fish Habitat	Vegetation and Wetlands	Wildlife and Wildlife Habitat	Socioeconomic Environment	Heritage Resources	Traditional Land and Resource
Failure of Erosion and Sediment Control Measures				✓	✓	✓	✓			✓
Failure of a Cofferdam				✓	✓			✓		
Vehicle Accident	✓	✓	✓	✓	✓		✓	✓		
Accidental Release of a Hazardous Material	✓		✓	✓	✓	✓	✓			✓
Discovery of a Heritage Resource									✓	
Stranded Migratory Fish					✓		✓	✓		✓

Legend: ✓ indicates a potential interaction

Those accidents, malfunctions, or unplanned events that may result in an interaction with a specific VC are identified with a checkmark in the table above, and are therefore carried for further assessment below.

Accidents, malfunctions, or unplanned events that are not identified with a checkmark in the table above are not expected to result in an interaction with a specific VC or VCs, and are thus not discussed further.

7.3.1 Failure of Erosion and Sediment Control Measures

Erosion and sediment control (ESC) measures prevent erosion of surface soils and the resulting surface runoff from directly entering surface water bodies. Failure of ESC measures could be a result of the measures being insufficient to manage a given runoff event (e.g., rainfall or spring runoff exceeding capacity) or the implementation was poorly constructed.

A failure of ESC measures could primarily affect fish and fish habitat. The discharge of runoff containing sediment to watercourses during storm events or spring runoff could result in the degradation of adjacent surface water bodies, wetlands, and fish and fish habitat which those environments support. The effects on fish and fish habitat could include a temporary reduction in water quality due to increased sediment load. If the release were to occur during spawning periods, spawning beds could be negatively affected as sediment may cover the gravel beds and suffocate the eggs. Aquatic organisms may be adversely affected by a sediment release, potentially reducing the fish's food supply.

Consequential environmental effects could result to surface water, vegetation and wetlands, and wildlife and wildlife habitat.

In addition, a failure of ESC measures could affect traditional land and resource use as a consequential environmental effect. Indigenous communities that practice traditional activities near the Project site could be affected if the fish and fish habitat affected by an ESC failure were being used for traditional purposes.

7.3.1.1 Mitigation

Key mitigation to prevent a failure of erosion or sedimentation control measures includes:

- Construction of the ESC measures using quality materials and sound and proven construction practices in accordance with industry best practice;
- Periodic inspection and maintenance (as required) of the ESC measures, particularly following each precipitation event;
- Contingency plans will be developed for extreme rainfall or spring runoff events including:
    - monitoring of surface runoff conditions during heavy rainfall/spring runoff and operational observations to evaluate the need for improvements in surface runoff control,
    - cover will be applied to highly erodible areas,
    - clean-out of check dams will be conducted, and
    - provision of a stockpile of sediment and erosion control materials.
- A PSEMP with defined contingency and emergency response procedures in the event of a failure of an ESC measure will be developed and implemented.

Note that approaches will vary depending upon season, and the Site Manager shall indicate approaches for summer low flow periods, spring-fall high flow periods, and frozen ground high flow periods.

7.3.1.2 Potential Interactions Following Mitigation

The installation, maintenance, and monitoring of erosion and sedimentation control structures is a routine activity on construction sites and industrial operations, and is well understood by site managers and construction personnel. With daily visual monitoring of erosion and sedimentation control devices, conducting maintenance of them as necessary, periodically removing accumulated sediment, and active water management on-site, the risk of a failure of erosion and sediment control measures occurring is expected to be very low. With the implementation of mitigation measures, contingency and emergency response procedures, and best practices, the potential interactions of a failure of erosion and sedimentation control measures on surface water, fish and fish habitat, vegetation and wetlands, wildlife and wildlife habitat, and traditional land and resources are not expected to be substantive.

7.3.2 Failure of a Cofferdam

Failure of a cofferdam could interact with the socioeconomic environment, surface water, and fish and fish habitat.

Construction of one or more cofferdams will allow decommissioning and demolition work to be carried out in dry conditions in isolation from the watercourse, while at the same time permitting river flow around the work area. It is anticipated that a temporary access road will be constructed on top of the cofferdams in order for mobile equipment used in the demolition of the dam structures (i.e., excavators, rock breakers) to access the dam components.

Failure of part or all of a cofferdam prior to dewatering of the impoundment could result in the injury of workers employed in demolition and decommissioning work. Workers and equipment could be on the temporary access road built atop the cofferdams or immediately downstream of the dam. A rapid failure of a cofferdam may prevent workers from evacuating the site before being injured. This could be considered an interaction with the socioeconomic environment VC (from a human health and safety perspective).

Surface water and fish and fish habitat could be negatively affected by the sediment and waste material carried downstream by water breaching the cofferdam.

7.3.2.1 Mitigation

Key mitigation to prevent a failure of a cofferdam includes:

- The cofferdams will be designed and constructed to all applicable standards and for the hydraulic conditions specific to the site;
- Use of ESC measures surrounding the cofferdams to prevent erosion and sedimentation;
- Regular visual inspection of the cofferdams and their constituent elements will be carried out during and after their construction; and
- A PSEMP with defined contingency and emergency response procedures will be implemented.

