



NEW BRUNSWICK POWER CORPORATION

# 2021 Fish and Fish Habitat Technical Report

Nepisiguit Falls Generating Station Life Extension Project  
Bathurst Mines, New Brunswick



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## 1.0

# Introduction

This document is a supplementary technical report that is intended to support the environmental impact assessment (EIA) registration document and other environmental permitting applications for the Nepisiguit Falls Generating Station Life Extension Project (the Project) proposed by the New Brunswick Power Corporation (NB Power) at Nepisiguit Falls, in the community of Bathurst Mines, Gloucester County, New Brunswick, Canada. The Nepisiguit Falls Generating Station's (the Station) powerhouse is located at approximate coordinates 47° 24' 19.25" N and 65° 47' 30.76" W, at an elevation of approximately 107.5 m above sea level (m asl).

The Station is situated approximately 30 km south of Bathurst, along and within the wetted portion of the Nepisiguit River. The Project is an "undertaking" under items (b) and (i) 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" and "(i) all causeways and multiple-span bridges"]. Dillon Consulting Limited (Dillon) was retained by NB Power to complete natural environment surveys in support of a provincial EIA registration and other environmental permitting requirements for the Project.

Fish and fish habitat are considered an important feature and valued component (VC) of the environment and thus make up a key part of the assessment of the Project's potential effects on the environment. This technical report provides a summary of fish and fish habitat surveys conducted in summer 2021 in support of the Project's EIA registration and environmental permit applications, and includes: a brief description of the Project; a description of the regulatory framework; survey scope and methodology; a summary of the results; and discussion thereof. The assessment of residual effects (including potential interactions and mitigation) of the Project on fish and fish habitat is addressed within the main body of the Project's EIA Registration document (Dillon 2021).

Though other focused environmental surveys were completed concurrently with the fish and fish habitat surveys, the focus of this technical report is on fish and fish habitat. The remaining field surveys (i.e., bats, birds, wetlands, and vegetation) are summarized in a separate technical report that is also intended to support the EIA Registration and other environmental permits.

## 1.1

## Project Overview

This Project overview is an abbreviated summary for the purposes of this technical report. For a detailed description of the Project facilities/components, phases and activities, the reader is referred to the EIA Registration document (Dillon 2021).

The Project will be carried out at Nepisiguit Falls, approximately 30 km south of the city of Bathurst, Gloucester County, New Brunswick, Canada. The parcel identifier (PID) of the property owned by NB Power and which is associated with the Station, as referenced by Service New Brunswick, is PID No.

20872263. PID No. 20378907 is also associated with the Station but is owned by the Government of New Brunswick. The Station site has an area of approximately 40.2 hectares (ha).

The Station is comprised of the following existing facilities:

- **Powerhouse and related equipment:** The powerhouse contains three Francis-type turbine-generators and other mechanical and electrical systems and related instrumentation, including: control room, motor control centres, various instrumentation, and related systems. In addition, there is office space, a lunch room, washrooms, and related amenities.
- **Dam and related structures:** a main (forebay) dam, a submerged gate and two rubber bladder dams (one in the sluiceway and one atop the forebay dam), and an impoundment. The impoundment extends approximately 4 km upstream of the Station (i.e., the head of the impoundment is at the nearest upstream rapids located near some small islands in the river), and has a surface area of approximately 56 ha.
- **Electrical substation:** An electrical substation (terminal) is located on-site which connects the Station to the remainder of the New Brunswick electrical grid.
- **Other related facilities and infrastructure:** Other facilities and infrastructure include an access road, multi-span bridge, navigational safety boom in the impoundment, parking and related facilities, and other facilities typical of industrial facilities.

As currently envisioned by NB Power, the Project will involve turbine-generator replacements, forebay (north) bridge repair or replacement, forebay and sluiceway bladders replacement, and structural repairs.

### 1.1.1 Project Site

The Project site 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 Station is approximately 40.2 ha, the entirety of that area will not be disturbed by the Project. The Project site includes all of the Station-related facilities as well as areas to be used as laydown/temporary storage for the construction activities. In addition, NB Power owns a submerged water lot of the Nepisiguit River with an approximate area of 1.8 ha, a portion of which will be affected by Project activities (e.g., dewatering, cofferdam construction). The Project Site is presented below in **Figure 1**.

### 1.1.2 Local Assessment Area

The local assessment area (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. It can be thought of as the “zone of influence” of the Project on fish and fish habitat. For fish and fish habitat, the local assessment area was defined in the EIA registration document as the approximate extent of the lower portion of the impoundment (i.e., from the dam to 500 m upstream of the Station) to approximately 500 m downstream of the Station, including a 30 m of riparian area on each side of the Nepisiguit River (Dillon 2021). The LAA is shown in **Figure 2** below.



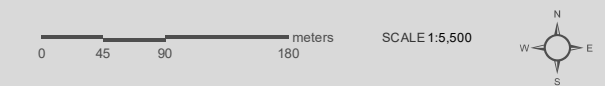
# NEPISIGUIT FALLS GENERATING STATION LIFE EXTENSION PROJECT

FISH AND FISH HABITAT TECHNICAL REPORT

## PROJECT SITE

FIGURE 1

- Project Location
- Road
- Watercourse
- Waterbody

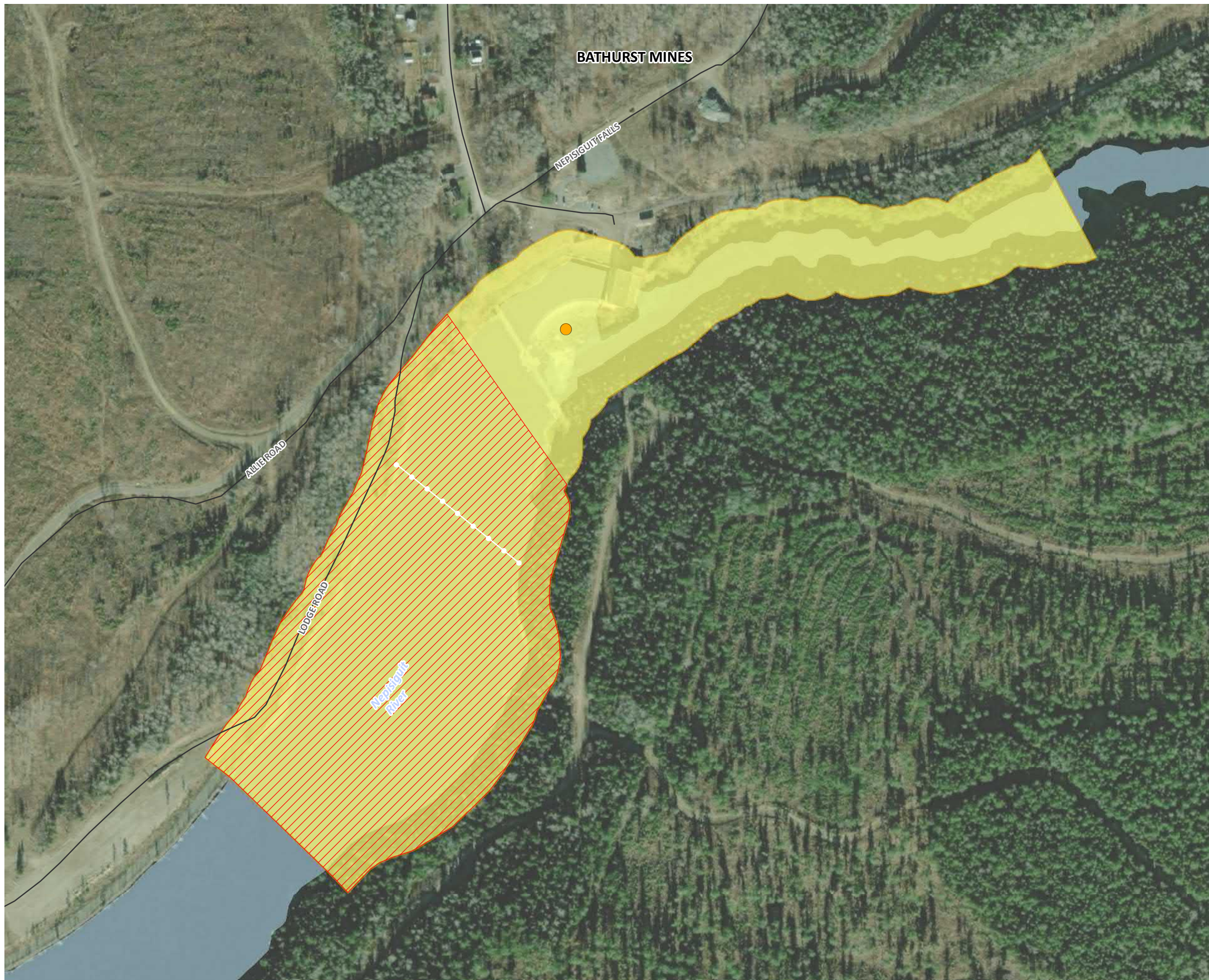


MAP DRAWING INFORMATION: ESRI, DIGITALGLOBE, GEOEYE, EATHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AEROGRID, IGN, AND THE GIS USER COMMUNITY  
 DATA PROVIDED BY: DILLON CONSULTING & GEONB

MAP CREATED BY: MEC  
 MAP CHECKED BY: DM  
 MAP PROJECTION: NAD 1983 CSRS NEW BRUNSWICK STEREOGRAPHIC



PROJECT: 20-3641  
 STATUS: FINAL  
 DATE: 2022-02-09



# NEPISIGUIT FALLS GENERATING STATION LIFE EXTENSION PROJECT

FISH AND FISH HABITAT TECHNICAL REPORT

## LOCAL ASSESSMENT AREA (LAA) FOR FISH HABITAT

FIGURE 2

- Project Location
- Road
- Safety Boom (approximate location)
- Fish and Fish Habitat Study Area
- Local Assessment Area: Fish Habitat Assessment
- Waterbody



SCALE 1:3,500



MAP DRAWING INFORMATION: ESRI, DIGITALGLOBE, GEOEYE, EATHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AERGRID, IGN, AND THE GIS USER COMMUNITY  
 DATA PROVIDED BY: DILLON CONSULTING, GEONB, ACCDC

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## Overview of Applicable Regulatory Framework

The New Brunswick *Environmental Impact Assessment Regulation – Clean Environment Act* (EIA Regulation), 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. The following items under Schedule “A” of the EIA regulation apply 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 Station); and
- “(i) all causeways and multiple-span bridges (for the repair or replacement of the forebay bridge).”

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* (WAWA). The federal *Fisheries Act* provides protection for all fish and fish habitat (DFO 2019). Section 35(1) of the *Fisheries Act* prohibits the harmful alteration, disruption or destruction (HADD) of fish habitat without an authorization; Section 34.4(1) prohibits the death of fish by means other than fishing without an authorization; and Section 36(3) prohibits the release of a deleterious substance into waters frequented by fish.

Additionally, aquatic species at risk (SAR) are protected under both the federal *Species at Risk Act* (SARA) and New Brunswick *Species at Risk Act* (NB SARA). Finally, although the Canadian Council of Ministers of Environment (CCME) “Canadian Environmental Quality Guidelines for the Protection of Freshwater Aquatic Life” (CEQG FWAL) do not have force of law, they provide environmental quality objectives for protecting fish from lethal and sub-lethal effects.

Further details on the applicable regulatory framework for the Project are provided in the EIA Registration document (Dillon 2021).



## 2.0 Scope of Work and Methodology

The following section outlines the methodology that was undertaken to conduct desktop analysis as well as the fish and fish habitat field surveys.

### 2.1 Scope of Work

The New Brunswick “Guide to Environmental Impact Assessment in New Brunswick” (EIA Guide; NBDELG 2018) requires that physical and natural features be described and assessed to support assessment of environmental effects and permitting; including, where appropriate, the collection of field data during appropriate seasonal windows. This information typically includes the following:

- The type or significance of fish populations and their habitat;
- Presence of or potential for aquatic species at risk or their habitat; and
- Presence of critical, sensitive, or otherwise designated protected aquatic habitat.

The scope of work for the fish and fish habitat surveys for this project is based upon an understanding of the nature of the Project, as well as Dillon’s experience in assessing similar landscapes/natural systems. For the purposes of this report and in support of the EIA registration for the Project, the fish and fish habitat considers the following definitions:

- **Watercourses** – Watercourses in New Brunswick are defined as: “A feature in which the primary function is the conveyance or containment of water, which includes: a) the bed, banks and sides of any watercourse that is depicted on the New Brunswick Hydrographic Network layer (available on GeoNB Map Viewer); b) the bed, banks and sides of any incised channel greater than 0.5 metres in width that displays a rock or soil (mineral or organic) bed, that is not depicted on New Brunswick Hydrographic Network layer (available on GeoNB Map Viewer); water/flow does not have to be continuous and may be absent during any time of year; or c) a natural or man-made basin (i.e. lakes and ponds).” (NBDELG 2017);
- **Fish and Fish Habitat** – All fish and their habitat are protected in Canada under the *Fisheries Act*. Fish species include all species of anadromous, catadromous and resident fish, as well as benthic invertebrates and other aquatic invertebrates such as mollusks. Aquatic mammals or herpetiles are not assessed as part of fish and fish habitat and have been separately assessed as part of the EIA registration.
- **Fish Species at Risk and Fish Species of Conservation Concern** – “Species at risk” (abbreviated SAR) as those species that are listed as “Extirpated”, “Endangered”, “Threatened”, or “Special Concern” on Schedule 1 of the *Species at Risk Act* (SARA) or on 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]).

- **Unique or Sensitive Aquatic Habitats** – includes aquatic habitats identified as protected or managed by federal and provincial authorities or non-governmental organizations (e.g., Nature Trust of New Brunswick).

It is understood that many, if not all, natural systems are directly or indirectly connected to one another. The fish and fish habitat VC is most specifically directly connected to surface water, groundwater, as well as vegetation and wetlands. Surface water and sediment sampling is included within this technical report (as discussed within the sections below), and is directly connected to the health of freshwater aquatic life. The information presented herein on surface water is summarized within Section 5.5 of the EIA Registration document (Dillon 2021). Vegetation and wetland surveys were also conducted in support of the EIA registration and are summarized in a separate technical report.

Fish and fish habitat surveys of the impoundment were conducted during the 2021 field season, 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 summarized in separate memo (**Appendix C**).

Methodologies used during these surveys are discussed below in **Section 2.2**. This information informs a general understanding of fish and fish habitat and the potential for effects. Additional detail may be required to meet permit requirements.

## 2.2 Methodologies

The methods to characterize existing conditions for fish and fish habitat in the impoundment are described below.

### 2.2.1 Study Area

The local assessment area (LAA) for desktop analysis of fish and fish habitat in relation to the Project was described in **Section 1.1.2**. For the fish and fish habitat field program conducted in 2021, the study area was focussed on the upstream portion of the LAA (i.e., a portion of the impoundment area upstream of the Station), within the wetted channel of the Nepisiguit River as well as the riparian areas (**Figure 2**). Due to logistics and safety concerns, fish and fish habitat surveys were conducted solely within the upstream side of the falls, near the boat launch and safety boom. This is because the

presence of a deeply incised gorge at the base of Nepisiguit Falls, limited access, and a highly dynamic environment at this location made for conditions too unsafe to carry out a field program downstream of the Station.

### 2.2.2 Desktop Analysis

Desktop analysis of readily available information from reputable sources on the aquatic setting of the Nepisiguit River, its associated fish habitat, water quality, and fish species assemblages around the Project site was conducted and summarized as part of the EIA registration; it can be referenced in Section 5.6 of the EIA Registration document (Dillon 2021). Prior to completing the fish and fish habitat field surveys, Dillon reviewed the results of the desktop analysis to assist in scoping, and preparing for, the field surveys. Information sources included:

- A report from the AC CDC (2021) detailing historical observations of SAR and SOCC within 100 km of the Station;
- Information, documents and reports from the Department of Fisheries and Oceans Canada (DFO);
- Habitat assessment methodology from the New Brunswick Department of Natural Resources and Energy Development (NBDNRED);
- Water quality information from the New Brunswick Department of Environment and Local Government (NBDELG);
- Status reports with respect to the recommended conservation status of various species as assessed by COSEWIC, the federal SARA and NB SARA; and
- High resolution aerial photography.

### 2.2.3 Field Survey Methods

Several environmental surveys were combined into an aquatic field program including fish and fish habitat surveys, in-situ water quality measurements, surface water sampling, and sediment sampling. Survey locations were upstream of the Station within the predefined study area (described in **Section 2.2.1**) and were completed during the summer 2021 field season during low flow conditions. The field survey team was led by Dillon aquatic sciences staff, an experienced aquatic biologist from Boreal Environmental, and supplemented by a representative from the Mi'gmawe'l Tplu'taqnn Inc. (MTI) and NB Power's field liaison Jennica Doucet, MIT. Field surveys for fish and fish habitat were conducted from July 6 to July 8, 2021. Dillon's aquatic biologist Sean Doyle, M.Sc. was the overall field lead for the survey.

The fish and fish habitat surveys were conducted using survey protocols based on NBDNRED (formerly NBDNR) and the 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 within the study area. 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. These methods are further described in the sub-sections below.

### 2.2.3.1 Fish Habitat Assessment

Using the NBDNRED and the DFO standard aquatic assessment forms, fish habitat and aquatic features were assessed within the study area, upstream of the Station along the Nepisiguit River. The habitat assessment was completed on four transects, two transects each upstream and downstream of the safety boom. Assessment criteria included:

- **Description of aquatic habitat type:**  
Habitat types within the watercourse were visually assessed as riffle, run, pool, or flat, where possible, in the study area;
- **Dominant substrate type and embeddedness:**  
Dominant substrate types were described and documented by percent of relative abundance based on visual assessment. Substrate type (e.g., gravel or silt) is especially important for fish spawning habitat;
- **Stream channel characteristics:**  
Stream channel characteristics including average wet width, approximate bankfull width, average wetted depth, and maximum wetted depth were estimated in the field;
- **Instream cover and overhead canopy cover ratings:**  
Instream cover such as submerged woody debris, cobble, boulders, and aquatic vegetation was visually assessed, and overhead canopy cover ratings (i.e., percent covered by shrubs and trees) were scored;
- **Fish habitat suitability:**  
Habitat suitability for fish was assessed based on the evaluation of habitat type, substrate type, instream cover, overhead cover, and other ecological observations in relation to documented habitat suitability index for salmonids and other species observed;
- **Environmental conditions and water level:**  
Environmental conditions (e.g., drier than normal seasonal conditions) were noted during the assessment and water level was rated as “low, moderate, or high”. Water clarity (turbidity) was also characterized using a visual assessment;
- **Bank stability:**  
Bank stability and presence of eroding banks (potential for natural and anthropogenic sources) was visually assessed within the study area; and
- **Riparian vegetation community:**  
The riparian vegetation community was described by percent trees, shrubs, grasses and bare ground within an approximate 15 m buffer adjacent to the watercourse. Aquatic vegetation was

also visually assessed and documented as part of aquatic vegetation communities and instream cover.