7.3.2.2 Potential Interactions Following Mitigation

The cofferdams/temporary access roads will be designed to industry standards taking into account the hydraulic conditions of the St. Croix River at the Project location. The use of large rock fill material for construction of the cofferdams will provide a stable base for operating machinery on it, providing structural integrity of the cofferdams while minimizing the potential for release of finer materials if more granular fill were to be used. With thorough design and regular inspection/maintenance combined with mitigation measures, contingency and emergency response procedures, and best practices, the potential interactions of a failure of a cofferdam with the surface water, fish and fish habitat, and socioeconomic environment are not expected to be substantive.

7.3.3 Vehicle Accident

A vehicle accident could affect the socioeconomic environment, the atmospheric environment, the acoustic environment, groundwater, surface water, fish and fish habitat, and/or wildlife and wildlife habitat.

Vehicles will be active across the Project site for the entirety of the Project duration as well on provincial roads as waste material is transferred to the various approved disposal facilities (location dependent upon material type). Vehicle collisions have the potential to pose a risk to human health and safety and other property such as project infrastructure or private property. This could have an adverse effect on the socioeconomic environment.

Consequential environmental effects of a vehicle accident could occur on the atmospheric environment, as fires or fuel spills arising from a vehicle accident could result in a temporary and localized reduction in air quality. The resulting noise from a vehicle accident as well as from emergency response vehicles could cause an interaction with the acoustic environment. Fuel spills resulting from a vehicle accident could adversely affect surface water, groundwater, or fish and fish habitat, as surface or groundwater resources may become contaminated by fuel, potentially threatening potable water supplies and fish and fish habitat. Finally, a vehicle accident could have a direct effect on wildlife in the event of vehicle-to-wildlife collision, and an indirect effect in the event of a fuel spill or fire resulting from a vehicle collision.

7.3.3.1 Mitigation

Key mitigation to prevent a vehicle accident includes:

- Establishment of a transportation plan;
- Select a preferred transportation route to optimize safety by using roads that are designed to accommodate the vehicle weights that will be associated with the Project;
- Vehicles travelling to and from the Project site will adhere to posted speed limits, weight restrictions, and other traffic safety rules, and drivers will adjust their speed to conditions accordingly;
- Drivers will also heed wildlife warning signs and reduce speed in areas identified as posing a potential risk of wildlife collision;
- Pedestrian zones will be identified to allow workers access throughout the work area on foot;
- A communications plan will be established to engage with local communities potentially affected by Project-related traffic; and
- A PSEMP with defined contingency and emergency response procedures in the event of a vehicle accident will be developed and implemented.

7.3.3.2 Potential Interactions Following Mitigation

Though vehicle accidents may occur with any project, particular attention will be paid to conducting Project operations in a careful and safe manner so as to reduce the risk of a serious vehicle accident. With the implementation of mitigation measures, contingency and emergency response procedures, and best practices, the potential interactions of a vehicle accident on the socioeconomic environment, atmospheric environment, acoustic environment, surface water, groundwater, fish and fish habitat, and wildlife and wildlife habitat are not expected to be substantive.

7.3.4 Accidental Release of Hazardous Materials

The accidental release of a hazardous material through spills could affect primarily groundwater, surface water, and fish and fish habitat, with consequential environmental effects possible to the atmospheric environment, vegetation and wetlands, wildlife and wildlife habitat, and traditional land and resource use.

In addition to liquid hazardous materials that are present at any industrial facility, it is likely that, given the age of the facility, some other solid hazardous materials will be found on-site in the buildings or equipment, and direct exposure to these materials could cause a concern to human health and safety as well as the environment. Possible examples include lead-based paint, asbestos, ozone depleting substances, creosote-treated wood, polychlorinated biphenyls (PCBs), mould, and the like. The first step before any decommissioning or demolition work takes place will be a hazardous materials survey. Materials will be catalogued and appropriate disposal locations identified. Only qualified personnel will participate in the removal and disposal of hazardous material resulting from the decommissioning.

Aside from the hazardous materials associated with the historic operation of the station, no hazardous material or liquid fuels will be permanently stored on the Project site during decommissioning and demolition. As vehicles and mobile equipment used to carry out demolition, and transportation operations on-site will need to be refuelled on a daily basis for their continued operation, fuels will be brought on-site daily by mobile tankers operated by approved refuelling contractors. Refuelling activities will be carried out in a designated area (at least 30 m away from watercourses or wetlands) using defined procedures to prevent the occurrence of a spill.

An accidental spill of hydrocarbons or other substances during decommissioning and demolition of the Station may contaminate air, soils, and groundwater and, through runoff, contaminate watercourses. Contaminants may adversely affect both terrestrial and aquatic habitats and their species, including migratory birds. Loss of petroleum hydrocarbons, hazardous materials, or other substances may volatilize and adversely affect ambient air quality on a temporary and localized basis.

Chemical and fuel spills may enter a watercourse directly, potentially affecting water quality and fish and their habitat, with the extent of effects depending upon the nature of the material and the quantity released. The effects could range from a small localized spill, which is contained and remediated quickly, to a large release of a highly soluble material that affects the receiving watercourse. Possible negative effects to fish and fish habitat could include direct mortality of fish and aquatic organisms, degradation

of surface water quality, and potential injury or death of wildlife in the event of exposure. If natural resources affected by a spill are used for traditional purposes by Indigenous persons, a consequential environmental effect of a spill could also occur to traditional land and resource use.

Effects on vegetation and wetlands from an accidental hazardous materials release include a physical harm or death of vegetation species, a reduction or loss of wetland function as a habitat for fish and wildlife, and accretion of contaminants in wetland sediments. Contaminants are less likely to move through a wetland system at the same rate as riparian systems due to the generally lower mobility of water and sediments. Contaminants may build up in the sediments and be released into the ecosystem over time, rather than being flushed out over a season as with a riparian system.

7.3.4.1 Mitigation

Key mitigation to prevent an accidental release of a hazardous material includes:

- Carrying out a hazardous materials survey prior to initiating demolition activities, and identification of safe removal procedures and suitable disposal sites for removed hazardous materials;
- A PSEMP with defined contingency and emergency response procedures in the event of a hazardous material spill will be developed and implemented;
- No storage of petroleum hydrocarbons will occur on-site; fuel will be brought to the site by mobile tankers on a daily basis for vehicle refuelling in a designated area, and leave the site following the refuelling activities;
- A Spill Contingency Plan will be developed as part of the PSEMP for substances anticipated to be brought on-site during the decommissioning, demolition and improvement activities;
- Fuelling operations will be conducted in designated areas located at a minimum distance of 30 m from wetlands and surface water bodies;
- Vehicle maintenance, including the changing of oil and lubricants, will not be permitted on-site;
- Releases potentially caused by vehicle accidents will be addressed initially by local emergency response agencies and as directed by the NBDELG. Subsequently, site contractors will contain the spill and remove contaminated soils and sediment for disposal; and
- Emergency spill kits will be available on-site.

Small spills can typically be cleaned up effectively with minimal long-term impacts, and larger spills are not likely to occur based on limited quantities of hydrocarbons anticipated to be present on-site during the Project.

7.3.4.2 Potential Interactions Following Mitigation

With the implementation of a hazardous materials survey and management plan, no planned storage of liquid hazardous materials on-site, and careful implementation of best practices during refuelling of equipment from mobile tankers on a daily basis, the risk of spills resulting from the Project is expected

to be low. With the implementation of mitigation measures, contingency and emergency response procedures, and best practices, the potential interactions of an accidental release of a hazardous material on the atmospheric environment, water resources, fish and fish habitat, vegetation and wetlands, wildlife and wildlife habitat, and traditional land and resource use are not expected to be substantive.

7.3.5 Discovery of a Heritage Resource

The discovery of a heritage resource would interact with the heritage resources VC.

Any ground breaking or earth moving activity has the potential to uncover previously undiscovered heritage resources. Archaeological resources (i.e., artifacts) tend to be found in surficial soils and when discovered, whereas palaeontological resources (i.e., fossils) tend to be found in bedrock. The discovery of these resources can provide valuable information about human activity or use in the distant past (in the case of artifacts), or the presence of wildlife and vegetation in earlier eras (in the case of fossils).

With respect to the Project, it is possible that previously undiscovered heritage resources in the form of artifacts could be found in the surficial soils during demolition of the fishway or during shoreline stabilization along the riverbank, or within the riverbed during demolition of in-river elements or during improvement of Salmon Falls for volitional fish passage. The documented presence of a registered archaeological site near the Project site (note: the specific location of this registered archaeological site is not well defined in the AHB's database), as well as the Station location being located approximately 1-2 km upstream of the head of tide of the St. Croix River and atop Salmon Falls (whereby waterfalls have an elevated potential for traditional uses such as fishing that might result in an elevated archaeological potential) could increase the potential for archaeological resources to be present. Waterfalls have historically been a gathering place for Indigenous peoples due to the general abundance of fish normally found below waterfalls as well as suitable locations for encampments to be present, thus elevating the potential for artifacts to be present.

With respect to palaeontological resources, however, it is highly unlikely that fossils could be found in the underlying bedrock, which is an intrusive Late Silurian Gabbro formation (GNB 2008). The rock underlying the Project was formed when magma from the Earth's interior intruded into the surrounding rock from deep below the surface, cooled and then crystalized. In order for fossils to occur in rock, the remains of organisms (i.e., plants, animals) must be incorporated into sediments that eventually form rock over millions or billions of years. Intrusive rocks do not contain fossils because they intrude from molten rock and only reach the surface through weathering.

7.3.5.1 Mitigation and Response

Key mitigation measures to minimize the potential for the discovery of a heritage resource include conducting an archaeological impact assessment (AIA), consisting of background research, map and model interpretation, a walkover of the Project site, and associated shovel test pitting of any areas that were determined through the walkover to have a moderate to high archaeological potential. If archaeological or heritage resources are discovered through the AIA, further mitigation including

archaeological monitoring during decommissioning, demolition, and restoration activities, obtaining a site alteration permit, or other measures would be considered. Additionally, a PSEMP with defined contingency and emergency response procedures in the event of the accidental discovery of a heritage resource will be developed and implemented. The PSEMP will include contingency and emergency response procedures to be implemented in the event of a chance find of a heritage resource. Decommissioning, demolition, removal, and restoration activities in areas identified by the AIA as having a high potential to harbour archaeological resources will be carried out under the supervision of a professional archaeologist.