### 2.2.3.2 Fish Presence/Absence and Fish Assemblages

Qualitative fish presence assessments were completed using various passive and active methods. Active methods included backpack electrofishing, conventional angling, and seine netting. Passive methods included fyke netting and eel traps. A combination of these methods were used to accommodate the varying conditions in the study area upstream of the Station (refer to **Appendix A**). Assessment methods were designed to collect a representative sample of the fish community by distributing assessment efforts between habitat types (i.e., riffle, pool, and undercut banks) within the study area. Methods were used in accordance with Scientific Collection License (#322696) issued to Dillon by DFO. Additional details on each assessment (set lengths and locations, equipment settings) are provided in the results section and **Appendix A**. Fish capture methods included the following:

- A backpack electrofishing unit (Halltech HT2000) equipped with an 11-inch anode ring was used for the electrofishing surveys where conditions allowed, with one technician operating the electrofisher and two technicians to recover the fish using dip nets. Unit settings were 450 V and a frequency of 60 Hz, according to the conductivity of the watercourse and observed fish response. This method was used in shallow areas, in water less than a metre deep, with low velocity conditions above the dam.
- Fyke nets are modified hoops with nets and equipped with netted/webbed wings intended to intercept fish and funnel them into a trap net. Fyke nets can be set for 8 to 12 hour periods and were deployed with the aid of a boat where needed. This method was used in areas where the backpack electrofisher unit could not be used (i.e., in deeper water in the impoundment).
- Seine nets are large nets that hang vertically in the water with floatation devices on the top and weights on the bottom, used to intercept fish. Personnel held and manoeuvred the net on either side. The net was deployed in a circular shape in the water, and the net was slowly brought to shore and retrieved with the intent that fish are funneled into the net's catchment bag. This method was attempted in shallow areas, in water less than a metre deep. A total of four seine nets were deployed within the study area.
- Conventional angling was conducted where conditions allowed using conventional spin fishing methods. Angling was done from both the shore and from a boat above the Station, in the impoundment area.
- Eel and minnow traps funnel fish into a framed or cylindrical trap via a tapered mesh opening at the subsurface of the water using bait where once the fish swim through they cannot get out. Traps were set at various locations within the impoundment, and pet food and raw pork were used as bait.

It is noted that gill nets were not used for this Project because of concerns about fish injury/mortality that often result from their use.

## 2.2.3.3

**Surface Water Sampling**

Surface water samples (i.e., grab samples) were collected using the Canadian Council of Ministers of the Environment (CCME) Surface Water Sampling Protocol (CCME 2011) to collect one sample (SW 1) in the impoundment plus one duplicate sample (SW 2) upstream of the dam adjacent to a boat launch located upstream of the safety boom. Sample bottles were provided by the laboratory, and storage and transport protocols were conducted as determined by the laboratory.

In addition, in-situ measurements of water quality parameters using a YSI Pro Plus water quality meter were obtained at the same locations. In-situ measurements were taken within the top 0.5 m of the water surface and included: water temperature (°C), conductivity (µS/cm), dissolved oxygen (DO) (mg/L and %), total dissolved solids (TDS) (mg/L), and pH.

The collected surface water samples were sent to a Canadian Association for Laboratory Accreditation (CALA) laboratory (i.e., the Research and Productivity Council [RPC] laboratory in Fredericton, New Brunswick) to be analyzed for:

- Petroleum hydrocarbons (including: benzene, toluene, ethylbenzene, xylenes, VPH C6-C10, EPH >C10-C16, EPH >C16-C21, EPH >C21-C32, modified TPH Tier 1);
- General chemistry (including: total organic carbon, total suspended solids (TSS), turbidity, alkalinity, hardness, pH, nitrate and nitrite, total ammonia, sulphate, chloride, and fluoride); and
- Trace metals (total metals analysis, including: aluminum, cadmium, cobalt, copper, iron, nickel, lead, vanadium, zinc, and mercury).

Results were compared to the CCME environmental quality guidelines for chemical concentrations in various environmental media, as established in its Canadian Environmental Quality Guidelines (CEQG) for the protection of freshwater aquatic life (FWAL) (CCME 1999). Where CCME guidelines did not exist, relevant provincial guidelines were used for comparison purposes. For example, where no equivalent New Brunswick guidelines were available, applicable Nova Scotia guidelines were applied. The guidelines used for comparison to the surface water results are summarized in **Table 1** below.

**Table 1. Surface Water Quality Guidelines**

Guideline	Description
Canadian Council of Ministers of the Environment Canadian Water Quality Guidelines for the Protection of Aquatic Life	Canadian environmental quality guidelines that provide science based goals for the protection and quality of aquatic ecosystems (CCME 1999).
Nova Scotia Environmental Quality Standards for Contaminated Sites Rationale and Guidance Document	Nova Scotia Environment (NSE) guidance for the assessment and remediation of contaminated sites for various chemicals in surface water (NSE 2014).
Atlantic Risk-Based Corrective Action for Petroleum Impacted Sites in Atlantic Canada	Guidelines for ecological screening levels for petroleum hydrocarbons (Atlantic PIRI 2021).

## 3.0 Results and Discussion

The results of the desktop assessment as well as the field studies are presented below.

### 3.1 General Setting

Over 90% of the lands within the Tjigog ecodistrict are forested with dominate tree species consisting of intermediate to mature intolerant hardwood and softwood species (Zelazny 2007). Forested area in the LAA consists of white birch (*Betula papyrifera*), trembling aspen (*Populus tremuloides*), red maple (*Acer rubrum*), red spruce (*Picea rubens*), black spruce (*Picea mariana*), balsam fir (*Abies balsamea*), and scattered eastern white pine (*Pinus strobus*).

The Project is located within the Nepisiguit River watershed. The Nepisiguit River is located in the northeastern inland portion of New Brunswick, flowing for over 120 km and starting at the Nepisiguit Lakes and draining to the Bay of Chaleur at Bathurst, New Brunswick (GeoNB 2021). The Nepisiguit River boasts numerous lakes and tributaries which provide access for tourism and recreation and have been historically important for the now less dominant forestry, fisheries, and agricultural industries of the area.

Importantly, the Nepisiguit River provides habitat for several freshwater and saltwater (i.e., diadromous) fish species. Freshwater species recreationally fished species (i.e., brook trout (*Salvelinus fontinalis*), and Atlantic salmon (*Salmo salar*) and non-sport fish (i.e., American eel (*Anguilla rostrata*), gaspereau (*Alosa pseudoharengus*), rainbow smelt (*Osmerus mordax*), American shad (*Alosa sapidissima*), striped bass (*Morone saxatilis*), sea lamprey (*Petromyzon marinus*), white sucker (*Catostomus commersonii*) as well as a variety of minnow species). The Nepisiguit Falls are a natural barrier to fish passage, thus the fish species assemblage below the Station, which includes Atlantic salmon and other diadromous fish, is more diverse than it is above the Station.

Like much of northern and central New Brunswick, the Nepisiguit River and surrounding lands were first occupied by the Mi'kmaq people since time immemorial (White 1871). The Nepisiguit River, as many others within the province of New Brunswick, was used as a primary mode of transportation and means of sustenance since time immemorial by the Mi'kmaq peoples. The historic Nepisiguit Mi'gmaq Trail, a traditionally important trail network that is still in use today, follows the Nepisiguit River for approximately 150 km from Daly Point Nature Reserve at the Bathurst Harbour (i.e., outlet of the Nepisiguit River) to the Bathurst Lakes camps in Mount Carleton Provincial Park. The trail is thousands of years old and was used to access tribal hunting, fishing, trapping, and gathering sites, including those accessed during seasonal migrations following the availability/seasonality of resources. The trail was also used as a thoroughfare, which the Mi'kmaq peoples traveled to trade with other First Nation communities (NMTP 2020). Based on this longstanding use and present day cultural importance, the trail and lands along the Nepisiguit River are considered to be rich in cultural heritage and have a high probability of undiscovered archaeological artifacts and/or sites (NMTP 2020). The general area of

Nepisiguit Falls is likely still used by Indigenous people for traditional practices such as hunting, fishing, ceremonial, and gathering purposes.

## 3.2 Desktop Assessment Results

This section provides a brief overview of desktop information reviewed in preparation for the field surveys. The results of more detailed desktop analysis conducted on available fish and fish habitat data/information can be referenced in Section 5.6 of the EIA Registration document (Dillon 2021).

### 3.2.1 General

Nepisiguit Falls itself is impassable to diadromous fish (i.e., fish that migrate between freshwater and marine environments) because of its approximate 30 m drop in elevation, and, therefore, fish assemblages are vastly different when comparing reaches above (upstream) and below (downstream) of the Station. The lower reach of the watershed provides habitat for the majority of aquatic species in the system.

Although the impoundment associated with the Station is an anthropogenic feature that would have changed the physical characteristics of the Nepisiguit River, this area may now provide some cool water refuge for species when water temperatures are high and water levels are low during summer months, as was noted within the study area during the field surveys.

### 3.2.2 Known Fish Species Assemblages

As noted in the EIA Registration document (Dillon 2021), a custom report was obtained from the Atlantic Canada Conservation Data Centre (AC CDC) for the area within 100 km radius of the Station, as there were not enough data to generate a comprehensive catalogue of species within a 5 km radius. This report (AC CDC 2021) provides information on known historical observations of SAR and SOCC, and is helpful in understanding possible fish species assemblages that may be present in the LAA as well as for planning of field studies.

As noted in AC CDC (2021), the following fish species have been recorded within 100 km of the Project Site, and may potentially be present in the Nepisiguit River:

- American shad (*Alosa sapidissima*);
- Blacknose dace (*Rhinichthys atratulus*);
- Brook trout (*Salvelinus fontinalis*);
- Common shiner (*Luxilus cornutus*);
- Gaspereau (*Alosa spp.*): Alewife (*Alosa pseudoharengus*) and Blueback herring (*Alosa aestivalis*);
- Creek chub (*Semotilus atromaculatus*);
- Rainbow smelt (*Osmerus mordax*);
- Sea lamprey (*Petromyzon marinus*);



- White sucker (*Catostomus commersonii*);
- American eel (*Anguilla rostrata*);
- Atlantic salmon (*Salmo salar*) – Gaspé-Southern Gulf of St. Lawrence population; and
- Striped bass (*Marone saxatilis*) – Southern Gulf of St. Lawrence population.

Further details are provided in Section 5.6.2 of the EIA Registration document (Dillon 2021).

### 3.2.3 Aquatic Species at Risk Habitat

American eel have a known occurrence in New Brunswick but were not observed during field surveys. American eel use rivers to swim to sea to spawn, as they are catadromous. They require both freshwater, where they spend most of their life, and saltwater, where they migrate to spawn in the Sargasso Sea (Page and Burr 1991). In freshwater, the American eel is found in rivers such as the Nepisiguit River and lakes up to 10 m deep with sufficient cover and dissolved oxygen (i.e., rock, sand, mud, woody debris, vegetation) (COSEWIC 2012), all of which were noted during the field surveys.

Although not observed during field surveys, Atlantic salmon (Gaspé-Southern Gulf of St. Lawrence population) have been recorded and/or have historically been found in the Nepisiguit River (COSEWIC 2010) in areas downstream of Nepisiguit Falls. Habitat requirements for Atlantic salmon include shallow riffles with gravel, rubble, rock, or boulder substrates, while “redds” require gravel beds near head of riffles, or the tail of a pool (Page and Burr 1991).

### 3.2.4 Environmentally Significant Areas

There is one biologically significant area within 5 km of the Project footprint (AC CDC 2021). The Doctor Bells Meadow Environmentally Significant Area (ESA) located approximately 5 km directly south of the Project area (AC CDC 2021). There are no Protected Natural Areas (PNAs) within 5 km of the LAA. No unique or limited habitat types were observed within the study area during the field survey.

### 3.2.5 Traditional Knowledge

An Indigenous traditional land and resource use study has not been completed for this Project, and Indigenous consultation is ongoing. However, it is likely that parts of the Project site and surrounding area are still used by Indigenous people for traditional practices such as hunting, fishing, ceremonial, and gathering purposes. Within the Project Site, hunting is not permitted and recreational fishing is restricted. It is more likely that hunting, fishing, ceremony, and gathering would also take place within other more natural areas beyond the Project site, as these areas are more forested with less restrictions for access and use. It is expected that further information on traditional land, resource use, and knowledge will be obtained through ongoing consultation of First Nations in respect of the Project.

### 3.3 Field Survey Results

Fish and fish habitat surveys were conducted within the study area from July 6 to 8, 2021. The surveys were conducted in collaboration of Dillon aquatic sciences staff, Boreal Environmental, NB Power's field liaison, and a member of MTI. The results and discussion of each field survey type are discussed within the subsections below. See **Appendix D** for site photos.

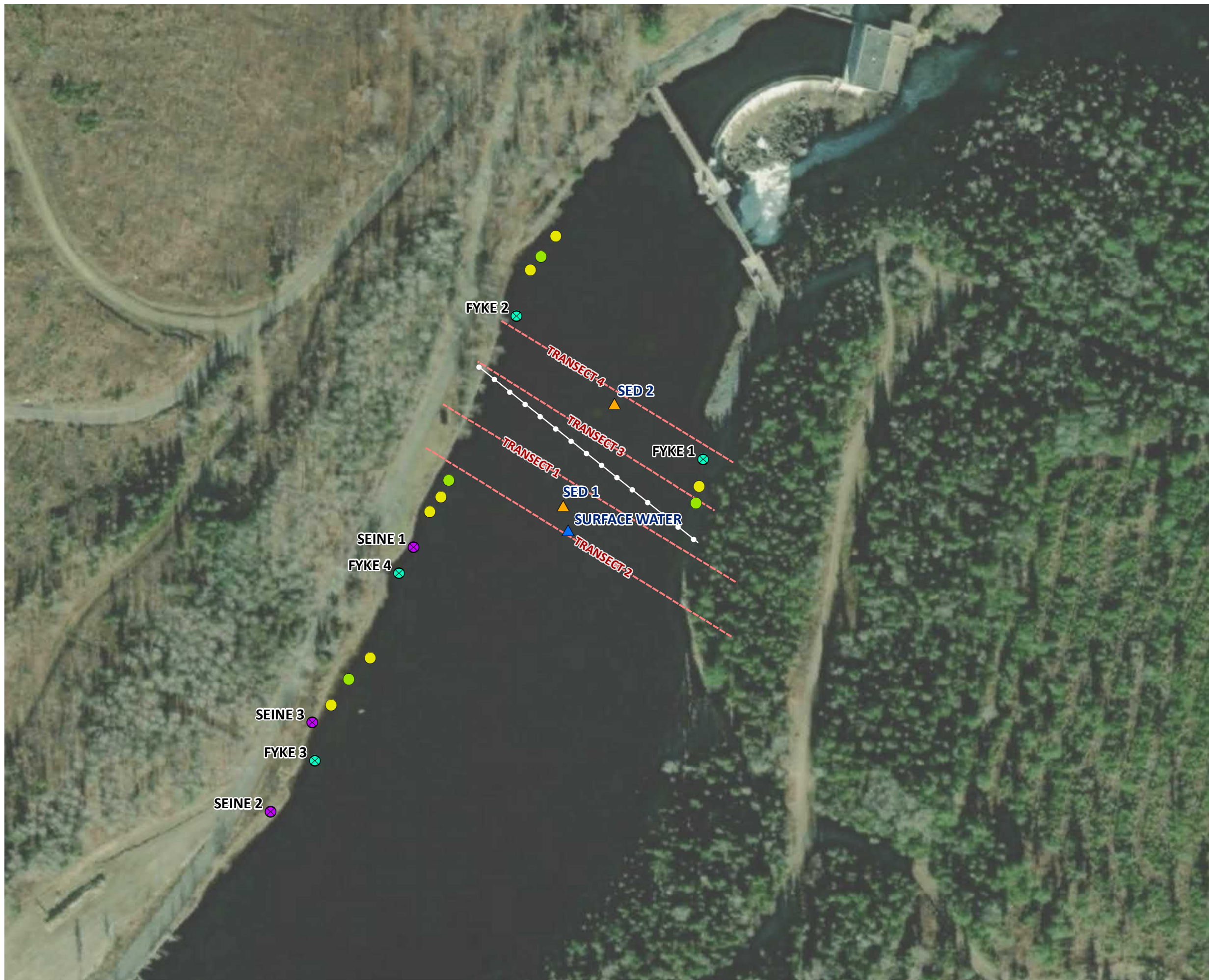
#### 3.3.1 Fish Habitat Assessment

The Nepisiguit River is a large fish bearing river that provides, in general, good quality habitat for various species of salmonids (i.e., trout and salmon), cyprinids (i.e., minnows), catostomatidae (i.e., sucker fish), gasterosteidae (i.e., sticklebacks), and anguilliformes (i.e., eels).

Fish habitat surveys were conducted via transects upstream (i.e., transects 1 and 2) and downstream (i.e., transects 3 and 4) of the safety boom (refer to **Figure 3** below). In general, this section of the Nepisiguit River was characterized as an impoundment. Within the impoundment, minnows were the most common species encountered during fish surveys, with white sucker and sticklebacks being common as well. Turbidity levels were low and no elevated sedimentation levels were observed during the field survey. Fish habitat results are summarized below. Refer to field data sheets in **Appendix A** for more details.

Sediment in the upper reach is dominated by bedrock and medium to smaller sized boulders, rock, and rubble with silt and organics. Minimal bank erosion was noted during the field surveys on both banks in some areas of sparse vegetation. The majority riparian areas were well vegetated and the natural presence of bedrock and boulders/rock/rubble along the watercourse banks which serve to protect against erosion.

The falls associated with the Station are a natural barrier to fish passage. No other obstructions to fish passage within the study area were observed during the field survey.



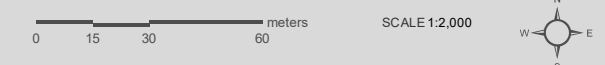
# NEPISIGUIT FALLS GENERATING STATION LIFE EXTENSION PROJECT

FISH AND FISH HABITAT TECHNICAL REPORT

## FISH AND FISH HABITAT SURVEY LOCATIONS

FIGURE 3

- Minnow Trap
- Eel Trap
- ⊗ Fyke Net
- ⊗ Seine Net
- ▲ Sediment Sample
- ▲ Surface Water Sample
- Transect
- Safety Boom (approximate location)



MAP DRAWING INFORMATION: ESRI, DIGITALGLOBE, GEOEYE, EATHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AERGRID, IGN, AND THE GIS USER COMMUNITY

DATA PROVIDED BY: DILLON CONSULTING, GEONB, ACCDC  
 MAP CREATED BY: MEC  
 MAP CHECKED BY: DM  
 MAP PROJECTION: NAD 1983 CSRS NEW BRUNSWICK STEREOGRAPHIC



PROJECT: 20-3641  
 STATUS: FINAL  
 DATE: 2022-02-09

### 3.3.2 In-situ Water Quality

The in-situ water quality parameters were collected upstream of the safety boom at the boat launch 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 (range between 7.11 and 8.49), temperature in degrees Celsius (°C) (range between 21.5 and 21.7 °C), dissolved oxygen in percentage (range between 82.1 and 87.4 %) and in milligrams per litre (range between 7.14 and 7.62 mg/L), total dissolved solids in milligrams per litre (range between 36.4 and 39.0 mg/L), and specific water conductance in microsiemens per centimetre (range between 56.4 and 57.6 µS/cm). The water quality parameters measured throughout the field survey are summarized in **Table 2** below.

**Table 2. Field Parameters for In-Situ Surface Water Quality at Station SW 1, July 6-8 2021**

Parameter	Date		
	July 6, 2021	July 7, 2021	July 8, 2021
Temperature (°C)	21.5	21.7	21.6
Conductivity (µS/cm)	56.4	59.8	57.6
Dissolved Oxygen (%)	83.4	82.1	87.4
Dissolved Oxygen (mg/L)	7.28	7.14	7.62
Total Dissolved Solids (mg/L)	36.4	39.0	38.2
pH (units)	7.11	8.49	8.07

As noted above, surface temperature was consistently slightly above 20°C, which is considered to be relatively warm in relation to fish habitat (MacMillan et al. 2005), although not unexpected given the hot summer conditions experienced throughout summer 2021. 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. 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 CEQG FWAL acceptable range of 6.5 to 9.0. The DO values were above the CCME DO requirement for early life stages of warm water biota (6 mg/L), but below the CCME DO requirement of early life stages of cool water biota (9.5 mg/L) (CCME 1999). Higher DO levels may occur at lower depths in the impoundment.

### 3.3.3 Surface Water Sampling Results

Two surface water samples were collected during the field surveys on July 8, 2021, within the study area (refer to **Figure 3**). The water samples were submitted to the Research and Productivity Council (RPC) Laboratory in Fredericton, New Brunswick. RPC holds a Canadian Association for Laboratory Accreditation (CALA) as well as being accredited by the Standards Council of Canada (SCC).