In the event that an archaeological or cultural resource or artifact is discovered during the Project, the following procedure will be followed, to be updated as part of the development of the PSEMP:

- Work will be immediately stopped, and the area will be marked to prevent further disturbance. An exclusion zone of 100 m surrounding the find will be established;
- The Site Manager will immediately contact the Archaeology and Heritage Branch (AHB) of the New Brunswick Department of Tourism, Heritage and Culture to notify them of the discovery and establish a mitigation plan;
- Notify affected First Nations of the discovery in a manner consistent with the directions of AHB;
- No additional work will be permitted at the site until approval has been received from the appropriate regulatory agency to resume the work;
- If bones or human remains are found, work in the area must cease, and the RCMP shall be immediately notified;
- No one shall disturb, move or rebury any uncovered human remains; and
- If the discovered resources are related to Indigenous culture, the New Brunswick Department of Aboriginal Affairs will be contacted to determine how best to proceed with respect to repatriation of the resources.

7.3.5.2 Potential Interactions Following Mitigation

With the conduct of an AIA (systematic evaluation) to confirm that archaeological resources are not present, and with the implementation of mitigation measures, contingency and emergency response procedures, and best practices, the potential for an accidental discovery of heritage resources is not expected to be substantive.

7.3.6 Stranded Migratory Fish

The unintentional stranding of migratory fish could affect the fish and fish habitat, wildlife and wildlife habitat, socioeconomic environment, and traditional land and resource use VCs.

Gaspereau make up the largest proportion of migratory species identified during annual counts at the Milltown fishway. They have historically been fished in the St. Croix River, both recreationally and as a

food source by Indigenous and non-Indigenous people in the LAA. Gaspereau also provide an important food source for other fish as well as wildlife species including bald eagle and osprey.

As noted in **Section 2.3.2**, the existing pool-and-weir fishway at the Station will be operated until approximately mid-July 2022 (subject to formal DFO approval) in order to complete the annual gaspereau migration during that year, after which it will be permanently shut down and decommissioned. Given this, the removal of human-made structures in the river and the restoration of Salmon Falls for volitional fish passage must be achieved by Spring 2023 in time for the annual diadromous fish migration (including importantly gaspereau) so that volitional fish passage can occur that spring. Though hydraulic modelling has been carried out as part of the design of the Project to simulate river flows and water elevations following decommissioning and river restoration, it will not be possible to complete a full hydrological and fish passage evaluation of the Salmon Falls restoration until the built structures are removed and the river is permitted to flow naturally. If the evaluation determines that volitional fish passage cannot be achieved despite the removal of structures in the water and the river improvements at Salmon Falls, a temporary solution to achieve volitional fish passage immediately in time for the spring 2023 gaspereau run, followed by a permanent solution to allow volitional fish passage on an ongoing basis, will need to be must be conceived, approved, and implemented.

Failure to address the issue could result in several thousand fish becoming stranded below the falls, limiting their ability to migrate to their spawning grounds upstream and negatively impacting the productivity and very survival of migratory fish populations in the St. Croix River.

7.3.6.1 Mitigation

In the unlikely event that stranded migratory fish occurs, mitigation to address the potential for stranded migratory fish could include:

- Conduct a hydrological and fish passage evaluation of Salmon Falls, following the removal of human-made obstructions to fish passage in the river at Salmon Falls, to evaluate the success or non-success of the interventions aimed at establishing volitional fish passage;
- Immediately upon identification of a potential fish passage concern (either via the hydrological and fish passage evaluation or through the observation of fish being stranded), NB Power will immediately establish a working group made up of representatives from the Department of Fisheries and Oceans Canada, the pertinent U.S.A. resource agencies, Indigenous communities, and academics to evaluate and implement interim measures to allow fish passage through Salmon Falls, followed by more permanent measures as necessary;
- Only existing proven technologies or methods for safe fish passage of Salmon Falls will be considered; and
- Development and implementation of a follow-up and monitoring program to evaluate the success of the temporary or permanent fish passage and ongoing modification to ensure a high survival rate.

7.3.6.2 Potential Interactions Following Mitigation

With the planned hydrological and fish passage evaluation to confirm that volitional fish passage can and will be achieved, the immediate establishment of a working group comprised of experts if the hydrological evaluation or visual observation determines that fish are not able to ascent Salmon Falls, the use of proven technologies/methods for fish passage, and planned ongoing follow-up and monitoring during the migration periods to verify the success of the intervention measures, the potential interactions of a fish stranding on the fish and fish habitat, wildlife and wildlife habitat, socioeconomic environment, and traditional land and resource use VCs are not expected to be substantive.

7.3.7 Overall Summary

In light of the above, with the implementation of mitigation measures, contingency and emergency response procedures, and best practices, the potential interactions of all credible accidents, malfunctions, or unplanned events on all VCs are not expected to be substantive.

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8.0 Indigenous Consultation

This section of the EIA Registration document was prepared by NB Power.

The entire province of New Brunswick is unceded Indigenous territory and is subject to the Peace and Friendship Treaties originally signed in 1725 by the British with the Wolastoqey (Maliseet), Mi'kmaq, and Peskotomuhkati (Passamaquoddy) Nations along with other First Nations in what is now known as Maine, New Hampshire, and Nova Scotia, and renewed in specific agreements thereafter (including notably in 1754). Section 35 of the *Constitution Act, 1982* recognizes and reaffirms the rights and title of the Aboriginal peoples of Canada. The Supreme Court of Canada has confirmed that First Nations continue to have treaty rights to carry out traditional activities (including the right to hunt, trap, fish, and gather towards earning a moderate livelihood) in their traditional territories. The Supreme Court of Canada has also held that the Crown (including the Governments of Canada and New Brunswick) have a duty to consult with First Nations, and accommodate as necessary, when exercising a decision that may affect Aboriginal or treaty rights. As an agent of the Crown, NB Power has the duty conduct its business in a manner consistent with upholding the honour of the Crown. As such, it meaningfully engages and consults with potentially affected First Nations. The New Brunswick Department of Aboriginal Affairs is kept fully informed of the engagement and consultation activities, regularly attending meetings.

As NB Power will frequently be required to engage and consult on multiple projects, it developed a strategy in 2013 titled "Strategic Approach for First Nations Affairs". The strategy focused on building long-lasting and trusted relationships between each Nation and NB Power that, in part, would support effective engagement and consultation of New Brunswick's Indigenous peoples in relation to NB Power's projects. In support of this strategy, NB Power also developed consultation agreements with the Wolastoqey Nation in New Brunswick (WNNB) and Mi'gmawe'l Tplu'taqnn Incorporated (MTI), and meets with them on a regular basis to provide updates on ongoing NB Power projects including the Milltown project. Aligned with the strategy, NB Power also regularly engages with the Peskotomuhkati First Nation, as well as Elsipogtog First Nation through its representative body, Kopit Lodge.

8.1 Overall Approach

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

1. Consult frequently with the First Nation communities that wish to be engaged through meaningful written updates and in person meetings, as requested, throughout the life of the project;
2. Record concerns raised by First Nations throughout the process and consider appropriate mitigative measures to address the concerns where possible;
3. Communicate when and how mitigative measures have been applied to address comments and concerns that were raised by First Nations; and

4. Follow the guiding principles agreed to between each Nation, representative organization, or community and NB Power.

To effectively consult with First Nations on this Project, the approach is designed to be adaptive and inclusive. The approaches described below were employed through the engagement process completed thus far and will continue to be utilized through the consultation process.

Direct Written Communication

Though engagement of First Nations with respect to Milltown was initiated in 2017 when refurbishment of the Station was being considered, each First Nation community, copying representative organizations and consultation representatives, were formally notified of the plans for decommissioning of the Station through a letter in June 2019, in advance of public news releases. Further information on the Project including: an overview of the Project; the Project location and map; a summary of the Project components and activities; and contact information to whom questions, comments and concerns could be forwarded was provided to the Nations, representative organizations, and consultation representatives in October 2019, with follow up correspondence in January 2020. A copy of the initial notification letter and supplemental information letter is presented in **Appendix C**.

Comments, questions and concerns received from rights holders in writing will be recorded and responded to (as appropriate) in writing in a timely manner.

Invitations to future meetings and open houses will also be extended in writing to the First Nation community, copying representative organizations, and consultation representatives, as appropriate.

In-Person and Virtual Meetings

NB Power has been engaging with First Nations regarding the Milltown Station through regular in-person meetings since 2017. During the meetings, project updates are provided, followed by an opportunity for questions on project-specific elements. Questions are recorded and, most often, responded to directly during the meetings. When questions cannot be immediately answered, there were subsequently responded to in writing or added as a recurring agenda item until the comment has been addressed.

NB Power invited each First Nation community or their representative organizations to a facilitated workshop in January 2020 to provide information about the Project to interested stakeholders and explore potential areas of concern. Comments and questions raised during the session were recorded and responded to directly during the meeting when applicable. While NB Power meets routinely with Indigenous organizations to keep them updated on their projects, since March 2020, these meetings have been held virtually due to the COVID-19 pandemic, and it is likely that virtual meetings will continue for some time.

NB Power is also open to having additional Milltown Project-specific meetings at the Nation or community's request as required. As each meeting will be dependent on the individual groups' interests, the content, location, meeting agendas, and formats will be adapted to best suit the request. Virtual means will be preferred for meetings for the foreseeable future.

Comments, questions or concerns raised at any in-person or virtual meeting will be recorded and responded to directly during the meeting if possible, or in writing at a later date when applicable.

Community Open House Events

NB Power recognizes that an effective means of disseminating information in First Nation communities is by an open house style information session available to the entire community upon request. The information sessions provide a less formal way for providing information on specific items of concern to attendees through face-to-face interactions with NB Power staff. If requested, NB Power would be pleased to host an information session in a First Nation community to provide additional Project information to interested community members, either in-person (if it safe to do so) or by virtual means (if the ongoing pandemic prevents in-person gatherings). During the meetings, verbal questions and comments will be, recorded by Project representatives. In addition, paper forms and an email address will be made available for feedback on the Project to be submitted in writing if so desired.