The results of the surface water quality laboratory analyses are provided in **Tables 3** and **4** below.

Table 3. Metals and General Chemistry Concentrations in Surface Water

Parameter (metals)	CCME Water Quality Guidelines for the Protection of Aquatic Life in Freshwater (µg/L)	Nova Scotia Tier I EQS for Surface Water (µg/L)	SW 1 (µg/L) 08-Jul-21	SW 2 (µg/L) 08-Jul-21	Parameter (general chemistry)	CCME Water Quality Guidelines for the Protection of Aquatic Life in Freshwater (mg/L)	SW 1 (mg/L) 08-Jul-21	SW 2 (mg/L) 08-Jul-21
Aluminum	100	-	21	23	Sodium	NG	1.84	1.81
Antimony	NG	20	< 0.1	< 0.1	Potassium	NG	0.40	0.41
Arsenic	5	-	< 1	< 1	Calcium	NG	5.30	5.28
Barium	NG	1,000	4	4	Magnesium	NG	1.05	1.05
Beryllium	NG	5.3	< 0.1	< 0.1	Iron	NG	0.05	0.06
Bismuth	NG	NG	< 1	< 1	Manganese	NG	0.022	0.025
Boron	1,500	-	2	2	Copper	0.002	< 0.001	< 0.001
Cadmium	0.04	-	0.02	0.02	Zinc	0.007	0.006	0.007
Calcium	NG	NG	5,300	5,280	Ammonia (as N)	NG	< 0.05	< 0.05
Chromium	1	-	< 1	< 1	pH (units)	6.5-9.0	7.6	7.5
Cobalt	NG	10	< 0.1	< 0.1	Alkalinity (as CaCO <sub>3</sub> )	NG	19	19
Copper	2	-	< 1	< 1	Chloride	640	0.6	0.6
Iron	300	-	50	60	Sulfate	NG	2	2
Lead	1	-	< 0.1	< 0.1	Nitrate + Nitrite (as N)	NG	< 0.05	< 0.05
Lithium	NG	NG	0.2	0.2	o-Phosphate (as P)	NG	< 0.01	< 0.01
Magnesium	NG	NG	1,050	1,050	r-Silica (as SiO <sub>2</sub> )	NG	7.0	7.2
Manganese	240	-	22	25	Carbon Total Organic	NG	2.9	2.7
Mercury	0.026	NG	-	-	Tannin & Lignin	NG	-	-
Molybdenum	73	-	0.2	0.2	Turbidity (NTU)	NG	0.5	0.6
Nickel	25	-	< 1	< 1	Solids - Total Suspended	NG	-	-
Potassium	NG	NG	400	410	Conductivity (us/cm)	NG	48	48
Rubidium	NG	NG	0.7	0.7	Bicarbonate (as CaCO <sub>3</sub> )	NG	18.9	18.9
Selenium	1	-	< 1	< 1	Carbonate (as CaCO <sub>3</sub> )	NG	0.071	0.056
Silver	0.25	-	< 0.1	< 0.1	Hydroxide (as CaCO <sub>3</sub> )	NG	0.020	0.016
Sodium	NG	NG	1,840	1,810	Cation Sum (meq/L)	NG	0.445	0.443
Strontium	NG	21,000	17	17	Anion Sum (meq/L)	NG	0.438	0.438
Tellurium	NG	NG	< 0.1	< 0.1	Percent Difference (%)	NG	0.79	0.57
Thallium	0.8	-	< 0.1	< 0.1	Theoretical Conductivity (µS/cm)	NG	44	44
Tin	NG	NG	< 0.1	< 0.1	Hardness (as CaCO <sub>3</sub> )	NG	17.6	17.5
Uranium	15	-	< 0.1	< 0.1	Ion Sum	NG	30	30
Vanadium	NG	6	< 1	< 1	Saturation pH (5°C)	NG	9.5	9.5
Zinc	7	-	6	7	Langelier Index (5°C)	NG	-1.92	-2.02

**Notes:**  
 "-" CCME Guideline applies-  
 NG = no guideline available  
 Bolded and green background denotes concentration exceeds 2014 Nova Scotia Tier I Environmental Quality Standards  
 Bolded and blue background denotes concentration exceeds the CCME Freshwater Guidelines  
 "-" Denotes Parameter Not Analyzed  
 Bolded and blue background denotes concentration exceeds the CCME Freshwater Guidelines

Table 4. Petroleum Hydrocarbon Concentrations in Surface Water

Sample	Sample Date	BTEX Concentration (mg/kg)				Modified Total Petroleum Hydrocarbons (mg/kg)				
		Benzene	Toluene	E. Benzene	Xylenes	Purgeable C <sub>6</sub> - C <sub>10</sub>	Purgeable C <sub>10</sub> - C <sub>16</sub>	Extractable C <sub>16</sub> - C <sub>21</sub>	Extractable C <sub>21</sub> - C <sub>32</sub>	Total
SW 1	08-Jul-21	<0.001	< 0.001	< 0.001	< 0.001	<0.01	< 0.05	< 0.05	< 0.1	< 0.1
SW 2 (Duplicate)	08-Jul-21	<0.001	< 0.001	< 0.001	< 0.001	<0.01	< 0.05	< 0.05	< 0.1	< 0.1
<b>2021 Atlantic PIRI Tier I ESL Surface water (FWAL)</b>		<b>2.10</b>	<b>0.77</b>	<b>0.32</b>	<b>0.33</b>	-	-	-	-	<b>0.1</b>
<b>Notes:</b> 'ND' denotes not detected                      "NR" denotes no resemblance "UP" denotes unknown peaks                "LO" denotes lube oil fraction "PLO" denotes possible lube oil fraction Bold and green background denotes values exceed the Atlantic PIRI Tier I ESL										

The results of metals in surface water (**Table 3**) were below the applicable CCME guidelines for the surface water samples collected. General chemistry results for surface water are also summarized in **Table 3**. There are no applicable guidelines for these parameters; however, the general chemistry results fall within the expected range of a typical New Brunswick watercourse.

Metals in surface water were also compared to the Nova Scotia Tier I Environmental Quality Standards (EQS) for surface water where CCME guidelines do not exist; metals in surface water were below the Nova Scotia Tier I EQS except for copper (lab result 7 µg/L; 2 µg/L guideline).

Hydrocarbon results in surface water are summarized in **Table 4**. Concentrations of petroleum hydrocarbons were below the laboratory detection limits and therefore the samples meet the applicable guidelines.

#### 3.3.4 Sediment Sampling Results

Two sediment samples were collected during the field surveys on July 8, 2021, within the study area (refer to **Figure 3**). The sediment samples were submitted to the RPC laboratory in Fredericton, New Brunswick.

The results of the sediment water quality laboratory analyses are summarized in **Tables 5, 6, and 7** below; full details are provided in **Appendix C**.

**Table 5. Metal Concentrations in Sediment**

Parameter	Atlantic PIRI Ecological Tier II Pathways Specific Standards (PSS) for Sediment – Freshwater (mg/kg)	SED 1		SED 2
		08-Jul-21	08-Jul-21 (LD)	08-Jul-21
Aluminum	NB	12,400	12,800	11,500
Antimony	25	< 0.1	< 0.1	0.1
Arsenic	17	7	6	8
Barium	NB	29	31	24
Beryllium	NB	0.5	0.5	0.5
Bismuth	NB	< 1	< 1	< 1
Boron	NB	< 1	< 1	< 1
Cadmium	3.5	0.3	0.33	0.21
Calcium	NB	1,570	1,570	1,440
Chromium	90	21	22	18
Cobalt	NB	7.4	8	6.8
Copper	197	14	15	11
Iron	43,766	20,500	21,200	19,900
Lead	91.3	11.4	11.3	10.7
Lithium	NB	13	13.4	11.9
Magnesium	NB	6,500	6,840	6,160
Manganese	1,100	339	369	346
Mercury	0.486	< 0.01	< 0.01	< 0.01
Molybdenum	NB	0.4	0.4	0.5
Nickel	75	20	22	18
Potassium	NB	900	940	880
Rubidium	NB	8.6	8.9	7.7
Selenium	2	< 1	< 1	< 1
Silver	0.5	< 0.1	< 0.1	< 0.1
Sodium	NB	70	80	130
Strontium	NB	6	6	6
Tellurium	NB	< 0.1	< 0.1	< 0.1
Thallium	NB	< 0.1	< 0.1	< 0.1
Tin	NB	< 1	< 1	< 1
Uranium	NB	1.4	1.3	1.1
Vanadium	NB	24	27	23
Zinc	315	192	216	187

**Notes:**  
 "LD" denotes laboratory duplicate sample.  
 "NB" denotes benchmark not available.  
 Bold and pink background denotes concentration exceeds the Atlantic PIRI Tier II PSS.



**Table 6. Petroleum Hydrocarbon Concentrations in Sediment**

Sample	Sample Date	BTEX Concentration (mg/kg)				Petroleum Hydrocarbons (mg/kg)						Resemblance
		Benzene	Toluene	Ethylbenzene	Xylenes	Purgeable C <sub>6</sub> - C <sub>10</sub>	Purgeable C <sub>10</sub> - C <sub>16</sub>	Extractable C <sub>16</sub> -C <sub>21</sub>	Extractable C <sub>21</sub> - C <sub>32</sub>	Extractable >C <sub>16</sub> -C <sub>32</sub>	Modified TPH (less BTEX)	
<b>SED 1</b>	08-Jul-21	< 0.02	< 0.05	< 0.02	< 0.05	< 2.5	< 12	89	73	160	160	UP
<b>SED 2</b>	08-Jul-21	< 0.005	< 0.05	< 0.01	< 0.05	< 2.5	< 12	< 12	< 12	< 12	< 21	NR
	08-Jul-21 (FD)	< 0.005	< 0.05	< 0.01	< 0.05	< 2.5	< 12	< 12	< 12	< 12	< 21	NR
<b>Atlantic PIRI Tier I ESLs</b> – Typical Petroleum Hydrocarbon Sediment Ecological Screening Levels for the Protection of Freshwater Aquatic Life		1.2	1.4	1.2	1.3	NB	NB	NB	NB	NB	15 25 43 500	Gasoline (G) Fuel Oil (F) Lube Oil (L) Max
<b>Notes:</b> "NB" denotes benchmark not available; "UP" denotes unknown peaks; "FD" denotes field duplicate. Bold and green background denotes concentration exceeds the 2021 Atlantic PIRI Tier I ESLs												

Table 7. Polycyclic Aromatic Concentrations in Sediment

Parameter	Units	RDL	Atlantic PIRI Ecological Tier II Pathways Specific Standards (PSS) for Sediment - Freshwater (mg/kg)	SED 1	SED 2	
				08-Jul-21	08-Jul-21	08-JUL-21 (FD)
Naphthalene	mg/kg	0.01	0.391	< 0.01	< 0.01	< 0.01
Acenaphthylene	mg/kg	0.01	0.128	< 0.01	< 0.01	< 0.01
Acenaphthene	mg/kg	0.01	0.0889	< 0.01	< 0.01	< 0.01
Fluorene	mg/kg	0.01	0.144	< 0.01	< 0.01	< 0.01
Phenanthrene	mg/kg	0.01	0.515	< 0.01	< 0.01	< 0.01
Anthracene	mg/kg	0.01	0.245	< 0.01	< 0.01	< 0.01
Fluoranthene	mg/kg	0.01	2.355	< 0.01	< 0.01	< 0.01
Pyrene	mg/kg	0.01	0.875	< 0.01	< 0.01	< 0.01
Benz(a)anthracene	mg/kg	0.01	0.385	< 0.01	< 0.01	< 0.01
Chrysene/Triphenylene	mg/kg	0.01	0.862	< 0.01	< 0.01	< 0.01
Benzo(b+j)fluoranthene	mg/kg	0.01	13.4	< 0.01	< 0.01	< 0.01
Benzo(k)fluoranthene	mg/kg	0.01		< 0.01	< 0.01	< 0.01
Benzo(e)pyrene	mg/kg	0.01	0.782 <sup>#1</sup>	< 0.01	< 0.01	< 0.01
Benzo(a)pyrene	mg/kg	0.01	0.782	< 0.01	< 0.01	< 0.01
Indeno(1,2,3-c,d)pyrene	mg/kg	0.01	3.2	< 0.01	< 0.01	< 0.01
Benzo(g,h,i)perylene	mg/kg	0.01	0.32	< 0.01	< 0.01	< 0.01
Dibenz(a,h)anthracene	mg/kg	0.01	0.135	< 0.01	< 0.01	< 0.01

**Notes:**

#1. Benzo(e)pyrene benchmark is not available; however, it is structurally similar to benzo(a)pyrene. On this basis, the available benzo(a)pyrene benchmark was applied as a surrogate benchmark.

"FD" denotes field duplicate sample.

Bold and pink background denotes concentration exceeds the Atlantic PIRI Tier II PSS.

There were detections of several metals above the laboratory reporting limits in the sediment samples. However, concentrations were below the Atlantic PIRI Tier II Pathway Specific Standards (PSS) for Sediment-Freshwater.

There was an unknown petroleum hydrocarbon detected above applicable guideline concentrations in sediment sample SED 1; however there were no detectable hydrocarbon concentrations in sediment sample SED 2. Refer to **Figure 3** for sediment sampling locations.

Concentrations of polycyclic aromatic hydrocarbons were below laboratory detection limits and therefore below applicable guidelines.

### 3.3.5 Fish Presence and Assemblage

Qualitative fish presence assessments in the study area were conducted on July 6 to 8, 2021 by Dillon aquatic sciences staff, Boreal Environmental staff, an NB Power representative, and a member of Mi'gmaw'e'l Tplu'taqnn Inc. (MTI), all of whom were experienced in conducting fish surveys. The weather conditions at the time of the surveys were sunny, and daytime temperatures hovered around 25°C. The water levels noted at the time of the field survey were considered to be seasonally low (due to a hot and dry summer).

A variety of methods as described above in **Section 2.2.3.2** were used to accommodate the varying conditions throughout the study area (refer to **Figure 3** above). Of the methods presented in **Section 2.2.3.2**, seine netting was most successful in obtaining fish presence data. The identification of the fish species captured is presented in **Table 8**, below. In total, over 300 individual fish of twelve distinct species were captured, weighed, and measured for length (i.e., fork length) (refer to field data sheets in **Appendix A**); in addition, several unidentified minnows were captured in great abundance but were too small to be identified by species.

**Table 8. Summary of Fish Species Observed within the Study Area, July 6-8, 2021**

Common Name	Scientific Name	Number of Individuals	Capture Methods	Average Weight and Fork Length	Maximum and Minimum Weight	Maximum and Minimum Fork Length
Creek chub	<i>Semotilus atromaculatus</i>	52	Seine net, minnow trap	2.52 g; 59 mm	3.71 g; 0.80 g	70 mm; 45 mm
Lake chub	<i>Couesius plumbeus</i>	3	Seine net, minnow trap	2.12 g; 53 mm	2.50 g; 1.75 g	58 mm; 45 mm
Blacknose dace	<i>Rhinichthys atratulus</i>	16	Seine net	1.39 g; 44 mm	1.81 g; 0.71 g	47 mm; 39 mm
Northern Redbelly dace	<i>Chrosomus eos</i>	3	Minnow trap	1.67 g; 53 mm	1.80 g; 1.50 g	50 mm; 58 mm
Finescale dace	<i>Chrosomus neogaeus</i>	4	Seine net	1.43 g; 46 mm	1.71 g; 1.12 g	51 mm; 38 mm
Pearl dace	<i>Semotilus margarita</i>	11	Seine net	2.12 g; 51 mm	4.51 g; 0.51 g	67 mm; 32 mm
White sucker	<i>Catostomus commersoni</i>	29	Fyke net, Seine net	6.88 g; 63 mm	54.74 g; 0.18 g	24 mm; 175 mm
Blackspotted stickleback	<i>Gasterosteus wheatlandi</i>	5	Seine net	1.10 g; 47 mm	1.30 g; 0.95 g	55 mm; 38 mm
Threespine stickleback	<i>Gasterosteus aculeatus</i>	7	Seine net, minnow trap	1.50 g; 51 mm	2.60 g; 0.80 g	58 mm; 44 mm
Fourspine stickleback	<i>Apeltes quadracus</i>	6	Seine net, minnow trap	0.69 g; 43 mm	1.25 g; 0.10 g	51 mm; 23 mm
Ninespine stickleback	<i>Pungitius</i>	14	Seine net, minnow trap	0.85 g; 44 mm	1.80 g; 0.13 g	55 mm; 28 mm
Banded killifish	<i>Fundulus diaphanus</i>	6	Seine net, electrofishing	1.18 g; 50 mm	2.01 g; 0.37 g	60 mm; 35 mm
Unidentified minnow	<i>Cyprinidae sp.</i>	200+	Fyke net, Seine net	0.40 g	-	-

As indicated in **Section 2.2.3.2**, both active and passive fishing methods were employed to gather fish assemblage data. Active fishing methods consisted of conventional angling, seine netting, and electrofishing. A summary by each fishing method is as follows.

- **Electrofishing:** An open site single pass was completed at the boat launch area using the electrofisher with a fishing period of 282 seconds.
- **Angling:** Conventional angling took place on July 8, 2021. Angling was not successful in capturing fish (see **Appendix D, Photo 5**).
- **Seine Netting:** Seine netting was conducted at three locations upstream of the safety boom. This was the most successful method in capturing fish (see **Appendix D, Photo 4**).
- **Fyke Nets:** Fyke nets were deployed in four areas, two each upstream and downstream of the safety boom. These nets were deployed three times and were collected 12 hours after each deployment. A minimal amount of fish were captured using this method, as noted in **Table 8** (see **Appendix D, Photo 3**).
- **Eel Traps/minnow traps:** Two eel traps, and two minnow traps were deployed three times and were collected 12 hours after each deployment. The eel traps were empty when retrieved; however, the minnow traps were successful in capturing numerous fish.

Overall, juveniles of an unknown cyprinid species were the most abundant species observed, but were too small for positive identification. The second most abundant species observed was the creek chub, followed by white sucker. Low numbers (i.e., five or less) of blackspotted stickleback, lake chub, northern redbelly dace, and finescale dace were observed (refer to **Table 8**).

### 3.3.6 Aquatic Species at Risk and Species of Conservation Concern

A custom AC CDC (2021) data report was obtained for a 100 km radius around the LAA. Refer to Section 5.6 of the EIA registration document for a description of SAR and SOCC that have been observed within the LAA.

No fish/aquatic SAR or SOCC were observed during the fish and fish habitat field surveys.

## Summary and Conclusion

This technical report is intended to supplement the EIA registration for the Nepisiguit Falls Generating Station Life Extension Project and meet the requirements of the New Brunswick “Guide to Environmental Impact Assessment in New Brunswick” (EIA Guide; NBDELG 2018). This report summarizes the methods and results of the fish and fish habitat field assessment, including fish SAR and SOCC, and unique or protected aquatic habitats, as well as surface water and sediment quality sampling completed in the 2021 field season.

Results of the qualitative fish presence assessments confirm that a number of species identified in the desktop review, including numerous minnow species, sticklebacks, and white sucker, are present and using habitats offered within the study area. No SAR/SOCC were observed during the field survey. Based on available background data reviewed and presented within the EIA Registration document (Dillon 2021), other species that were not observed during the field survey may be present.

The results of the surface water sampling indicated a slightly elevated concentration of copper above the NS Tier I EQS guidelines within the sample collected. The remaining metals analyzed in surface water were below the applicable CCME and NS Tier I EQS guidelines. Hydrocarbon concentrations were also below the applicable CCME and NS Tier I EQS guidelines. The results of the general chemistry analysis along with the YSI measurements taken in the field were all within the expected range for this environment and with the exception of temperature (due to the warm summer conditions), were within acceptable ranges that can support salmonids and the fish species observed.

The results of the fish and fish habitat field surveys confirm that fish occupancy and suitable habitats are present within the study area. The assessment of potential interactions and proposed mitigation for fish and fish habitat with respect to the Project are outlined in Section 5.6 of the EIA Registration document (Dillon 2021).

## 5.0

## Closure

This report was prepared by Dillon Consulting Limited (Dillon) on behalf of the New Brunswick Power Corporation, in support of the EIA and permitting of the Nepisiguit Falls Generating Station Life Extension Project. 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.

Yours truly,

**DILLON CONSULTING LIMITED**



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

## 6.0

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# Appendix A

## *Fish and Fish Habitat Field Data Sheets*



Project No.	20-3641-4000
Proj Manager	Denis Marquis
Site No./ Name	Nepisguit Dam
Client / SOW No.	
Client	NB Power
Date	July 6/2021
Dillon Staff	TC + SD

### DAILY FIELD REPORT

Weather <u>Sunny</u>	On Site <u>10:00</u>	Travel Time <u>3.5</u>
Temp <u>20°C</u>	Off Site <u>5:00</u>	Total Hours <u>11</u>

Service Locates	Complete	Details:	Info. Attached
GAS			
ELEC			
MUNICIPAL			
TELE			
OTHER			
OTHER			


Not Required

<b>Contractor on Site</b>		Details:
<input type="checkbox"/>	Yes	
<input checked="" type="checkbox"/>	No	

<b>Activities:</b>	Phase I	Phase II	Phase III
	Monitoring	Audit	Emergency Response
	Remediation	Hazmat	Air Quality
	<input checked="" type="checkbox"/> Other (desc.)	<u>Fish Habitat Survey</u>	

**Remarks:**

- Loaded up gear @ Warehouse and drove to site
- Completed H&S/Tailgate
- Set Fyke nets, minnow and eel traps
- Collected water quality data and completed some angling.
- Left site and checked into hotel
- Personal vehicle's used.

	Project No	0	Client	0	
	Project Manager	0	Date	0	
	Site Number	0	Dillon Staff	0	
Irving Unit Equipment - (DDCFEQ)	Unit	Quantity		Size	Rented (Y)
		Fredericton	Saint John		
Interface Probe (DDPRIF)					
Gastech / RKI Eagle Vapour Meter (DDGSTH)					
Metal Detector (DDMETD)	per Day (N/R)				
Data Logger (DDDLSP/day)					
Survey Gear (DDSREQ)					
<b>SAMPLING CONSUMABLES</b>					
Nitrile Gloves (DPGLOV)	pair (N/R)				
Ziplock Bags (DEZPBG)	individual (N/R)				
Ziplock Bags (DBZPBG)	box (N/R)				
<b>GROUNDWATER CONSUMABLES</b>					
Disposable Bailers (DEDISB)	each (N/R)				
Watterra Tubing (Macro) (5/8") (DFTB62)	feet (N/R)				
LDPE Tubing (Low Flow) (1/4") (DFTB25)	feet				
Silicon Tubing (for peristaltic) (DFTUBS)	feet				
Watterra Footvalves (Internal) (D16) (DEFTVL)	each (N/R)				
Watterra Footvalves (External) (D25) (DEFV25)	each (N/R)				
<b>WATER MONITORING GEAR</b>					
Interface Probe (DDPRIF)	per Day (N/R)				
Water Level Meter (DDWRLM)	per Day (N/R)				
Multimeter (Horiba) (DDMLTM)	per Day				
Multimeter (YSI) (DDYSIM)	per Day	1			
Flow Through Cell (Horiba/YSI) (DDFWTC)	per Day				
IRVING - Multimeter + Flow Through Cell (DDLFSE)	per Day				
Peristaltic Pump (DDPERP)	per Day				
Hydrolift (Watterra) Pump (DDHYDP)	per Day (N/R)				
Submersible Water Pump (Monsoon) (DDSBWP)	per Day (N/R)				
Well Casing Indicator (DDWLCD)	per Day				
Sollinst Levellogger/Barologger (DDDLSP)	per Day (N/R)				
<b>SOIL / SOIL VAPOUR SAMPLING</b>					
Teflon Tubing (Air Sampling) (1/4") (DFTTUB)	feet				
Gastech/RKI Eagle Vapour Meter (DDGSTH)	per Day (N/R)				
Rae Multi-Gas Monitor (DDMGMR)	per Day (N/R)				
SKC Personal Air/Vapour Pump (DDSKCP)	per Day (N/R)				
Hand Auger (DDHAUG)	per Day (N/R)				
Helium Shroud (DEHESH)	each (N/R)				
Galvanized Steel Extension (DEGSE2) (DEGSE4)	each / length (2', 4')				
Galvanized Steel Coupling (DEGVSC)	each				
<b>NATURAL RESOURCE</b>					
Electrofischer (DDELCF-day)	per Day	1			
Bat Meter (DDBATM)	per Day				
Minnow Trap (DDMINT)	per Day	3			
Secchi Disc (DDSDIC)	per Day				
Ponar Sampler (TBD)	per Day				
Ekman Sampler (TBD)	per Day				
Benthic Sieve Bucket (DDBSBK)	per Day				
<b>LOCATE / SURVEY</b>					
Metal Detector (DDMETD)	per Day (N/R)				
Utility Locator (Seektech SR22) (TBD)	per Day (N/R)				
Level Survey Gear (DDSREQ)	per Day (N/R)				
Total Station (DDTSTN)	per Day				
Trimble RTK (DDBGPS)	per Day				
Handheld GPS (DDHGPS)	per Day	1			
SPOT GPS (DDSGPS)	per Day				
<b>MONITOR WELL INSTALLATION/REPAIR</b>					
Downhole Pipe Cutter (DDPCUT)	per Day				
Compression/J-Plug (non-lockable) (DEJP2U)	each / 2", 4", 6"				
Compression/J-Plug (lockable) (DEJP2L)	each / 2", 4", 6"				
PVC Slip on Cap (DEPVC1, 2, 4, 6)	each / 2", 4", 6"				
Solid PVC Casing (5' long) (DEPVCC)	each				
Solid PVC Casing (10' long)	each				
Screened PVC (5' long) (DEPVCS)	each				
Screened PVC (10' long)	each				
PVC End Cap (install) (DEPVEC)	each				
Silica Sand (DBSDSL)	bag				
Sand (20kg bag) (DBSD20)	bag				
Sand (40kg bag) (DBSD40)	bag				
Bentonite (#20) (Med) (DDBENO)	bag				
Cement (Portland; 25kg bag) (DBCEMT)	bag				
Flushmount Cover (7" x 10") (DEFLM7)	each				
Flushmount Cover (10" x 12") (DEFLM12)	each				
Lock (DELOCK)	each				
<b>SPILLS</b>					
Oxygen Compound Socks (DEORCS)	pair (N/R)				
Absorbent Wick (DEAWCK)	each (N/R)				
Absorbent Pad (DEAPAD)	each (N/R)				
Absorbent Boom (DEABRM)	each (N/R)				
<b>OTHER</b>					
Field Tablet (TBD)	per Day				
GoPro (DDCAMW)	per Day				
Shop Vac (DDSVAC)	per Day (N/R)				
Generator (DDGENR)	per Day (N/R)				



Project No.	20-3641-4000
Proj Manager	Denis Marquis
Site No./ Name	Nepisquit Dam
Client / SOW No.	
Client	UB Power
Date	July 7/2021
Dillon Staff	TCA SD

### DAILY FIELD REPORT

Weather <u>Overcast</u>	On Site <u>8:00</u>	Travel Time <u>1</u>
Temp <u>22°C</u>	Off Site <u>4:30</u>	Total Hours <u>10</u>


Service Locates	Complete	Details:	Info. Attached
GAS			Not Required <input checked="" type="checkbox"/>
ELEC			
MUNICIPAL			
TELE			
OTHER			
OTHER			

<b>Contractor on Site</b>		Details:
<input type="checkbox"/>	Yes	
<input checked="" type="checkbox"/>	No	

<b>Activities:</b>	Phase I	Phase II	Phase III
	Monitoring	Audit	Emergency Response
	Remediation	Hazmat	Air Quality
	<input checked="" type="checkbox"/> Other (desc.)	<u>Fish Habitat Survey</u>	

**Remarks:**

- Drove to site from hotel
- Completed MFS / Tailgate
- Completed fish ID's of previous day nets.
- Moved Fyke, minnow and eel pots above boom.
- Completed seine netting and angling
- Completed Habitat Survey of site
- Returned to Hotel
- Personal Vehicle used.

	Project No	0	Client	0	
	Project Manager	0	Date	0	
	Site Number	0	Dillon Staff	0	
<b>Irving Unit Equipment - (DDCFEQ)</b>	<b>Unit</b>	<b>Quantity</b>		<b>Size</b>	<b>Rented (Y)</b>
		<b>Fredericton</b>	<b>Saint John</b>		
Interface Probe (DDPRIF)					
Gastech / RKI Eagle Vapour Meter (DDGSTH)					
Metal Detector (DDMETD)	per Day (N/R)				
Data Logger (DDDLSP/day)					
Survey Gear (DDREQ)					
<b>SAMPLING CONSUMABLES</b>					
Nitrile Gloves (DPGLOV)	pair (N/R)				
Ziplock Bags (DEZPBG)	individual (N/R)				
Ziplock Bags (DBZPBG)	box (N/R)				
<b>GROUNDWATER CONSUMABLES</b>					
Disposable Bailers (DEDISB)	each (N/R)				
Waterra Tubing (Macro) (5/8") (DFTB62)	feet (N/R)				
LDPE Tubing (Low Flow) (1/4") (DFTB25)	feet				
Silicon Tubing (for peristaltic) (DFTUBS)	feet				
Waterra Footvalves (Internal) (D16) (DEFTVL)	each (N/R)				
Waterra Footvalves (External) (D25) (DEFV25)	each (N/R)				
<b>WATER MONITORING GEAR</b>					
Interface Probe (DDPRIF)	per Day (N/R)				
Water Level Meter (DDWRLM)	per Day (N/R)				
Multimeter (Horiba) (DDMLTM)	per Day				
Multimeter (YSI) (DDYSIM)	per Day				
Flow Through Cell (Horiba/YSI) (DDFWTC)	per Day				
IRVING - Multimeter + Flow Through Cell (DDLFE)	per Day				
Peristaltic Pump (DDPERP)	per Day				
Hydrolift (Waterra) Pump (DDHYDP)	per Day (N/R)				
Submersible Water Pump (Monsoon) (DDSBWP)	per Day (N/R)				
Well Casing Indicator (DDWLCD)	per Day				
Soilnst Levellogger/Barologger (DDDLSP)	per Day (N/R)				
<b>SOIL / SOIL VAPOUR SAMPLING</b>					
Teflon Tubing (Air Sampling) (1/4") (DFTTUB)	feet				
Gastech/RKI Eagle Vapour Meter (DDGSTH)	per Day (N/R)				
Rae Multi-Gas Monitor (DDMGMR)	per Day (N/R)				
SKC Personal Air/Vapour Pump (DDSKCP)	per Day (N/R)				
Hand Auger (DDHAUG)	per Day (N/R)				
Helium Shroud (DEHESH)	each (N/R)				
Galvanized Steel Extension (DEGSE2) (DEGSE4)	each / length (2', 4')				
Galvanized Steel Coupling (DEGVSC)	each				
<b>NATURAL RESOURCE</b>					
Electrofisher (DDELFCF-day)	per Day				
Bat Meter (DDBATM)	per Day				
Minnow Trap (DDMINT)	per Day				
Secchi Disc (DDSDIC)	per Day				
Ponar Sampler (TBD)	per Day				
Ekman Sampler (TBD)	per Day				
Benthic Sieve Bucket (DDB5BK)	per Day				
<b>LOCATE / SURVEY</b>					
Metal Detector (DDMETD)	per Day (N/R)				
Utility Locator (Seektech SR22) (TBD)	per Day (N/R)				
Level Survey Gear (DDREQ)	per Day (N/R)				
Total Station (DDTSTN)	per Day				
Trimble RTK (DDBGPS)	per Day				
Handheld GPS (DDHGPS)	per Day				
SPOT GPS (DDSGPS)	per Day				
<b>MONITOR WELL INSTALLATION/REPAIR</b>					
Downhole Pipe Cutter (DDPCUT)	per Day				
Compression/J-Plug (non-lockable) (DEJP2U)	each / 2", 4", 6"				
Compression/J-Plug (lockable) (DEJP2L)	each / 2", 4", 6"				
PVC Slip on Cap (DEPVC1, 2, 4, 6)	each / 2", 4", 6"				
Solid PVC Casing (5' long) (DEPVCC)	each				
Solid PVC Casing (10' long)	each				
Screened PVC (5' long) (DEPVCS)	each				
Screened PVC (10' long)	each				
PVC End Cap (Install) (DEPVEC)	each				
Silica Sand (DBSDSL)	bag				
Sand (20kg bag) (DBSD20)	bag				
Sand (40kg bag) (DBSD40)	bag				
Bentonite (#20) (Med) (DDBENO)	bag				
Cement (Portland; 25kg bag) (DDBCEMT)	bag				
Flushmount Cover (7" x 10") (DEFLM7)	each				
Flushmount Cover (10" x 12") (DEFLM12)	each				
Lock (DELOCK)	each				
<b>SPILLS</b>					
Oxygen Compound Socks (DEORCS)	pair (N/R)				
Absorbent Wick (DEAWCK)	each (N/R)				
Absorbent Pad (DEAPAD)	each (N/R)				
Absorbent Boom (DEABRM)	each (N/R)				
<b>OTHER</b>					
Field Tablet (TBD)	per Day				
GoPro (DDCAMW)	per Day				
Shop Vac (DDSVAC)	per Day (N/R)				
Generator (DDGENR)	per Day (N/R)				



Project No.	20-34641-4000
Proj Manager	Denis Marguis
Site No./ Name	Nepisquit Dam
Client / SOW No.	
Client	ND Power
Date	July 8/2021
Dillon Staff	TC+SP

### DAILY FIELD REPORT

Weather <u>Sunny</u>	On Site <u>7:00</u>	Travel Time <u>3.5</u>
Temp <u>28°C</u>	Off Site <u>3:00</u>	Total Hours <u>12</u>

Service Locates	Complete	Details:	Info. Attached
GAS			
ELEC			
MUNICIPAL			
TELE			
OTHER			
OTHER			


Not Required

<u>Contractor on Site</u>		Details:
<input type="checkbox"/>	Yes	
<input checked="" type="checkbox"/>	No	

<u>Activities:</u>	<input type="checkbox"/> Phase I	<input type="checkbox"/> Phase II	<input type="checkbox"/> Phase III
	<input type="checkbox"/> Monitoring	<input type="checkbox"/> Audit	<input type="checkbox"/> Emergency Response
	<input type="checkbox"/> Remediation	<input type="checkbox"/> Hazmat	<input type="checkbox"/> Air Quality
	<input checked="" type="checkbox"/> Other (desc.)	<u>Fish Habitat Survey</u>	

Remarks:

- Drove to site from Hotel
- Completed MFS / Tailgate
- Collected Fish from fyke, minnow and eel pots.
- Completed Seine netting and collected water quality data
- Collected surface water and sediments samples
- Completed transects.
- Loaded equipment and drove back to office / warehouse
- Personal vehicle used.
- SW1 = SW2. (Field Duplicate)
- Submitted samples to RPC on July 12/2021.

	Project No	0	Client	0
	Project Manager	0	Date	0
	Site Number	0	Dillon Staff	0

Irving Unit Equipment - (DDCFEQ)	Unit	Quantity		Size	Rented (Y)
		Fredericton	Saint John		
Interface Probe (DDPRIF)					
Gastech / RKI Eagle Vapour Meter (DDGSTH)					
Metal Detector (DDMETD)	per Day (N/R)				
Data Logger (DDDLS/day)					
Survey Gear (DDSREQ)					
<b>SAMPLING CONSUMABLES</b>					
Nitrile Gloves (DPGLOV)	pair (N/R)	5			
Ziplock Bags (DEZPBG)	individual (N/R)				
Ziplock Bags (DBZPBG)	box (N/R)				
<b>GROUNDWATER CONSUMABLES</b>					
Disposable Bailers (DEDISB)	each (N/R)				
Watterra Tubing (Macro) (5/8") (DFTB62)	feet (N/R)				
LDPE Tubing (Low Flow) (1/4") (DFTB25)	feet				
Silicon Tubing (for peristaltic) (DFTUBS)	feet				
Watterra Footvalves (Internal) (D16) (DEFTVL)	each (N/R)				
Watterra Footvalves (External) (D25) (DEFV25)	each (N/R)				
<b>WATER MONITORING GEAR</b>					
Interface Probe (DDPRIF)	per Day (N/R)				
Water Level Meter (DDWRLM)	per Day (N/R)				
Multimeter (Horiba) (DDMLTM)	per Day				
Multimeter (YSI) (DDYSIM)	per Day	1			
Flow Through Cell (Horiba/YSI) (DDFWTC)	per Day				
IRVING - Multimeter + Flow Through Cell (DDLFSE)	per Day				
Peristaltic Pump (DDPERP)	per Day				
Hydrolift (Watterra) Pump (DDHYDP)	per Day (N/R)				
Submersible Water Pump (Monsoon) (DDSBWP)	per Day (N/R)				
Well Casing Indicator (DDWLCD)	per Day				
Sollinst Levellogger/Barologger (DDDLS)	per Day (N/R)				
<b>SOIL / SOIL VAPOUR SAMPLING</b>					
Teflon Tubing (Air Sampling) (1/4") (DFTTUB)	feet				
Gastech/RKI Eagle Vapour Meter (DDGSTH)	per Day (N/R)				
Rae Multi-Gas Monitor (DDMGMR)	per Day (N/R)				
SKC Personal Air/Vapour Pump (DDSKCP)	per Day (N/R)				
Hand Auger (DDHAUG)	per Day (N/R)				
Hellum Shroud (DEHESH)	each (N/R)				
Galvanized Steel Extension (DEGSE2) (DEGSE4)	each / length (2', 4')				
Galvanized Steel Coupling (DEGVSC)	each				
<b>NATURAL RESOURCE</b>					
Electrofisher (DDELCF-day)	per Day	1			
Bat Meter (DDBATM)	per Day				
Minnow Trap (DDMINT)	per Day	3			
Secchi Disc (DDSDIC)	per Day				
Ponar Sampler (TBD)	per Day				
Ekman Sampler (TBD)	per Day	1			
Benthic Sieve Bucket (DDBSBK)	per Day				
<b>LOCATE / SURVEY</b>					
Metal Detector (DDMETD)	per Day (N/R)				
Utility Locator (Seektech SR22) (TBD)	per Day (N/R)				
Level Survey Gear (DDSREQ)	per Day (N/R)				
Total Station (DDTSTN)	per Day				
Trimble RTK (DDBGPS)	per Day				
Handheld GPS (DDHGPS)	per Day	1			
SPOT GPS (DDSGPS)	per Day				
<b>MONITOR WELL INSTALLATION/REPAIR</b>					
Downhole Pipe Cutter (DDPCUT)	per Day				
Compression/J-Plug (non-lockable) (DEJP2U)	each / 2", 4", 6"				
Compression/J-Plug (lockable) (DEJP2L)	each / 2", 4", 6"				
PVC Slip on Cap (DEPVC1, 2, 4, 6)	each / 2", 4", 6"				
Solid PVC Casing (5' long) (DEPVCC)	each				
Solid PVC Casing (10' long)	each				
Screened PVC (5' long) (DEPVCS)	each				
Screened PVC (10' long)	each				
PVC End Cap (Install) (DEPVEC)	each				
Silica Sand (DBSDSL)	bag				
Sand (20kg bag) (DBSD20)	bag				
Sand (40kg bag) (DBSD40)	bag				
Bentonite (#20) (Med) (DBBENO)	bag				
Cement (Portland; 25kg bag) (DBCEMT)	bag				
Flushmount Cover (7" x 10") (DEFLM7)	each				
Flushmount Cover (10" x 12") (DEFLM12)	each				
Lock (DELOCK)	each				
<b>SPIILLS</b>					
Oxygen Compound Socks (DEORCS)	pair (N/R)				
Absorbent Wick (DEAWCK)	each (N/R)				
Absorbent Pad (DEAPAD)	each (N/R)				
Absorbent Boom (DEABRM)	each (N/R)				
<b>OTHER</b>					
Field Tablet (TBD)	per Day				
GoPro (DDCAMW)	per Day				
Shop Vac (DDSVAC)	per Day (N/R)				
Generator (DDGENR)	per Day (N/R)				



# ELECTROFISHING SITE FORM

Session ID#: \_\_\_\_\_  
 Date (yyyy-mm-dd): \_\_\_\_\_

Site ID#: \_\_\_\_\_  
 Site Name: \_\_\_\_\_

**STANDARDIZED STREAM TRANSECTS:**

Indicate which transect was used for the flow measurement calculation.