Electronic Input

At the time of submission of the EIA Registration document to NBDELG, an electronic copy of the document will be provided to First Nation communities and their representative organizations. If requested, a hard copy of the registration will also be provided. In addition, the document will be made available in hardcopy form at the St. Stephen Town Hall (located at 22 Budd Avenue) and the St. Croix Public Library (located at 11 King Street). The document will also be provided electronically on the NBDELG website (https://www2.gnb.ca/content/gnb/en/departments/elg/environment/content/environmental_impactassessment/registrations.html) and the NB Power Project website (https://www.nbpower.com/en/about-us/projects/milltown-decommissioning/).

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

8.2 Engagement Activities Conducted to Date

Aligned with its strategy to conduct meaningful consultation with First Nation communities, NB Power has been meeting with communities, or their representative organizations, since 2017 to discuss the Project (though engagement at that early time was in the context of potentially refurbishing the Station). Since then, engagement efforts have been individualized to best suit each community or organization based on guidance from the consultation leaders, and recently the focus of these discussions has shifted towards the planned decommissioning of the Station. Engagement efforts have included regular in-person or teleconference/virtual meetings, direct written communications, and personal communications between the project manager and consultation leaders.

8.3 Key Comments or Concerns to Date

Through the limited engagement efforts completed to date, First Nations have generally indicated support of the decommissioning of the Milltown Station and on June 28, 2019, Chief Akagi of the Peskotomuhkati Nation at Skutik issued a news release indicating support for the Project. In consideration of the early support, comments and questions have largely been related to specific components of the Project, and have generally included:

- A request for available background information regarding other projects that this Project may be used to offset through the *Fisheries Act* Authorization.
- Further details on the timing of the Project.

As part of the process, a database was created to track each comment, question, or concern as they are received. The database enables NB Power to track how the comments are addressed and what commitments are made. Comments, questions, and concerns raised by First Nations, unless confidential in nature, will be included in the Public Consultation Summary Report (without attribution, to protect personal information) which will be submitted to NBDELG for review within 60 days following registration of the Project.

8.4 Future Activities

NB Power commits to continuing to share information on the Project and continue to consult with First Nations throughout the duration of the Project. Although consultation efforts with each Nation will be customized and adaptable, it is anticipated that the efforts will include: written communication, personal communication, in-person and teleconference meetings, and open house style information sessions (either in-person or virtually if in-person meetings are not possible), if so desired by the host communities.

It is anticipated that as the Project progresses, Indigenous monitors will be engaged to participate in field activities or to provide oversight during the decommissioning, demolition, removal, or river restoration activities.

8.5 Consultation Log

NB Power's consultation efforts will be recorded in a consultation log; however, as the log is confidential in nature, it will only be shared with the New Brunswick Department of Aboriginal Affairs as per agreements between NB Power and the Nations.

Comments, questions and concerns raised by First Nations, unless confidential in nature, will be included in the Public Consultation Summary Report which will be submitted to NBDELG for review within 60 days following registration of the Project.

9.0 Public and Stakeholder Consultation

This section of the EIA Registration document was prepared by NB Power.

The planned approach to public and stakeholder involvement in support of the EIA Registration and EIA review of the Project is described in this section. In accordance with the EIA Regulation, direct communication with stakeholders (local residents, elected officials, service groups, businesses, etc.) is required, as a minimum. NB Power is proposing a broad public and stakeholder engagement process for this Project which includes cross-border consultation with international stakeholders.

9.1 Overall Approach

To effectively engage elected officials, landowners, stakeholders and the general public on the Project, NB Power has initiated a multi-pronged approach based on the following objectives:

- regularly inform stakeholders, community groups, and the general public on the project through timely and meaningful information updates via direct communications and online platforms;
- provide direct written communications with elected officials and stakeholder groups;
- consult with affected stakeholders in a timely manner in an effort to mitigate potential impacts, communicate when/how mitigative measures have been applied to address comments and concerns; and
- provide the public and interested stakeholder groups with opportunities to learn more about the Project; and to share their issues and concerns about the Project so that they may be addressed as part of the EIA review process.

To ensure that stakeholders are effectively engaged in the Project, the approach is designed to be adaptive and inclusive through a variety of different communication platforms and methods. The following platforms and methods will be deployed throughout the engagement process.

- Media Releases:
    - NB Power recognizes that modern communication techniques are required to effectively reach a large demographic of the general public and has utilized its significant corporate social media profile to reach New Brunswickers. As part of the public and stakeholder engagement process, NB Power will post news releases on the NB Power website and poste links to media releases on its social media platforms (with over 17,500 followers).
- Project Webpage:
    - NB Power has launched a project specific webpage (https://www.nbpower.com/en/about-us/projects/milltown-decommissioning/) which contains information on the Project background, benefits of decommissioning, the proposed Project schedule and a hyperlink to the Project specific email link.