Transect #	Stream Type	WIDTH (m):		WETTED DEPTH (m)					BANKFULL DEPTH (m)		
		Wet	Bankfull	1/4	1/2	3/4	DIFF.	MAX	1/4	1/2	3/4
1				6.86	5.3	5.25	} Above Boom (US)				
2				7.08	6.80	5.34					
3				6.25	7.10	7.83					
4				5.68	8.25	7.30		} Below Boom (US)			

**STREAM BANK CHARACTERISTICS & CANOPY: based on the BANKFULL WIDTH**

**% OVERHEAD CANOPY**

- (e.g. mature trees)
- 0      0
  - 1      ≤ 1-20%
  - 2      21 - 40%
  - 3      41 - 70%
  - 4      71 - 90%
  - 5      >90%

	% Bank Erosion			% Bank Vegetation			
	Stable	Bare Stable	Eroding	Bare	Grasses	Shrubs	Trees
LEFT							
RIGHT							

**LARGE WOODY DEBRIS (LWD): Individual lengths (m)**

(Record for each piece if it is Dry (D), Wet (W) and if Wet what Stream Type does the piece fall within).

LWD(m)										
S. Type										

LWD(m)										
S. Type										

**% COVER BY TYPE:**

**POOL WITH STRUCTURE (PWS):**

Individual Measurements

	% Undercut		% OHV "Cover"	
	Wet	Bankfull	Wet	Bankfull
LEFT				
RIGHT				

PWS#	Length (m)	Width (m)	Area (m <sup>2</sup> )

**% INSTREAM COVER BY TYPE: based on WETTED area**

COVER TYPE	%
Turbulence	
Instream vegetation	
Instream SWD	
Other: Cobble	
Other: Boulder	
Other: (specify)	

**TOTAL BROOK TROUT COVER RATING: (visual estimate of the % stream wetted area that offers cover)**

- <20%     
  20-40%     
  40-60%     
  >60%

\*\*\*\*\*MUST COMPLETE FRONT SIDE OR FIRST PAGE OF FORM\*\*\*\*\*

# ELECTROFISHING SITE FORM

Fish Collection Permit #: 11847049  
 Session ID#: \_\_\_\_\_  
 Date (yyyy-mm-dd): \_\_\_\_\_  
 Water Name: \_\_\_\_\_  
 Tributary to: \_\_\_\_\_  
 Site ID#: \_\_\_\_\_  
 Site Name: \_\_\_\_\_  
 Agency: Dillon Consulting  
 Personnel: \_\_\_\_\_  
 Second Agency/Contact: \_\_\_\_\_  
 Weather: \_\_\_\_\_

**SITE COORDINATES:**  
 Start Waypoint ID#: \_\_\_\_\_ End Waypoint ID#: \_\_\_\_\_  
 Coordinates: \_\_\_\_\_ End Point \_\_\_\_\_  
 x/long: \_\_\_\_\_  
 y / lat: \_\_\_\_\_

Projection: (e.g., UTM) UTM Datum: (e.g., NAD83) NAD83

Site Pictures: \_\_\_\_\_

Water ID: \_\_\_\_\_ Drainage Code: \_\_\_\_\_

**Rating of the site for brook trout prior to electrofishing:**  
 Poor  Fair  Good  Excellent  
**Angler Pressure:** Low  Moderate  High   
**Access Rating:** Easy  Moderate  Difficult

**ELECTROFISHING DETAILS: (Reminder: electrofishing MUST proceed in upstream direction!)**  
 (check one of the choices under each of the following headings and provide additional details if required.)

**Method Used:**  
 Diminishing Returns  
 Catch Per Unit Effort  
 Spot Check  
 Salvage

**Site Set-Up:**  
 Open  Closed

**Gear Used: Model**  
 Backpack \_\_\_\_\_  
 Boat \_\_\_\_\_  
 Shore-based \_\_\_\_\_

**Settings:**  
 Voltage: \_\_\_\_\_  
 Frequency: \_\_\_\_\_  
 Duty-Cycle: \_\_\_\_\_  
 POW Setting: \_\_\_\_\_

Date: \_\_\_\_\_ (if different then habitat data) Power Output (watts): \_\_\_\_\_

Sweep/Effort # of Netters	1 (t= s)	2 (t= s)	3 (t= s)	4 (t= s)	5 (t= s)

**WATER CHEMISTRY:** (see "Forms Manual" for details)

Specific Water Conductivity (Cs) = \_\_\_\_\_ TDS (ppt) \_\_\_\_\_ pH \_\_\_\_\_

Dissolved Oxygen (mg/l) = \_\_\_\_\_ (%) \_\_\_\_\_  
 Water Clarity: Poor  Fair  Good

Temperature (oC) \_\_\_\_\_  

	Water	Air	Time
Start			
End			

 Water Level: Low  Moderate  High

**SITE DIMENSIONS: SUMMARY**

Length (m): \_\_\_\_\_  
 Average Wetted Width (m): \_\_\_\_\_  
 Average Bankfull Width (m): \_\_\_\_\_  
 Average Wetted Depth (m): \_\_\_\_\_  
 Average Bankfull Depth (m): \_\_\_\_\_  
 Maximum Site Depth (m): \_\_\_\_\_  
 Bankfull Area (m<sup>2</sup>): \_\_\_\_\_  
 Wetted Area (m<sup>2</sup>): \_\_\_\_\_

**STREAM TYPE:**

% of area	Qty
Riffle: _____	
Run: _____	
Rapid: _____	
Pool: _____	
Flat: _____	
Other: _____	

**SUBSTRATE TYPE: (% of wetted surface area)**

Bedrock (ledge): \_\_\_\_\_  
 Boulder (> 460 mm): \_\_\_\_\_  
 Rock (180 - 460 mm): \_\_\_\_\_  
 Rubble (54 - 179 mm): \_\_\_\_\_  
 Gravel (2.6 - 53 mm): \_\_\_\_\_  
 Sand (0.06 - 2.5 mm): \_\_\_\_\_  
 Fines (0.0005 - 0.05 mm): \_\_\_\_\_

**CHANNEL TYPE:**  Main  Side  Split  Bogan  
**% Embeddness:**  1 (< 20%)  2 (20 - 35%)  3 (35 - 50%)  4 (≥ 50%)

**Water Velocity (m/s):** \_\_\_\_\_  
 from meter  from calculation

**Water Flow (m<sup>3</sup>/sec):** \_\_\_\_\_

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

	Coefficient	FLOAT TIME (sec) of Length of ___m			
		¼ WAY	½ WAY	¾ WAY	Average
Smooth	0.9				
Rough	0.8				

where W = width, D = depth, A = coefficient for the stream bottom, L = length, and T = average float time

**Comments: \*Specific portions of the form were filled out as per DND instruction.**

\*\*\*\*\*MUST COMPLETE BACK SIDE OR SECOND PAGE OF FORM\*\*\*\*\*

# ELECTROFISHING SITE FORM

Session ID#: \_\_\_\_\_

Site ID#: \_\_\_\_\_

Date (yyyy-mm-dd): \_\_\_\_\_

Site Name: \_\_\_\_\_

**STANDARDIZED STREAM TRANSECTS:**

Indicate which transect was used for the flow measurement calculation.

Transect #	Stream Type	WIDTH (m):		WETTED DEPTH (m)					BANKFULL DEPTH (m)			
		Wet	Bankfull	1/4	1/2	3/4	DIFF.	MAX	1/4	1/2	3/4	

**STREAM BANK CHARACTERISTICS & CANOPY: based on the BANKFULL WIDTH**

**% OVERHEAD CANOPY**

- (e.g. mature trees)
- 0 0
  - 1 ≤ 1-20%
  - 2 21 - 40%
  - 3 41 - 70%
  - 4 71 - 90%
  - 5 >90%

	% Bank Erosion			% Bank Vegetation			
	Stable	Bare Stable	Eroding	Bare	Grasses	Shrubs	Trees
LEFT	35	10	5	5	10	10	25
RIGHT	40	5	5	5	5	15	30

**LARGE WOODY DEBRIS (LWD): Individual lengths (m)**

(Record for each piece if it is Dry (D), Wet (W) and if Wet what Stream Type does the piece fall within).

LWD(m)	lot of large woody debris both submerged						
S. Type	and on bank not being measured due to safety.						

**% COVER BY TYPE:**

**POOL WITH STRUCTURE (PWS):**

	% Undercut		% OHV "Cover"	
	Wet	Bankfull	Wet	Bankfull
LEFT	5	5	5	5
RIGHT	5	5	5	5

Individual Measurements

PWS#	Length (m)	Width (m)	Area (m2)

**% INSTREAM COVER BY TYPE: based on WETTED area**

COVER TYPE	%
Turbulence	0
Instream vegetation	5
Instream SWD	5
Other: Cobble	5
Other: Boulder	20
Other: (specify) Bedrock	10

**TOTAL BROOK TROUT COVER RATING: (visual estimate of the % stream wetted area that offers cover)**

- <20%     20-40%     40-60%     >60%

\*\*\*\*\*MUST COMPLETE FRONT SIDE OR FIRST PAGE OF FORM\*\*\*\*\*

# ELECTROFISHING SITE FORM

Fish Collection Permit #: 11847049  
 Session ID#: \_\_\_\_\_  
 Date (yyyy-mm-dd): July 7, 2021  
 Water Name: Nepisquit River  
 Tributary to: N/A  
 Site ID#: \_\_\_\_\_  
 Site Name: Boat Launch  
 Agency: Dillon Consulting  
 Personnel: Tyler Crocker, Sean Doyle, Nick Simon  
 Second Agency/Contact: Jenica Doucet (OB Power)  
 Weather: Sunny 25°C

### SITE COORDINATES:

Start Waypoint ID#: \_\_\_\_\_ End Waypoint ID#: \_\_\_\_\_  
 Coordinates: \_\_\_\_\_ End Point \_\_\_\_\_  
 x/long: \_\_\_\_\_  
 y/lat: \_\_\_\_\_

Projection: (e.g., UTM) UTM Datum: (e.g., NAD83) NAD83

### Rating of the site for brook trout prior to electrofishing:

Angler Pressure:  Low  Moderate  High  
 Access Rating:  Easy  Moderate  Difficult

### ELECTROFISHING DETAILS: (Reminder: electrofishing MUST proceed in upstream direction!)

(check one of the choices under each of the following headings and provide additional details if required.)

<b>Method Used:</b> <input checked="" type="checkbox"/> Diminishing Returns <input checked="" type="checkbox"/> Catch Per Unit Effort <input type="checkbox"/> Spot Check <input type="checkbox"/> Salvage	<b>Site Set-Up:</b> Open <input checked="" type="checkbox"/> Closed <input type="checkbox"/>	<b>Gear Used: Model</b> <input checked="" type="checkbox"/> Backpack _____ <input type="checkbox"/> Boat _____ <input type="checkbox"/> Shore-based _____	<b>Settings:</b> Voltage: <u>450</u> Frequency: <u>60</u> Duty-Cycle: _____ POW Setting: _____													
Date: _____ (if different then habitat data)		Power Output (watts): _____														
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Sweep/Effort # of Netters</th> <th>1 (t = <u>2.5</u> s)</th> <th>2 (t = _____ s)</th> <th>3 (t = _____ s)</th> <th>4 (t = _____ s)</th> <th>5 (t = _____ s)</th> </tr> </thead> <tbody> <tr> <td></td> <td style="text-align: center;">2</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>					Sweep/Effort # of Netters	1 (t = <u>2.5</u> s)	2 (t = _____ s)	3 (t = _____ s)	4 (t = _____ s)	5 (t = _____ s)		2				
Sweep/Effort # of Netters	1 (t = <u>2.5</u> s)	2 (t = _____ s)	3 (t = _____ s)	4 (t = _____ s)	5 (t = _____ s)											
	2															

### WATER CHEMISTRY: (see "Forms Manual" for details)

Specific Water Conductivity (Cs) = \_\_\_\_\_ TDS (ppt) \_\_\_\_\_ pH \_\_\_\_\_  
 Dissolved Oxygen (mg/l) = \_\_\_\_\_ (%) \_\_\_\_\_  
 Water Clarity:  Poor  Fair  Good  
 Temperature (oC):

	Water	Air	Time
Start			
End			

Water Level:  Low  Moderate  High

### SITE DIMENSIONS: SUMMARY

Length (m): \_\_\_\_\_  
 Average Wetted Width (m): \_\_\_\_\_  
 Average Bankfull Width (m): \_\_\_\_\_  
 Average Wetted Depth (m): \_\_\_\_\_  
 Average Bankfull Depth (m): \_\_\_\_\_  
 Maximum Site Depth (m): \_\_\_\_\_  
 Bankfull Area (m<sup>2</sup>): \_\_\_\_\_  
 Wetted Area (m<sup>2</sup>): \_\_\_\_\_

### STREAM TYPE:

% of area	Qty
Riffle: <u>0%</u>	
Run: _____	
Rapid: _____	
Pool: <u>30%</u>	
Flat: <u>0%</u>	
Other: <u>man made</u>	

(specify) Head Pond

### SUBSTRATE TYPE: (% of wetted surface area)

Bedrock (ledge): 60  
 Boulder (> 460 mm): 10  
 Rock (180 - 460 mm): 5  
 Rubble (54 - 179 mm): 5  
 Gravel (2.6 - 53 mm): 10  
 Sand (0.06 - 2.5 mm): 5  
 Fines (0.0005 - 0.05 mm): 5

CHANNEL TYPE:  Main  Side  Split  Bogan  
 % Embeddness:  1 (< 20%)  2 (20 - 35%)  3 (35 - 50%)  4 (≥ 50%)

Water Velocity (m/s): \_\_\_\_\_  
 from meter  from calculation

Water Flow (m<sup>3</sup>/sec): \_\_\_\_\_

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

	Coefficient	FLOAT TIME (sec) of Length of _____ m			
Smooth	0.9	¼ WAY	½ WAY	¾ WAY	Average
Rough	0.8				

where W = width, D = depth, A = coefficient for the stream bottom, L = length, and T = average float time

Comments: \*Specific portions of the form were filled out as per DND instruction.

\*\*\*\*\*MUST COMPLETE BACK SIDE OR SECOND PAGE OF FORM\*\*\*\*\*

# INDIVIDUAL FISH MEASUREMENTS FORM

Session ID #: \_\_\_\_\_

Date: July 7/2021  
(yyyy-mm-dd)

Water Name: \_\_\_\_\_

Site ID #: \_\_\_\_\_

Sampling Method:

Angling  
Stocking

Netting  
Trapping

Electrofishing  
Counting Facility

Other (specify): \_\_\_\_\_

Weighing device:

Scale

Comments: \_\_\_\_\_

Run/ Sweep Net	Fish ID#	Species Code	Length in mm <input type="checkbox"/> Total <input type="checkbox"/> Fork	Weight in g	Run/ Sweep Net	Fish ID#	Species Code	Length in mm <input type="checkbox"/> Total <input type="checkbox"/> Fork	Weight in g	Run/ Sweep Net	Fish ID#	Species Code	Length in mm <input type="checkbox"/> Total <input type="checkbox"/> Fork	Weight in g
Fyke 1		white sucker	95	10.43	Seine 1	Perch	67	4.51						
Fyke 2		WHITESUCKER	175	54.74			48	0.9						
2/20		CRKCHB	58	2.64			48	1.8						
		CRKCHB	65	2.74	Efish	Round Killifish	43	1.57						
		CRKCHB	48	1.81	"	"	45	1.22						
		CRKCHB	66	3.71										
		CRKCHB	45	1.90	Seine 2	CRKCHB	55	2.4						
		BK DACE	43	1.81	9 spine		52	1.33						
		BK DACE	39	1.46	3 spine		55	1.62						
		BK DACE	45	1.12	9 spine		45	0.85						
		BK DACE	43	0.71	"		49	1.32						
		BK DACE	47	1.63	Creek CHUB		68	3.67						
	Mark	STICKLEBACK	50	1.03	9 spine		28	0.13						
		"	40	1.00	"		32	0.25						
		"	50	1.30										
		"	55 (1.20)											
		2	58	0.95										
		Fine Scale	51	1.70										
		BK DACE	45	1.60	4 spine		23	0.1						
		Fine Scale	45	1.071										
		LKCHB	45	2.10										
		Fine Scale	51	1.70										
		Fine Scale	38	1.22										
		LKCHB	55	2.50										
		White Sucker	56	1.90										
		"	47	0.40										
		"	57	1.90										
		"	50	1.50										
		"	52	1.50										
		"	48	1.70										
		"	84	2.20										
		"	52	1.60										
		"	54	1.36										
	49 in	9 spine	52	1.80										
		9 spine	55	1.47										
		Perch Dace	63	3.56										
		"	52	2.11										
		"	60	3.14										
		"	32	0.51										
		"	50	2.40										

BATCH COUNT/WEIGHT DATA BY SWEEP FOR SPECIES IN WHICH INDIVIDUALS WERE NOT MEASURED.

CRK CHB			BK DACE			Unidentified minnows			Sweep	Count	Weight
Sweep	Count	Weight	Sweep	Count	Weight	Sweep	Count	Weight	Sweep	Count	Weight
Seine 1	24	60.9g	Seine 1	10	13.8g	1	50	19.76			
"	21	41.6g									

# ELECTROFISHING FIELD TALLY FORM

Session ID #: \_\_\_\_\_

Water Name: \_\_\_\_\_

Date (yyyy-mm-dd): \_\_\_\_\_

Site ID #: \_\_\_\_\_

"Individual Fish Measurements" form completed

More tally sheets completed (>2 species for population estimate)

Length (mm):		Species 1 Name: _____			
		Sweep Number (No. Shocking Seconds)			
		1	2	3	4
<input type="checkbox"/> Total <input type="checkbox"/> Fork		1 <sup>st</sup> 180 sec: (t= )	(t= )	(t= )	(t= )
< 40	(Specify lengths)				
40					
42					
44					
46					
48					
50					
52					
54					
56					
58					
60					
62					
64					
66					
68					
70					
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130					
132					
134					
136					
138					
140					
142					
144					
146					
148					
150					
152					
154					
156					
158					
160					
> 160	(Specify lengths)				

Length (mm):		Species 2 Name: _____			
		Sweep Number (No. Shocking Seconds)			
		1	2	3	4
<input type="checkbox"/> Total <input type="checkbox"/> Fork		1 <sup>st</sup> 180 sec: (t= )	(t= )	(t= )	(t= )
< 40	(Specify lengths)				
40					
42					
44					
46					
48					
50					
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132					
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136					
138					
140					
142					
144					
146					
148					
150					
152					
154					
156					
158					
160					
> 160	(Specify lengths)				

**OTHER SPECIES:**

Name	Counts			

Name	Counts			

**"Electrofishing Site Form" and "Individual Fish Measurements Form" MUST be completed.**

# INDIVIDUAL FISH MEASUREMENTS FORM

Session ID #: \_\_\_\_\_

Date : July B  
(yyyy-mm-dd)

Water Name: \_\_\_\_\_

Site ID #: \_\_\_\_\_

Sampling Method:  Angling  Netting  Electrofishing  
 Stocking  Trapping  Counting Facility

Other (specify): \_\_\_\_\_

Weighing device:  Scale  Comments: \_\_\_\_\_

Run/ Sweep Net	Fish ID#	Species Code	Length in mm <input type="checkbox"/> Total <input type="checkbox"/> Fork	Weight in g	Run/ Sweep Net	Fish ID#	Species Code	Length in mm <input type="checkbox"/> Total <input type="checkbox"/> Fork	Weight in g	Run/ Sweep Net	Fish ID#	Species Code	Length in mm <input type="checkbox"/> Total <input type="checkbox"/> Fork	Weight in g
Seine	2	U.SKR	55	1.94	Seine	3	4spine	51	1.25					
		3SPST	44	0.86			Banded Killifish	35	0.7					
		Pearl	39	0.85			9spine	39	0.21					
		9spiner	51	1.35			Killifish	57	0.37					
		W. SKR	28	0.19			CRKCHB	57	0.87					
		" "	24	0.18			9spine	37	0.30					
		9spine	44	0.74										
		3spine	45	0.92										
		9spine	40	0.38										
		9spine	44	0.67										
		" "	38	2.48										
		Pearl	58	2.69										
Michigan traps		3 Spine	57	2.6	(mort)									
		9 Spine	43	1.10	(mort)									
		CRKCHB	70	2.43										
		CRKCHB	63	2.90										
		" "	61	2.6										
		" "	68	3.06										
		" "	58	3.50										
		NR Red Body	58	1.80										
		CRKCHB	62	3.04										
		NR Red Body	52	1.70										
		" "	50	1.50										
		Lake CHWB	58	1.75										
		3 spine	58	1.60										
		4 spine	51	1.07										
		3 spine	49	0.80										
		4 spine	50	0.93										
		" "	50	0.93										
Seine #3		CRKCHB	47	1.81										
		Banded Killifish	60	2.01										
		Banded Killifish	158	1.2										
		3 Spine	47	2.11										
		CRKCHB	45	0.80										
		4 Spine	44	0.40										
		Pearl Dace	46	0.81										

BATCH COUNT/WEIGHT DATA BY SWEEP FOR SPECIES IN WHICH INDIVIDUALS WERE NOT MEASURED.

Sweep	White Sucker			Sweep	Unidentified minnow 150+									
	Count	Weight	AVE length		Count	Weight	Count	Weight	Count	Weight				
(F. 100 #4)	Mot3	15				325g					61.08g			

## ELECTROFISHING FIELD TALLY FORM

Session ID #: \_\_\_\_\_  
 Date (yyyy-mm-dd): \_\_\_\_\_

Water Name: \_\_\_\_\_  
 Site ID #: \_\_\_\_\_

"Individual Fish Measurements" form completed

More tally sheets completed (>2 species for population estimate)

Species 1 Name: _____		Sweep Number (No. Shocking Seconds)			
Length (mm): <input type="checkbox"/> Total <input type="checkbox"/> Fork					
	1	2	3	4	
< 40 (Specify lengths)	1 <sup>st</sup> 180 sec : (t= )	(t= )	(t= )	(t= )	
40					
42					
44					
46					
48					
50					
52					
54					
56					
58					
60					
62					
64					
66					
68					
70					
72					
74					
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132					
134					
136					
138					
140					
142					
144					
146					
148					
150					
152					
154					
156					
158					
160					
> 160 (Specify lengths)					

Species 2 Name: _____		Sweep Number (No. Shocking Seconds)			
Length (mm): <input type="checkbox"/> Total <input type="checkbox"/> Fork					
	1	2	3	4	
< 40 (Specify lengths)	1 <sup>st</sup> 180 sec : (t= )	(t= )	(t= )	(t= )	
40					
42					
44					
46					
48					
50					
52					
54					
56					
58					
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150					
152					
154					
156					
158					
160					
> 160 (Specify lengths)					

**OTHER SPECIES:**

Name	Counts			

Name	Counts			

"Electrofishing Site Form" and "Individual Fish Measurements Form" MUST be completed.



**REGISTRATION(S) AND/OR FISHING LICENCE(S)**

This document authorizes the registration card holder and/or licence holder to engage in fishing and related activities on the Atlantic coast of Canada subject to the provisions of the Fisheries Act and Regulations made thereunder.

This licence and/or registration is issued under the authority of the Minister of Fisheries and Oceans Canada.

FIN 700014868

CALENDAR YEAR: 2021  
ISSUANCE DATE: JUNE 30, 2021

DILLON CONSULTING  
C/O KAREN MARCH  
SUITE 100, 137 CHAIN LK DR  
HALIFAX, NS  
B3S 1B3

HOMEPORT  
12101 HALIFAX

Licence(s) - 2021

Licence #	Species	Areas	Licence Type	Gear Permitted	Amt	VRN	LOA
322696	ITEMS UNSPECIFIED			UNKNOWN			

DESIGNATED OPERATOR STATUS

Part 1: Activity

Pursuant to section 52 of the Fishery (General) Regulations SOR 93-53, this licence is hereby issued to Dillon Consulting Ltd (herein referred to as Licence Holder), Suite 100, 274 Sydney Street, Saint John, New Brunswick, E2L 0A8, and qualified persons working under their direct supervision: Courtney Beaver, Sean Doyle, Chris Kennedy, Kelly Regan, Jared DiCarlo, Tyler Crocker, Nathan Levesque, Alison Smith, Dave McGinnis, Julie Ellsworth, Brandon Kirk, Paul Koke, Janelle Lamrock, and Brian Sponagle (herein referred to as Operator) to fish for scientific purposes of environmental assessments, presence/absence studies, fish community surveys, fish rescues, and other related projects.

1. The Licence Holder/Operator is permitted to fish the inland and estuarial waters of Nova Scotia and New Brunswick, and is limited to the those waters under the jurisdiction of the Fisheries and Oceans Canada, Maritimes Region.

1.1 The Licence Holder/Operator is permitted to fish for and release any freshwater species common to streams and waterbodies of the Maritimes Region.

1.2 The Licence Holder/Operator is not permitted to retain any fish.

1.3 The Licence Holder/Operator is permitted to fish using the following gear: backpack electrofishers, dip nets, fyke nets, minnow traps, angling gear and seine nets.

1.4 The Licence Holder/Operator must be in possession of a provincial general angling licence and must carry a copy of this licence with them when angling in inland waters.

1.5 The Licence Holder/Operator must ensure that when setting the traps and nets permitted in condition 1.3 that these traps and nets must be tended at least once every 24 hours. If mortalities are observed in any fishing gear mentioned in condition 1.3, the Licence Holder/Operator must reduce the set interval of the non-tended gear.

1.6 The Licence Holder/Operator is permitted to electrofish from June 1 to September 30 only if the water temperature is below 22 degrees Celsius.

It is a condition of this licence that the registration holder/licencee sign all pages of this document.

  
FISHER

  
DATE

**AMENDMENT**

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Licence #	Species	Areas	Licence Type	Gear Permitted	Amt	VRN	LOA
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1.7 The Licence Holder/Operator is permitted to electrofish from date of issuance to December 31 for fish rescues only.

1.8 Notwithstanding condition 1.6, prior to conducting any electrofishing activities for fish rescues between September 30 to December 31, the Licence Holder/Operator is required to seek and gain approval from DFO Science, Mr. Dustin Raab (in writing at: Dustin.Raab@dfo-mpo.gc.ca).

1.9 The Licence Holder/Operator must take care when working in potential salmonid spawning habitat to avoid or minimize streambed disturbance.

1.10 All activities permitted in this licence are subject to Fisheries Management Orders issued by the Fisheries and Oceans Canada (DFO): <http://www.inter.dfo-mpo.gc.ca/Maritimes/Orders-Registry>.

1.11 The Licence Holder/Operator is permitted to fish the above noted locations during the following timeframe: May 1, 2021, to December 31, 2021.

Pursuant to subsection 22 (1) of the Fishery (General) Regulations SOR 93-53, the following conditions are specified for person(s) fishing under the authority of this Section 52 licence:

Part 2: Authority

2. The Licence Holder/Operator, as identified in Part 1 of this licence, is permitted to fish as per Part 1 of this licence.

2.1 The Licence Holder/Operator must carry a copy of the licence while conducting fishing activities and while in possession of fish caught or fishing gear used for fishing under the authority of this licence and shall produce this licence upon request by a Fishery Officer or Fishery Guardian.

2.2 Other than releasing live fish immediately into waters in which they were caught, the Licence Holder/Operator is prohibited from releasing live fish into fish habitat and/or transferring live fish to any fish rearing facility unless in possession of a licence issued pursuant to Section 56 of the Fishery (General) Regulations (see note 12 below).

Part 3: Fish Species

3. The Licence Holder/Operator is permitted to fish for the species identified in Part 1 of this licence.

3.1 The Licence Holder/Operator is prohibited from fishing for species

It is a condition of this licence that the registration holder/licencee sign all pages of this document.

FISHER

DATE

**AMENDMENT**

**Canada**



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FIN 700014868

CALENDAR YEAR: 2021  
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Licence #	Species	Areas	Licence Type	Gear Permitted	Amt	VRN	LOA
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at risk that are listed as 'endangered' or 'threatened' under Schedule 1 of the Species at Risk Act unless authorized under a separate permit issued in accordance with the Species at Risk Act (see Part 12: Notes).

Part 4: Fishing Area

4. The Licence Holder/Operator is only permitted to fish the locations identified in Part 1 of this licence.

4.1 The Licence Holder/Operator is prohibited from fishing in areas that have been closed by Fisheries and Oceans Canada by Prohibition Order.

4.2 The Licence Holder/Operator is prohibited from fishing in any Marine Protected Areas (MPA) unless a separate MPA approval has been issued in accordance with the Oceans Act regulations (see Part 12: Notes).

Part 5: Period of Activity

5. This Licence Holder/Operator is only permitted to fish during the timeframe identified in Part 1 of this licence.

Part 6: Fishing Gear

6. The Licence Holder/Operator is only permitted to fish using the fishing gear identified in Part 1 of this licence.

6.1 The Licence Holder/Operator must ensure that unattended gear is clearly marked with either the Vessel Registration Number or the name and phone number of the person who owns the gear.

6.2 The Licence Holder/Operator must identify their fishing gear in a manner described in section 27 of the Fishery (General) Regulation, SOR/93-53.

Part 7: Notification

7. The Licence Holder/Operator shall ensure that the Conservation and Protection Office closest to the fishing area, as identified in Part 1 of this Licence, be given at least 24 hours advance notification of the details and locations of fishing:

In New Brunswick:  
' St. George: 506-755-5000  
' Quispamsis: 506-845-1416  
' Fredericton: 506-452-3018, ext. 221

In Nova Scotia:  
' Sydney: 902-564-7211  
' Tusket: 902-648-5000  
' Sherbrooke: 902-522-3058  
' Liverpool: 902-354-6030  
' Dartmouth: 902-426-9010  
' Digby: 902-245-2544

It is a condition of this licence that the registration holder/licencee sign all pages of this document.

\_\_\_\_\_  
FISHER

\_\_\_\_\_  
DATE

**AMENDMENT**



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Barrington: 902-637-2851

Part 8: Retentions and Returns

8. The Licence Holder/Operator is prohibited from retaining any fish for human consumption or sale unless sale is authorized under Part 1.

8.1 The Licence Holder/Operator is prohibited from retaining any incidentally caught fish. Except for the time required to record data as per Part 9 of this licence, the Licence Holder shall forthwith return any incidentally caught fish to the place from which it was taken and where it is alive, in a manner that causes it least amount of harm.

Part 9: Reporting

9. The Licence Holder/Operator must complete the Section 52 Licence Report Form (Appendix A of licence), by project, in the format provided by Fisheries and Oceans Canada. The completed Section 52 Licence Report Form must be submitted to Fisheries and Oceans Canada electronically via email to: MARSIRM@dfo-mpo.gc.ca within 60 days of completion of the fishing activities as outlined in Part 1 of this licence.

9.1 The Licence Holder/Operator must report any lost fishing gear to DFO by completing and submitting the Lost Fishing Gear Form available online at <http://www.dfo-mpo.gc.ca/reporting> within 24 hours of discovering that the gear has been lost, or within 24 hours of arriving at port for trips less than 5 day length.

9.2 The Licence Holder/Operator must report the retrieval of any of their own previously reported lost gear to DFO by completing and submitting the Retrieval of Previously Reported Fishing Gear Form available online at <http://www.dfo-mpo.gc.ca/declarations> within 24 hours of retrieving gear previously reported as lost or within 24 hours of arriving at port for trips less than 5 days length. Retrieval can only occur under a valid fishing licence and only in relation to the specific type of gear authorized to be used by the fishing licence.

Part 10: Marine Mammal Interactions

10. The Licence Holder/Operator must provide information regarding all lethal and non-lethal interactions with non-target marine mammal species during fishing trips. Lethal and non-lethal interactions include bycatch, collision and all sightings of marine mammals entangled in fishing gear.

10.1 The Licence Holder/Operator must complete the DFO Marine Mammal Interaction Form (available at <http://dfo-mpo.gc.ca/species-especes/mammals-mammiferes/report-rapport/page01-eng.html>) and it must be submitted as per the instructions provided on the form.

Part 11: Licence Validity

11. That issuance of this licence implies no commitment by the

It is a condition of this licence that the registration holder/licencee sign all pages of this document.

\_\_\_\_\_  
FISHER

\_\_\_\_\_  
DATE

**AMENDMENT**

**Canada**

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Minister of Fisheries and Oceans Canada to reissue the licence in subsequent years.

11.1 The use of all of these licence(s) is subject to any conditions which are issued by Fisheries and Oceans Canada. The Licence Holder must ensure that they have received the licence conditions, and may not conduct any fishing activity unless in receipt of the licence conditions.

Part 12: Notes

Introductions and Transfers

Other than releasing live fish immediately into waters in which they were caught, nothing in this licence shall be construed as authority under Section 56 of the Fishery (General) Regulations SOR 93-53 to release live fish into fish habitat or to transfer live fish to a fish rearing facility. If the fishing activity, permitted in this licence, requires the release of live fish into fish habitat (other than releasing live fish immediately into waters in which they were caught) or the transfer of live fish into a fish rearing facility, the Licence Holder/Operator must contact the Chairperson of either the Nova Scotia Introductions and Transfers Committee by email at: NSITC.XMAR@dfo-mpo.gc.ca or the New Brunswick Introductions and Transfers Committee by email at: NBITC.XMAR@dfo-mpo.gc.ca to discuss whether a Licence may be required. For more information regarding the review process for the movement of live fish, visit: <https://www.dfo-mpo.gc.ca/aquaculture/management-gestion/it-code-eng.htm>.

Species at Risk

Nothing in this licence shall be construed as authority to contravene Sections 32 (1), 32 (2), 33 or 58 of the Species at Risk Act (SARA), with respect to any species listed under SARA as extirpated, endangered, or threatened. If the activity may affect a listed wildlife species, any part of its critical habitat or its residences, a Section 73 SARA permit may be required in addition to this licence. For a list of SARA protected species and an application for a Section 73 SARA permit, visit: <https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry.html> or contact [xmarsara@dfo-mpo.gc.ca](mailto:xmarsara@dfo-mpo.gc.ca).

Marine Protected Areas

Nothing in this licence shall be construed as authority to fish in a Marine Protected Area (MPA). There are several Oceans Act MPAs in DFO Maritimes Region. These areas have been established to protect particular species, habitats, and/or ecological features. A list of MPAs can be found online at: <http://www.dfo-mpo.gc.ca/oceans/mpa-zpm/index-eng.html>. If the proposed activity will be carried out within any of these MPAs, please contact [MaritimesMPAs@dfo-mpo.gc.ca](mailto:MaritimesMPAs@dfo-mpo.gc.ca) for more information, as additional approvals are required.

Aquatic Invasive Species

Nothing in this licence shall be construed as authority to import,

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\_\_\_\_\_  
FISHER  
**AMENDMENT**

\_\_\_\_\_  
DATE





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12101 HALIFAX

Licence # Species Areas Licence Type Gear Permitted Amt VRN LOA

possess, transport, release or introduce into a particular region or body of water frequented by fish where it is not indigenous, any aquatic invasive species listed in Parts 2 and 3 of the Schedule of the Aquatic Invasive Species Regulations (SOR/2015-121). The Aquatic Invasive Species Regulations can be found online at: https://laws-lois.justice.gc.ca/eng/regulations/SOR-2015-121/FullText.html

The use of ALL of these licence(s) is subject to any conditions which are issued by D.F.O. The licence holder must ensure that they have received the licence conditions, and may NOT conduct any fishing activity with any of these licence(s) unless in receipt of the licence conditions.

It is a condition of this licence that the registration holder/licencee sign all pages of this document.

FISHER

DATE

AMENDMENT





Stadler, Courtney &lt;cstadler@dillon.ca&gt;

**Fwd: Nepisiguit Field Day**

1 message

**Doyle, Sean** <seandoyle@dillon.ca>  
To: "Stadler, Courtney" <cstadler@dillon.ca>

Mon, Aug 23, 2021 at 12:09 PM

FYI

----- Forwarded message -----

From: **Crocker, Tyler** <tcrocker@dillon.ca>  
Date: Fri, Aug 20, 2021 at 11:54 AM  
Subject: Re: Nepisiguit Field Day  
To: Bainbridge, Jennifer <jbainbridge@dillon.ca>  
Cc: Sean Doyle <seandoyle@dillon.ca>

Hi team,

The in-situ SW measurements were as follows:

**July 6, 2021**

Temperature (C) = 21.5  
Dissolved Oxygen (%) = 83.4  
Specific Conductivity (us/cm) = 56.4  
Conductivity (us/cm) = 52.6  
TDS (mg/L) = 36.4  
pH = 7.11

**July 7, 2021**

Temperature (C) = 21.7  
Dissolved Oxygen (%) = 82.1  
Specific Conductivity (us/cm) = 59.8  
Conductivity (us/cm) = 56.1  
TDS (mg/L) = 39.0  
pH = 8.49

**July 8, 2021**

Temperature (C) = 21.6  
Dissolved Oxygen (%) = 87.4  
Specific Conductivity (us/cm) = 57.6  
Conductivity (us/cm) = 55.3  
TDS (mg/L) = 38.2  
pH = 8.07



**Tyler Crocker**  
**Dillon Consulting Limited**  
1149 Smythe Street Suite 200  
Fredericton, New Brunswick, E3B 3H4  
T - 506.444.8820 ext. 5157  
F - 506.444.8821  
TCrocker@dillon.ca  
www.dillon.ca



On Wed, Aug 18, 2021 at 2:12 PM Bainbridge, Jennifer <jbainbridge@dillon.ca> wrote:  
Hi Sean,

I am working on the Surface Water section for the Nepisiguit EIA Report.

## Appendix B

### *Laboratory Analytical Certificates*



Report ID: 418294-IAS  
 Report Date: 05-Nov-21  
 Date Received: 25-Oct-21

## CERTIFICATE OF ANALYSIS

for  
 Dillon Consulting Ltd  
 1149 Smythe Street, Suite 200  
 Fredericton, NB E3B 3H4



921 College Hill Rd  
 Fredericton NB  
 Canada E3B 6Z9  
 Tel: 506.452.1212  
 Fax: 506.452.0594  
 www.rpc.ca

Attention: Tyler Crocker

**Project #: 20-3641**

Location: Nepisiguit

### Grain Size

RPC Sample ID:			418294-1	418294-2
Client Sample ID:			SED ABOVE = Sed 1	SED BELOW = Sed 2
Date Sampled:			8-Jul-21	8-Jul-21
Analytes	Units	RL		
PHI -2 (4mm)	% Finer	0.1	100.	100.
PHI -1 (2 mm)	% Finer	0.1	99.0	93.6
PHI 0 (1 mm)	% Finer	0.1	92.7	74.8
PHI 1 (0.5 mm)	% Finer	0.1	69.1	41.4
PHI 2 (0.25 mm)	% Finer	0.1	8.2	0.7
PHI 3 (0.125 mm)	% Finer	0.1	2.4	0.4
PHI 4 (62.5 µm)	% Finer	0.1	1.5	0.3
PHI 5 (31.25 µm)	% Finer	0.1	1.1	0.3
PHI 6 (15.6 µm)	% Finer	0.1	0.8	0.1
PHI 7 (7.8 µm)	% Finer	0.1	0.6	0.1
PHI 8 (3.9 µm)	% Finer	0.1	0.4	< 0.1
PHI 9 (1.9 µm)	% Finer	0.1	0.3	< 0.1
Gravel	%	0.1	1.0	6.4
Sand	%	0.1	97.5	93.3
Silt	%	0.1	1.1	0.3
Clay	%	0.1	0.4	< 0.1

This report relates only to the sample(s) and information provided to the laboratory.