- Direct Written Communications:
    - Direct written communications describing the Project and the anticipated environmental effects and mitigation have been and will continue to be provided to elected federal, provincial, and municipal officials and regulatory agencies. Comments and questions received from elected officials and stakeholders have been, and will continue to be, recorded and responded to in a timely manner.
- Public Viewing of EIA Registration Document:
    - The EIA Registration document will be made available for public viewing in hardcopy form at the St. Stephen Town Hall (located at 22 Budd Avenue) and the St. Croix Public Library (located at 11 King Street) following registration.
    - In addition, the EIA Registration document will be made available on the NBDELG website (https://www2.gnb.ca/content/gnb/en/departments/elg/environment/content/environmental_impactassessment/registrations.html l) and the NB Power Project website (https://www.nbpower.com/en/about-us/projects/milltown-decommissioning/).
- Community/Stakeholder Meetings:
    - NB Power will attend community meetings and provide additional information on the Project with interested stakeholder groups at their request.
    - NB Power has established a Community Liaison Committee (CLC) to provide a formal mechanism through which to interact, receive information, or provide feedback or concerns relating to the Project from community members. As of the date of submission of this EIA Registration document to the NBDELG, the CLC had met six times since its inception.
    - Meetings are normally held in person, but since March 2020 these meetings have been held virtually due to the COVID-19 pandemic. It is possible that virtual meetings will continue for some time if not safe to do so in-person.
- Open Houses or Other Meetings:
    - Open house style information sessions will be conducted in the local community to provide additional project information to interested stakeholders, assuming it is safe to do so. In light of the ongoing COVID-19 pandemic, it is likely that public and stakeholder engagement that might occur in the foreseeable future will be held virtually.
    - During these sessions, verbal questions and comments will be recorded by Project representatives.
    - In addition, forms will be made available to the public for written feedback on the Project.
    - An email address will also be provided for attendees who would like to submit questions or comments.

9.2 Key Engagement Activities Conducted

During the period leading up to the registration of the Project, NB Power carried out a number of public, and stakeholder group engagement activities to provide Project information and explore potential areas of concern. The key engagement activities are summarized in **Table 9.2.1** below.

Table 9.2.1: List of Key Public and Stakeholder Engagement Activities Completed to Date

Engagement Activity	Date Completed	Intended Audience
News Release (advance notice)	June 19, 2019	Regulatory agencies
News Release	June 27, 2019	General public
Open House Invitation (direct written communication)	July 5, 2019	Stakeholder groups and elected officials
Public Open House	July 11, 2019	General public, stakeholder groups and elected officials
Community Meeting (St. Stephen Health and Wellness Group)	October 28, 2019	Stakeholder group
Facilitated Stakeholder Workshop	January 14, 2020	Stakeholder groups

Samples of the communications materials such as a news release, direct written communication and the information provided during the July 2019 open house and the January 2020 workshop is attached in **Appendix D**.

9.3 Key Issues Identification

As part of the public and stakeholder engagement process, a database was created to track each comment, question or concern as they are received. The database will also enable NB Power to track how each comment, question, or concern is being addressed and what commitments were made. A high-level summary of the key questions, comments, and concerns received as of January 2020 is presented below in **Table 9.3.1**.

Table 9.3.1: Feedback from the Public and Stakeholders on the Project as of January 2020

Comment Type	Summary of Issues Raised
Energy Source	• Why is the dam being decommissioned when two years ago it was planned to be refurbished? • The Milltown Generating Station provides a clean energy source and should remain online to support in the phasing out of nuclear power and fossil fuels.
Heritage Resource	• The Milltown Generating Station is considered to be a heritage resource for the town, and if there is a way to maintain the dam structure while allowing the river to return to its natural state, the option should be considered. • There should be a way to document, and pay tribute, to those that have been involved in the Station through its lifetime.

Comment Type	Summary of Issues Raised
Fish Passage	• How will fish passage occur while the dam is being decommissioned?
Cumulative Effects	• The effects of climate change should be considered in the design of the decommissioning process. • Will flooding be generated as a result of decommissioning the Station? • Will there be increased pollution downstream as a result of decommissioning the Station?

9.4 Future Activities

NB Power remains committed to engaging the public and key stakeholders on this Project throughout its duration. Future engagement activities will continue to follow the objectives outlined above. It is anticipated that the ongoing consultation activities will involve: news and media releases providing updates on the project; open houses/information sessions (perhaps held virtually); attendance at community/stakeholder meetings (perhaps held virtually); continued response to questions, comments and concerns as they arise; and continued written communication with elected officials, regulators and stakeholder groups. NB Power hosted its first Community Liaison Committee in March 2020 with members representing First Nations, community, business, environment, emergency response and the general public. It also includes NB Power representatives from communications and the Project team.

9.5 Summary Report

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

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10.0 Other Information

10.1 Project-Related Documents

This EIA Registration document includes other relevant documents as **Appendices A** to **H** of this document. Other than this EIA Registration document and the appended information, there are no additional Project-related documents that are publicly accessible.

10.2 Approval of the Undertaking

Following completion of the EIA review for the Project and the receipt of a Certificate of Determination, a number of other authorizations, approvals, permits, licenses, or leases may be required from provincial or federal agencies. Refer to **Section 1.4** of this document for more information in this regard.

A number of permits, approvals, and authorizations will also be required from U.S.A. federal, State, and local agencies, but these authorizations on the U.S.A. side of the international boundary are outside the scope of this EIA Registration.

10.3 Funding

The Project will be funded entirely by NB Power, and does not involve the receipt of any funds, loans, loan guarantees, land transfers, or other types of financial support from any federal or provincial government department or agency.