RL = Reporting Limit

Peter Crowhurst, B.Sc., C.Chem.  
 Director  
 Inorganic Analytical Chemistry

Matthew Norman  
 Senior Chemist  
 Inorganic Analytical Chemistry

Report ID: 418294-IAS  
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**CERTIFICATE OF ANALYSIS**

for  
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921 College Hill Rd  
 Fredericton NB  
 Canada E3B 6Z9  
 Tel: 506.452.1212  
 Fax: 506.452.0594  
 www.rpc.ca

Attention: Tyler Crocker

**Project #: 20-3641**

Location: Nepisiguit

**Analysis of Soil**

RPC Sample ID:	418294-1	418294-1 Dup	418294-2
Client Sample ID:	SED ABOVE = Sed 1	Lab Duplicate	SED BELOW = Sed 2
Date Sampled:	8-Jul-21	8-Jul-21	8-Jul-21
<b>Analytes</b>	<b>Units</b>	<b>RL</b>	
Carbon - Organic	%	0.01	0.53      0.57      0.21

Report ID: 418294-IAS  
 Report Date: 05-Nov-21  
 Date Received: 25-Oct-21

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for  
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 Fredericton NB  
 Canada E3B 6Z9  
 Tel: 506.452.1212  
 Fax: 506.452.0594  
 www.rpc.ca

Attention: Tyler Crocker

**Project #: 20-3641**

Location: Nepisiguit

### Analysis of Metals in Soil

RPC Sample ID:			418294-1	418294-1 Dup	418294-2
Client Sample ID:			SED ABOVE = Sed 1	Lab Duplicate	SED BELOW = Sed 2
Date Sampled:			8-Jul-21	8-Jul-21	8-Jul-21
Analytes	Units	RL			
Aluminum	mg/kg	1	12400	12800	11500
Antimony	mg/kg	0.1	< 0.1	< 0.1	0.1
Arsenic	mg/kg	1	7	6	8
Barium	mg/kg	1	29	31	24
Beryllium	mg/kg	0.1	0.5	0.5	0.5
Bismuth	mg/kg	1	< 1	< 1	< 1
Boron	mg/kg	1	< 1	< 1	< 1
Cadmium	mg/kg	0.01	0.30	0.33	0.21
Calcium	mg/kg	50	1570	1570	1440
Chromium	mg/kg	1	21	22	18
Cobalt	mg/kg	0.1	7.4	8.0	6.8
Copper	mg/kg	1	14	15	11
Iron	mg/kg	20	20500	21200	19900
Lead	mg/kg	0.1	11.4	11.3	10.7
Lithium	mg/kg	0.1	13.0	13.4	11.9
Magnesium	mg/kg	10	6500	6840	6160
Manganese	mg/kg	1	339	369	346
Mercury	mg/kg	0.01	< 0.01	< 0.01	< 0.01
Molybdenum	mg/kg	0.1	0.4	0.4	0.5
Nickel	mg/kg	1	20	22	18
Potassium	mg/kg	20	900	940	880
Rubidium	mg/kg	0.1	8.6	8.9	7.7
Selenium	mg/kg	1	< 1	< 1	< 1
Silver	mg/kg	0.1	< 0.1	< 0.1	< 0.1
Sodium	mg/kg	50	70	80	130
Strontium	mg/kg	1	6	6	6
Tellurium	mg/kg	0.1	< 0.1	< 0.1	< 0.1
Thallium	mg/kg	0.1	< 0.1	< 0.1	< 0.1
Tin	mg/kg	1	< 1	< 1	< 1
Uranium	mg/kg	0.1	1.4	1.3	1.1
Vanadium	mg/kg	1	24	27	23
Zinc	mg/kg	1	192	216	187

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for  
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1149 Smythe Street, Suite 200  
Fredericton, NB E3B 3H4



921 College Hill Rd  
Fredericton NB  
Canada E3B 6Z9  
Tel: 506.452.1212  
Fax: 506.452.0594  
[www.rpc.ca](http://www.rpc.ca)

### General Report Comments

Samples were air dried and sieved at 2 mm. A portion of each was digested according to EPA Method 3050B. The resulting solutions were analyzed for trace elements by ICP-MS. Mercury was analyzed by Cold Vapour AAS (SOP 4.M52 & SOP 4.M53). A portion of the sample was dried and sieved at 2 mm. Total and Inorganic Carbon were determined using combustion/acid evolution infrared methods. Total Organic Carbon is calculated as the difference.

Report ID: 418294-IAS  
 Report Date: 05-Nov-21  
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## CERTIFICATE OF ANALYSIS

for  
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921 College Hill Rd  
 Fredericton NB  
 Canada E3B 6Z9  
 Tel: 506.452.1212  
 Fax: 506.452.0594  
 www.rpc.ca

**Project #: 20-3641**

Location: Nepisiguit

**QA/QC Report**

RPC Sample ID:			CRM148903	RB083638
Type:			CRM NIST 2709a	Blank
Analytes	Units	RL		
Aluminum	mg/kg	1	23800	< 1
Antimony	mg/kg	0.1	0.1	< 0.1
Arsenic	mg/kg	1	9	< 1
Barium	mg/kg	1	406	< 1
Beryllium	mg/kg	0.1	0.8	< 0.1
Bismuth	mg/kg	1	< 1	< 1
Boron	mg/kg	1	35	< 1
Cadmium	mg/kg	0.01	0.34	< 0.01
Calcium	mg/kg	50	13000	< 50
Chromium	mg/kg	1	67	< 1
Cobalt	mg/kg	0.1	10.5	< 0.1
Copper	mg/kg	1	26	< 1
Iron	mg/kg	20	28800	< 20
Lead	mg/kg	0.1	10.7	< 0.1
Lithium	mg/kg	0.1	35.2	< 0.1
Magnesium	mg/kg	10	11400	< 10
Manganese	mg/kg	1	439	< 1
Mercury	mg/kg	0.01	0.83	< 0.01
Molybdenum	mg/kg	0.1	0.8	< 0.1
Nickel	mg/kg	1	67	< 1
Potassium	mg/kg	20	3350	< 20
Rubidium	mg/kg	0.1	32.5	< 0.1
Selenium	mg/kg	1	2	< 1
Silver	mg/kg	0.1	< 0.1	< 0.1
Sodium	mg/kg	50	540	-
Strontium	mg/kg	1	100	< 1
Tellurium	mg/kg	0.1	< 0.1	< 0.1
Thallium	mg/kg	0.1	0.2	< 0.1
Tin	mg/kg	1	< 1	4
Uranium	mg/kg	0.1	1.6	< 0.1
Vanadium	mg/kg	1	61	< 1
Zinc	mg/kg	1	84	< 1

Report ID: 418294-IAS  
Report Date: 05-Nov-21  
Date Received: 25-Oct-21

## CERTIFICATE OF ANALYSIS

for  
Dillon Consulting Ltd  
1149 Smythe Street, Suite 200  
Fredericton, NB E3B 3H4



921 College Hill Rd  
Fredericton NB  
Canada E3B 6Z9  
Tel: 506.452.1212  
Fax: 506.452.0594  
www.rpc.ca

### Methods

<u>Analyte</u>	<u>RPC SOP #</u>	<u>Method Reference</u>	<u>Method Principle</u>
EPA 3050B Digestion	IAS-M19	EPA 3050B	Nitric Acid/Hydrogen Peroxide Digestion
Trace Metals	IAS-M01/IAS-M29	EPA 200.8/EPA 200.7	ICP-MS/ICP-ES
Mercury	IAS-M53	EPA 245.5	Cold Vapor AAS

Report ID: 418294-OAS  
 Report Date: 03-Nov-21  
 Date Received: 25-Oct-21

## CERTIFICATE OF ANALYSIS

for  
 Dillon Consulting Ltd  
 1149 Smythe Street, Suite 200  
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 Fax: 506.452.0594  
 www.rpc.ca

Attention: Tyler Crocker

**Project #: 20-3641**

Location: Nepisiguit

### Hydrocarbon Analysis in Soil (Atlantic MUST)

RPC Sample ID:			418294-1	418294-2	418294-2 Dup
Client Sample ID:			SED ABOVE = Sed 1	SED BELOW = Sed 2	SED BELOW = Sed 2
Date Sampled:			8-Jul-21	8-Jul-21	8-Jul-21
Matrix:			soil	soil	soil
Analytes	Units	RL			
Benzene	mg/kg	0.005	< 0.02	< 0.005	< 0.005
Toluene	mg/kg	0.05	< 0.05	< 0.05	< 0.05
Ethylbenzene	mg/kg	0.01	< 0.02	< 0.01	< 0.01
Xylenes	mg/kg	0.05	< 0.05	< 0.05	< 0.05
VPH C6-C10 (Less BTEX)	mg/kg	2.5	< 2.5	< 2.5	< 2.5
EPH >C10-C16	mg/kg	12	< 12	< 12	< 12
EPH >C16-C21	mg/kg	12	89	< 12	< 12
EPH >C21-C32	mg/kg	12	73	< 12	< 12
EPH (>C16-C32)	mg/kg	12	160	< 12	< 12
Modified TPH Tier 1	mg/kg	21	160	< 21	< 21
VPH Surrogate (IBB)	%		133	112	109
EPH Surrogate (IBB)	%		95	101	100
EPH Surrogate (C32)	%		105	120	117
Resemblance			UP	ND	ND
Return to Baseline at C32			Yes	Yes	Yes
Moisture Content	%		68	24	24

This report relates only to the sample(s) and information provided to the laboratory.

RL = Reporting Limit; Soil results are expressed on a dry weight basis.

Bruce Phillips  
 Department Head  
 Organic Analytical Services

### ATLANTIC MUST SOIL

Page 1 of 6

Steven Davenport  
 Senior Technician  
 Organic Analytical Services

Report ID: 418294-OAS  
 Report Date: 03-Nov-21  
 Date Received: 25-Oct-21

## CERTIFICATE OF ANALYSIS

for  
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 Tel: 506.452.1212  
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 www.rpc.ca

Attention: Tyler Crocker

**Project #: 20-3641**

Location: Nepisiguit

### PAH in Soil

RPC Sample ID:			418294-1	418294-2	418294-2 Dup
Client Sample ID:			SED ABOVE <b>= Sed 1</b>	SED BELOW <b>= Sed 2</b>	SED BELOW <b>= Sed 2</b>
Date Sampled:			8-Jul-21	8-Jul-21	8-Jul-21
Matrix:			soil	soil	soil
Analytes	Units	RL			
Naphthalene	mg/kg	0.01	< 0.01	< 0.01	< 0.01
Acenaphthylene	mg/kg	0.01	< 0.01	< 0.01	< 0.01
Acenaphthene	mg/kg	0.01	< 0.01	< 0.01	< 0.01
Fluorene	mg/kg	0.01	< 0.01	< 0.01	< 0.01
Phenanthrene	mg/kg	0.01	< 0.01	< 0.01	< 0.01
Anthracene	mg/kg	0.01	< 0.01	< 0.01	< 0.01
Fluoranthene	mg/kg	0.01	< 0.01	< 0.01	< 0.01
Pyrene	mg/kg	0.01	< 0.01	< 0.01	< 0.01
Benz(a)anthracene	mg/kg	0.01	< 0.01	< 0.01	< 0.01
Chrysene/Triphenylene	mg/kg	0.01	< 0.01	< 0.01	< 0.01
Benzo(b+j)fluoranthene	mg/kg	0.01	< 0.01	< 0.01	< 0.01
Benzo(k)fluoranthene	mg/kg	0.01	< 0.01	< 0.01	< 0.01
Benzo(e)pyrene	mg/kg	0.01	< 0.01	< 0.01	< 0.01
Benzo(a)pyrene	mg/kg	0.01	< 0.01	< 0.01	< 0.01
Indeno(1,2,3-c,d)pyrene	mg/kg	0.01	< 0.01	< 0.01	< 0.01
Benzo(g,h,i)perylene	mg/kg	0.01	< 0.01	< 0.01	< 0.01
Dibenz(a,h)anthracene	mg/kg	0.01	< 0.01	< 0.01	< 0.01
2-fluorobiphenyl (surrogate)	%		114	92	98
p-terphenyl-d14 (surrogate)	%		106	86	87
Moisture Content	%		68	24	24

This report relates only to the sample(s) and information provided to the laboratory.

RL = Reporting Limit; Soil results are expressed on a dry weight basis.

Bruce Phillips  
 Department Head  
 Organic Analytical Services

Steven Davenport  
 Senior Technician  
 Organic Analytical Services



Report ID: 418294-OAS  
Report Date: 03-Nov-21  
Date Received: 25-Oct-21

## CERTIFICATE OF ANALYSIS

for  
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Tel: 506.452.1212  
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www.rpc.ca

### Method Summary

OAS-HC03: The Determination of Petroleum Hydrocarbons (Atlantic MUST) in Soil (VPH)  
OAS-HC03: Determination of Petroleum Hydrocarbons (Atlantic MUST) in Soil (EPH)  
OAS-HC06: The Determination of Polynuclear Aromatic Hydrocarbons in Soil

### Resemblance Legend

<u>Resemblance Code</u>	<u>Resemblance</u>	<u>Resemblance Code</u>	<u>Resemblance</u>
COMMENT	See General Report Comments	PAH	Possible PAHs Detected
FO	Fuel Oil Fraction	PG	Possible Gasoline Fraction
FO.LO	Fuel Oil and Lube Oil Fraction	PLO	Possible Lube Oil Fraction
G	Gasoline Fraction	PWFO	Possible Weathered Fuel Oil Fraction
LO	Lube Oil Fraction	PWG	Possible Weathered Gasoline Fraction
ND	Not Detected	TO	Transformer Oil
NR	No Resemblance (not-petrogenic in origin)	UP	Unknown Peaks
NRLR	No Resemblance in the lube oil range (>C21-C32).	WFO	Weathered Fuel Oil Fraction
OP	One Product (unidentified)	WG	Weathered Gasoline Fraction

### General Report Comments

Sample 418294-1 - EPH extract was treated with silica gel to remove polar interferences.

Elevated BTEX RLs due to the high moisture content of the sample.

Return to Baseline: Samples are considered to have returned to baseline if the area from C32-C36 is less than 10% of the area from C10-C32.

### COMMENTS

Report ID: 418294-OAS  
 Report Date: 03-Nov-21  
 Date Received: 25-Oct-21

**CERTIFICATE OF ANALYSIS**

for  
 Dillon Consulting Ltd  
 1149 Smythe Street, Suite 200  
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 www.rpc.ca

**Project #: 20-3641**

Location: Nepisiguit

**QA/QC Report**

RPC Sample ID:			BLANKD2108	BLANKD2109	SPIKED2108	SPIKED2109
Type:			EPH	VPH	EPH	VPH
Matrix:			soil	soil	soil	soil
Analytes	Units	RL			% Recovery	% Recovery
Benzene	mg/kg	0.005	-	< 0.005	-	105%
Toluene	mg/kg	0.05	-	< 0.05	-	108%
Ethylbenzene	mg/kg	0.01	-	< 0.01	-	110%
Xylenes	mg/kg	0.05	-	< 0.05	-	105%
VPH C6-C10 (Less BTEX)	mg/kg	2.5	-	< 2.5	-	97%
EPH >C10-C16	mg/kg	12	< 12	-	-	-
EPH >C16-C21	mg/kg	12	< 12	-	-	-
EPH >C21-C32	mg/kg	12	< 12	-	-	-
EPH >C10-C32	mg/kg	21	-	-	99%	-

RL = Reporting Limit

Report ID: 418294-OAS  
 Report Date: 03-Nov-21  
 Date Received: 25-Oct-21

## CERTIFICATE OF ANALYSIS

for  
 Dillon Consulting Ltd  
 1149 Smythe Street, Suite 200  
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 Fax: 506.452.0594  
 www.rpc.ca

**Project #: 20-3641**

Location: Nepisiguit

**QA/QC Report**

RPC Sample ID:			BLANKD2114	SPIKED2114
Matrix:			soil	soil
Analytes	Units	RL		% Recovery
Naphthalene	mg/kg	0.01	< 0.01	104%
Acenaphthylene	mg/kg	0.01	< 0.01	102%
Acenaphthene	mg/kg	0.01	< 0.01	101%
Fluorene	mg/kg	0.01	< 0.01	101%
Phenanthrene	mg/kg	0.01	< 0.01	106%
Anthracene	mg/kg	0.01	< 0.01	94%
Fluoranthene	mg/kg	0.01	< 0.01	101%
Pyrene	mg/kg	0.01	< 0.01	107%
Benz(a)anthracene	mg/kg	0.01	< 0.01	90%
Chrysene/Triphenylene	mg/kg	0.01	< 0.01	104%
Benzo(b+j)fluoranthene	mg/kg	0.01	< 0.01	90%
Benzo(k)fluoranthene	mg/kg	0.01	< 0.01	103%
Benzo(e)pyrene	mg/kg	0.01	< 0.01	91%
Benzo(a)pyrene	mg/kg	0.01	< 0.01	91%
Indeno(1,2,3-c,d)pyrene	mg/kg	0.01	< 0.01	73%
Benzo(g,h,i)perylene	mg/kg	0.01	< 0.01	85%
Dibenz(a,h)anthracene	mg/kg	0.01	< 0.01	81%

RL = Reporting Limit

Report ID: 418294-OAS  
Report Date: 03-Nov-21  
Date Received: 25-Oct-21

## CERTIFICATE OF ANALYSIS

for  
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www.rpc.ca

Project #: 20-3641

### Summary of Date Analyzed

RPC Sample ID	VPH		EPH		PAH	
	Extracted	Analyzed	Extracted	Analyzed	Extracted	Analyzed
418294-1	26-Oct-21	26-Oct-21	26-Oct-21	29-Oct-21	26-Oct-21	27-Oct-21
418294-2	26-Oct-21	26-Oct-21	26-Oct-21	27-Oct-21	26-Oct-21	27-Oct-21
418294-2 Dup	26-Oct-21	26-Oct-21	26-Oct-21	27-Oct-21	26-Oct-21	27-Oct-21

Report ID: 403739-IAS  
 Report Date: 19-Jul-21  
 Date Received: 12-Jul-21

## CERTIFICATE OF ANALYSIS

for  
 Dillon Consulting Ltd  
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 Canada E3B 6Z9  
 Tel: 506.452.1212  
 Fax: 506.452.0594  
 www.rpc.ca

Attention: Tyler Crocker

**Project #: 20-3641**

Location: Nepisiguit

### Analysis of Water

RPC Sample ID:		403739-1	403739-2
Client Sample ID:		SW1	SW2
Date Sampled:		8-Jul-21	8-Jul-21
Analytes	Units	RL	
Sodium	mg/L	0.05	1.84
Potassium	mg/L	0.02	0.40
Calcium	mg/L	0.05	5.30
Magnesium	mg/L	0.01	1.05
Iron	mg/L	0.02	0.05
Manganese	mg/L	0.001	0.022
Copper	mg/L	0.001	< 0.001
Zinc	mg/L	0.001	0.006
Ammonia (as N)	mg/L	0.05	< 0.05
pH	units	-	7.6
Alkalinity (as CaCO <sub>3</sub> )	mg/L	2	19
Chloride	mg/L	0.5	0.6
Sulfate	mg/L	1	2
Nitrate + Nitrite (as N)	mg/L	0.05	< 0.05
o-Phosphate (as P)	mg/L	0.01	< 0.01
r-Silica (as SiO <sub>2</sub> )	mg/L	0.1	7.0
Carbon - Total Organic	mg/L	0.5	2.9
Turbidity	NTU	0.1	0.5
Conductivity	µS/cm	1	48
<b>Calculated Parameters</b>			
Bicarbonate (as CaCO <sub>3</sub> )	mg/L	-	18.9
Carbonate (as CaCO <sub>3</sub> )	mg/L	-	0.071
Hydroxide (as CaCO <sub>3</sub> )	mg/L	-	0.020
Cation Sum	meq/L	-	0.445
Anion Sum	meq/L	-	0.438
Percent Difference	%	-	0.79
Theoretical Conductivity	µS/cm	-	44
Hardness (as CaCO <sub>3</sub> )	mg/L	0.2	17.6
Ion Sum	mg/L	-	30
Saturation pH (5°C)	units	-	9.5
Langelier Index (5°C)	-	-	-1.92

This report relates only to the sample(s) and information provided to the laboratory.