10.4 Signature

This document is submitted on behalf of the New Brunswick Power Corporation.

Lori Clark

December 4, 2020

Lori Clark
Senior Vice President, Operations

Date of Signature

11.0 Summary and Conclusion

This environmental impact assessment (EIA) registration document describes the current conceptual approach to the decommissioning, demolition, and removal of the Milltown Generating Station and the improvement of Salmon Falls located (the "Project") proposed by the New Brunswick Power Corporation (NB Power) in the neighbourhood of Milltown, Town of St. Stephen, New Brunswick. Formerly with an electrical generating capacity of up to 4 megawatts (MW), the Milltown Generating Station (the Milltown Station) is currently a 3 MW hydroelectric generating station located on the St. Croix River, which straddles the Canada/U.S.A. international border between St. Stephen, New Brunswick, Canada and Calais, Maine, U.S.A. The Milltown Station has reached the end of its useful service life, and NB Power has made the decision to permanently decommission it and restore Salmon Falls (upon which the Station is constructed) to a near-natural state.

This document is being submitted to the New Brunswick Department of Environment and Local Government (NBDELG) as part of the EIA process under the New Brunswick *Environmental Impact Assessment Regulation 87-83* of the *Clean Environment Act*. A federal impact assessment (IA) under the federal *Impact Assessment Act* is not required for the Project. Other parallel regulatory processes will be required on the U.S.A. side of the Canada/U.S.A. international boundary, but those processes are beyond the scope of this EIA Registration.

Although engineering design refinements are ongoing, decommissioning of the Milltown Station will involve the dismantling and removal of the existing hydroelectric facility including some or all structures and mechanical and electrical components associated with the powerhouses, gate house, gated spillway, stop log spillway, dam, fishway, and other structures, as well as the improvement of the site and the river at the location of the Milltown Station. The ultimate goal of the Project is to remove all human-made structures that obstruct fish passage so as to allow fish to naturally access the upstream reaches of the St. Croix River.

In accordance with the requirements the New Brunswick *Environmental Impact Assessment Regulation–Clean Environment Act*, this EIA Registration provided Project-related information available at the early stage of its engineering design, and has assessed the environmental interactions of the Project. The key elements of this report are as follows:

- A description of the proposed components of the Project, including a discussion of how the Project would be decommissioned as well as consideration of alternative means of carrying out the Project, was provided. Project-related emissions and wastes were also described.
- A high-level summary of the environmental setting for the Project was provided to introduce general physical, biological, and socioeconomic conditions applicable in the general area of the Project.

- The scope of the EIA, including the scope of the Project, factors to be considered, and scope of those factors were described. The methods that were to be used to conduct the assessment of interactions between the Project and various valued components (VCs) were discussed.
- An assessment of potential interactions of the Project on each VC of relevance and importance to this EIA was conducted. Ten VCs were identified as relevant and important to the EIA of the Project: atmospheric environment; acoustic environment; groundwater; surface water; fish and fish habitat, vegetation and wetlands, wildlife and wildlife habitat, socioeconomic environment; heritage resources; and traditional land and resource use. Additionally, effects of the environment on the Project, as well as accidents, malfunctions, and unplanned events, were assessed. Where applicable, follow-up or monitoring measures to verify the predictions of this EIA or to verify the effectiveness of mitigation were identified.
- Planned Indigenous and public engagement activities in respect of the Project were described.

The assessment of interactions between the Project and the various VCs concluded that there would be no significant substantive interactions expected from the Project activities in consideration of normal activities of the Project as planned. Positive environmental interactions were predicted for fish and fish habitat, the socioeconomic environment as they relate to employment, and traditional land and resource use. Effects of the environment on the Project were predicted to not be substantive in view of the nature of the Project (decommissioning) and the relatively short duration during which it will be carried out. The potential residual environmental effects of accidents, malfunctions, and unplanned events were also found to be not substantive. A limited number of follow-up or monitoring initiatives have been developed to verify the predictions of this EIA Registration or to verify the effectiveness of mitigation.

Overall, based on the results of this EIA Registration, it is concluded that, with planned mitigation and the implementation of best practices to avoid or minimize adverse environmental interactions, the residual environmental interactions between the Project and all VCs, including the effects of the environment on the Project and from accidents, malfunctions and unplanned events, during all Project activities are not expected to be substantive.

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12.0 Closing

This report was prepared by Dillon Consulting Limited (Dillon) on behalf of New Brunswick Power Corporation. Dillon has used the degree of care and skill ordinarily exercised under similar circumstances at the time the work was performed by reputable members of the environmental consulting profession practicing in Canada. Dillon assumes no responsibility for conditions which were beyond its scope of work. There is no warranty expressed or implied by Dillon.

The material in the report reflects Dillon's best judgment in light of the information available to Dillon at the time of preparation. Any use which a third party makes of this report, or any reliance on or decisions made based on it, are the responsibilities of such third parties. Dillon accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

This report has been prepared by a team of Dillon professionals on behalf of New Brunswick Power Corporation.

Respectfully submitted,

DILLON CONSULTING LIMITED

Denis L. Marquis, M.Sc.E., P.Eng.
Associate, Project Manager

13.0 References

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