RL = Reporting Limit; Organic Carbon and ion chemistries for turbid samples are determined on filtered aliquots.

Matthew Norman  
 Senior Chemist  
 Inorganic Analytical Chemistry

Krista Skinner  
 Chemical Technician  
 Inorganic Analytical Chemistry

Report ID: 403739-IAS  
 Report Date: 19-Jul-21  
 Date Received: 12-Jul-21

**CERTIFICATE OF ANALYSIS**

for  
 Dillon Consulting Ltd  
 1149 Smythe Street, Suite 200  
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 www.rpc.ca

Attention: Tyler Crocker

**Project #: 20-3641**

Location: Nepisiguit

**Analysis of Metals in Water**

RPC Sample ID:		403739-1	403739-2
Client Sample ID:		SW1	SW2
Date Sampled:		8-Jul-21	8-Jul-21
Analytes	Units	RL	
Aluminum	µg/L	1	21
Antimony	µg/L	0.1	< 0.1
Arsenic	µg/L	1	< 1
Barium	µg/L	1	4
Beryllium	µg/L	0.1	< 0.1
Bismuth	µg/L	1	< 1
Boron	µg/L	1	2
Cadmium	µg/L	0.01	0.02
Calcium	µg/L	50	5300
Chromium	µg/L	1	< 1
Cobalt	µg/L	0.1	< 0.1
Copper	µg/L	1	< 1
Iron	µg/L	20	50
Lead	µg/L	0.1	< 0.1
Lithium	µg/L	0.1	0.2
Magnesium	µg/L	10	1050
Manganese	µg/L	1	22
Molybdenum	µg/L	0.1	0.2
Nickel	µg/L	1	< 1
Potassium	µg/L	20	400
Rubidium	µg/L	0.1	0.7
Selenium	µg/L	1	< 1
Silver	µg/L	0.1	< 0.1
Sodium	µg/L	50	1840
Strontium	µg/L	1	17
Tellurium	µg/L	0.1	< 0.1
Thallium	µg/L	0.1	< 0.1
Tin	µg/L	0.1	< 0.1
Uranium	µg/L	0.1	< 0.1
Vanadium	µg/L	1	< 1
Zinc	µg/L	1	6

Report ID: 403739-IAS  
Report Date: 19-Jul-21  
Date Received: 12-Jul-21

## CERTIFICATE OF ANALYSIS

for  
Dillon Consulting Ltd  
1149 Smythe Street, Suite 200  
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Canada E3B 6Z9  
Tel: 506.452.1212  
Fax: 506.452.0594  
www.rpc.ca

### Methods

<u>Analyte</u>	<u>RPC SOP #</u>	<u>Method Reference</u>	<u>Method Principle</u>
Ammonia	4.M47	APHA 4500-NH <sub>3</sub> G	Phenate Colourimetry
pH	4.M03	APHA 4500-H <sup>+</sup> B	pH Electrode - Electrometric
Alkalinity (as CaCO <sub>3</sub> )	4.M43	EPA 310.2	Methyl Orange Colourimetry
Chloride	4.M44	APHA 4500-CL E	Ferricyanide Colourimetry
Sulfate	4.M45	APHA 4500-SO <sub>4</sub> E	Turbidimetry
Nitrate + Nitrite (as N)	4.M48	APHA 4500-NO <sub>3</sub> H	Hydrazine Red., Derivatization, Colourimetry
o-Phosphate (as P)	4.M50	APHA 4500-P F	Molybdate/Ascorbic Acid Colourimetry
r-Silica (as SiO <sub>2</sub> )	4.M46	APHA 4500-SI F	Heteropoly Blue Colourimetry
Carbon - Total Organic	4.M38	APHA 5310 C	UV-Persulfate Digestion, NDIR Detection
Turbidity	4.M06	APHA 2130 B	Nephelometry
Conductivity	4.M04	APHA 2510 B	Conductivity Meter - Electrode
Trace Metals	4.M01/4.M29	EPA 200.8/EPA 200.7	ICP-MS/ICP-ES

Report ID: 403739-OAS  
Report Date: 19-Jul-21  
Date Received: 12-Jul-21

## CERTIFICATE OF ANALYSIS

for  
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Tel: 506.452.1212  
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www.rpc.ca

Attention: Tyler Crocker

**Project #: 20-3641**

Location: Nepisiguit

### Hydrocarbon Analysis in Water (Atlantic MUST)

RPC Sample ID:		403739-1	403739-2
Client Sample ID:		SW1	SW2
Date Sampled:		8-Jul-21	8-Jul-21
Matrix:		water	water
Analytes	Units	RL	
Benzene	mg/L	0.001	< 0.001
Toluene	mg/L	0.001	< 0.001
Ethylbenzene	mg/L	0.001	< 0.001
Xylenes	mg/L	0.001	< 0.001
VPH C6-C10 (Less BTEX)	mg/L	0.01	< 0.01
EPH >C10 - C16	mg/L	0.05	< 0.05
EPH >C16 - C21	mg/L	0.05	< 0.05
EPH >C21-C32	mg/L	0.1	< 0.1
Modified TPH Tier 1	mg/L	0.1	< 0.1
VPH Surrogate (IBB)	%		104
EPH Surrogate (IBB)	%		115
EPH Surrogate (C32)	%		116
Resemblance			ND
Return to Baseline at C32			Yes

This report relates only to the sample(s) and information provided to the laboratory.

RL = Reporting Limit



Angela Colford  
Lab Supervisor  
Organic Analytical Services

**ATLANTIC MUST WATER**

Page 1 of 4



Steven Davenport  
Senior Technician  
Organic Analytical Services



Report ID: 403739-OAS  
Report Date: 19-Jul-21  
Date Received: 12-Jul-21

## CERTIFICATE OF ANALYSIS

for  
Dillon Consulting Ltd  
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### Method Summary

OAS-HC04: The Determination of Petroleum Hydrocarbons (Atlantic MUST) in Water(VPH)  
OAS-HC04: Determination of Petroleum Hydrocarbons (Atlantic MUST) in Water (EPH)

### Resemblance Legend

<u>Resemblance Code</u>	<u>Resemblance</u>	<u>Resemblance Code</u>	<u>Resemblance</u>
COMMENT	See General Report Comments	PAH	Possible PAHs Detected
FO	Fuel Oil Fraction	PG	Possible Gasoline Fraction
FO.LO	Fuel Oil and Lube Oil Fraction	PLO	Possible Lube Oil Fraction
G	Gasoline Fraction	PWFO	Possible Weathered Fuel Oil Fraction
LO	Lube Oil Fraction	PWG	Possible Weathered Gasoline Fraction
ND	Not Detected	TO	Transformer Oil
NR	No Resemblance (not-petrogenic in origin)	UP	Unknown Peaks
NRLR	No Resemblance in the lube oil range (>C21-C32).	WFO	Weathered Fuel Oil Fraction
OP	One Product (unidentified)	WG	Weathered Gasoline Fraction

### General Report Comments

Return to Baseline: Samples are considered to have returned to baseline if the area from C32-C36 is less than 10% of the area from C10-C32.

### COMMENTS

Report ID: 403739-OAS  
 Report Date: 19-Jul-21  
 Date Received: 12-Jul-21

**CERTIFICATE OF ANALYSIS**

for  
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 1149 Smythe Street, Suite 200  
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 www.rpc.ca

**Project #: 20-3641**

Location: Nepisiguit

**QA/QC Report**

RPC Sample ID:			BLANKD1168	BLANKD1184	SPIKED1168	SPIKED1184
Type:			EPH	VPH	EPH	VPH
Matrix:			water	water	water	water
Analytes	Units	RL			% Recovery	% Recovery
Benzene	mg/L	0.001	-	< 0.001	-	105%
Toluene	mg/L	0.001	-	< 0.001	-	100%
Ethylbenzene	mg/L	0.001	-	< 0.001	-	97%
Xylenes	mg/L	0.001	-	< 0.001	-	98%
VPH C6-C10 (Less BTEX)	mg/L	0.01	-	< 0.01	-	89%
EPH >C10 - C16	mg/L	0.05	< 0.05	-	-	-
EPH >C16 - C21	mg/L	0.05	< 0.05	-	-	-
EPH >C21-C32	mg/L	0.1	< 0.1	-	-	-
EPH >C10 - C32	mg/L		-	-	120%	-

RL = Reporting Limit

Report ID: 403739-OAS  
Report Date: 19-Jul-21  
Date Received: 12-Jul-21

## CERTIFICATE OF ANALYSIS

for  
Dillon Consulting Ltd  
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**Project #: 20-3641**

### Summary of Date Analyzed

RPC Sample ID	VPH		EPH	
	Extracted	Analyzed	Extracted	Analyzed
403739-1	16-Jul-21	16-Jul-21	13-Jul-21	16-Jul-21
403739-2	16-Jul-21	16-Jul-21	13-Jul-21	16-Jul-21

Attention: Tyler Crocker

Fax #:

TCrocker@dillon.ca; dmarquis@dillon.ca; jgreenlaw@dillon.ca; aali-guitard@dillon.ca; Dillon@ESdat.net

Project #: 20-3641

Location: Nepisiguit

Organochlorine Pesticides in Soil


RPC Sample ID:			418294-1	418294-1 Dup.	418294-2	Method Blank	Spike 1 Rec. (%)	Spike 2 Rec. (%)
Client Sample ID:			SED ABOVE = Sed 1	SED ABOVE = Sed 1	SED BELOW = Sed 2		SED BELOW = Sed 2	
Date Sampled:			08-Jul-21	08-Jul-21	08-Jul-21		08-Jul-21	
Matrix:			soil	soil	soil		soil	
Analytes	Units	RL						
α-BHC	µg/g	0.01	< 0.01	< 0.01	< 0.01	< 0.01	81	92
β-BHC	µg/g	0.01	< 0.01	< 0.01	< 0.01	< 0.01	94	95
γ-BHC (Lindane)	µg/g	0.01	< 0.01	< 0.01	< 0.01	< 0.01	78	93
δ-BHC	µg/g	0.01	< 0.01	< 0.01	< 0.01	< 0.01	63	64
Heptachlor	µg/g	0.01	< 0.01	< 0.01	< 0.01	< 0.01	71	98
Aldrin	µg/g	0.01	< 0.01	< 0.01	< 0.01	< 0.01	89	97
Heptachlor epoxide	µg/g	0.01	< 0.01	< 0.01	< 0.01	< 0.01	87	98
2,4'-DDE	µg/g	0.01	< 0.01	< 0.01	< 0.01	< 0.01	85	96
Endosulfan I	µg/g	0.01	< 0.01	< 0.01	< 0.01	< 0.01	86	94
4,4'-DDE	µg/g	0.01	< 0.01	< 0.01	< 0.01	< 0.01	82	99
Dieldrin	µg/g	0.01	< 0.01	< 0.01	< 0.01	< 0.01	81	88
2,4'-DDD	µg/g	0.01	< 0.01	< 0.01	< 0.01	< 0.01	78	102
Endrin	µg/g	0.01	< 0.01	< 0.01	< 0.01	< 0.01	81	90
Endosulfan II	µg/g	0.01	< 0.01	< 0.01	< 0.01	< 0.01	80	91
4,4'-DDD	µg/g	0.01	< 0.01	< 0.01	< 0.01	< 0.01	73	90
2,4'-DDT	µg/g	0.01	< 0.01	< 0.01	< 0.01	< 0.01	67	96
Endrin aldehyde	µg/g	0.01	< 0.01	< 0.01	< 0.01	< 0.01	64	74
Endosulfan sulfate	µg/g	0.01	< 0.01	< 0.01	< 0.01	< 0.01	80	95
4,4'-DDT	µg/g	0.01	< 0.01	< 0.01	< 0.01	< 0.01	70	95
Endrin ketone	µg/g	0.01	< 0.01	< 0.01	< 0.01	< 0.01	69	96
Methoxychlor	µg/g	0.01	< 0.01	< 0.01	< 0.01	< 0.01	69	101
Mirex	µg/g	0.01	< 0.01	< 0.01	< 0.01	< 0.01	86	103
Moisture	%	0.5	68	68	24	-	24	-

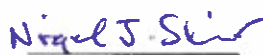
This report relates only to the sample(s) and information provided to the laboratory.

Method: Solvent extraction with analysis by Gas Chromatography/Electron Capture Detection (GC/ECD).

RL = Reporting Limit

Results are reported on a dry weight basis.

  
 Karen Broad  
 Chemist  
 Organic Analytical Services

  
 Nigel Skinner  
 Senior Technician  
 Organic Analytical Services

## Appendix C

### *Sediment Quality Results Memo*

# Memo

**To:** New Brunswick Power Corporation  
**From:** Dillon Consulting Ltd.  
**Date:** November 19, 2021  
**Subject:** Sediment Quality - Nepisiguit Falls Generating Station Life Extension Project  
**Our File:** 20-3641

## Introduction

The following technical memo is intended for use by the New Brunswick Power Corporation (NB Power) and is associated with the Nepisiguit Falls Generating Station Life Extension Project in Bathurst Mines, New Brunswick.

## Project Description

For the purposes of this memo, the project overview is an abbreviated summary. For a detailed description of the project, please refer to the Environmental Impact Association Registration document (Dillon 2021). The Nepisiguit Falls Generating Station (the station) is located at Nepisiguit Falls, New Brunswick. Construction of the station was completed in 1921 to provide power to the corrugated pulp and paper mill in Bathurst. The mill, which was most recently owned by Smurfit-Stone Container Corporation (Smurfit-Stone), was permanently closed in 2005. In 2008, NB Power purchased the dam from Smurfit-Stone (Canadian Dam Association [CDA] 2008). NB Power still operates the dam today, which provides power to approximately 3,000 homes per year (CDA 2008). NB Power is undertaking a life-extension project at the station (Nepisiguit Falls Generating Station Life Extension Project) to extend its service life by another 50 years. This includes modernizing, repairing, and replacing various components at the station. This project will be conducted using a phased approach between 2022 and approximately 2030.

The Environmental Impact Assessment (EIA) process for New Brunswick is regulated by the New Brunswick Department of Environment and Local Government (NBDELG). The New Brunswick *Environmental Impact Assessment Regulation - Clean Environment Act* establishes the EIA process in New Brunswick. According to the regulation, all undertakings listed in Schedule A require EIA registration at a minimum. The Nepisiguit Falls Generating Station Life Extension Project triggers an EIA registration, as it falls under the following category:

- “(b) all electric power generating facilities with a production rating of three megawatts or more”

A sediment quality assessment was conducted in 2021 above and below the dam in an effort to provide a baseline prior to the initiation of the project work in 2022. The baseline data will be used to establish the pre-construction sediment quality that will be applied to assess the sediment quality post-construction, as it relates to fish habitat and sediment quality.

## Sediment Sampling Methods

Sediment samples were collected at two locations within the study area (Figure 1). These locations were selected based on overall fish habitat representativeness and proximity to areas used to assess fish presence and assemblages. The sediment samples were collected wearing nitrile gloves using a 6"x6" mini-ponar grab sampler, deployed from a boat. The samples were decanted and collected using a composite of multiple grabs to obtain a representative sediment sample before being placed directly into laboratory-supplied containers. Sampling equipment was cleaned and rinsed between each sampling location. Sediment samples were collected at the end of the day, and placed into coolers with ice for transport back to Fredericton. They were placed into a freezer at Dillon's warehouse until they were taken to the lab for analysis.

The sediment samples were sent to the Research & Productivity Council (RPC) laboratory in Fredericton to be analyzed for:

- Grain size analysis;
- Trace metals;
- Benzene, toluene, ethylbenzene, xylenes and petroleum hydrocarbons; and
- Pesticides and herbicide suite of analysis.

RPC holds a Canadian Association for Laboratory Accreditation (CALA) as well as being accredited by the Standards Council of Canada (SCC).

The laboratory analytical results were compared to the applicable benchmarks as compiled by Atlantic Partnership in Risk-Based Corrective Action Implementation (Atlantic PIRI), in the 2021 Atlantic RBCA Environmental Quality Standards (EQS), as part of the Atlantic Risk Based Corrective Action (RBCA) for Impacted Sites in Atlantic Canada User Guidance Version 4.0 (2021).

## Sediment Quality Results

**Tables 1** through **4** provide a comparison of the measured sediment concentrations of target analytes to their applicable regulatory ecological health-based sediment quality benchmarks (SedQBs). **Table 5** shows the grain analysis results.

The following substances were below their laboratory reported detection limits (RDLs: non-detectable) in each of the sediment samples that were analyzed for these parameters:

- Antimony;
- Bismuth;
- Boron;
- Mercury;
- Selenium;
- Silver;
- Tellurium;
- Thallium;
- Tin;
- BTEX;
- F1 Petroleum Hydrocarbon Fraction (C6-C10);
- F2 Petroleum Hydrocarbon Fraction (C10-C16);
- Each analyzed PAH parameter; and
- Each analyzed organochlorine pesticide parameter

Modified TPH in sediment sample Sed above was reported at concentrations that exceed the Atlantic PIRI Tier I ESLs for typical sediment; however, it is less than the maximum TPH screening value (500 mg/kg).

The remaining analyzed parameters were reported at concentrations less than their applicable benchmarks or a benchmark was not available for comparison. Although the targeted polycyclic aromatic hydrocarbon (PAH) compounds (Table 3) were below detection limits, a substituted PAH which is tentatively identified as 1-methyl-7-isopropyl panthrene was present at a significant concentration. This compound is commonly associated with distillation of resinous wood and pulp mill effluent (RPC pers. comm. 2021).

## Summary and Conclusion

Sediment samples were collected as part of the EIA registration for this project to establish the pre-construction sediment quality that will be applied to assess the sediment quality post-construction, as it relates to fish habitat and sediment quality.



Modified TPH in sediment sample Sed above was reported at concentrations that exceed the Atlantic PIRI Tier I ESLs for typical sediment; however, it is less than the maximum TPH screening value (500 mg/kg). The remaining analyzed parameters were reported at concentrations less than their applicable benchmarks or a benchmark was not available for comparison.

## Closure

This report was prepared by Dillon Consulting Limited (Dillon) for the client (New Brunswick Power Corporation), in support of the EIA and permitting of the Nepisiguit Falls Generating Station Life Extension Project. 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 judgement 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.

Yours truly,

DILLON CONSULTING LIMITED

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DLM:aa

g Encl.[2]

# References

## Literature Cited and Internet Sites

Atlantic PIRI. 2021. Atlantic RBCA (Risk-Based Corrective Action) for Impacted Sites in Atlantic Canada. Version 4. User Guidance. Available at: [https://atlanticrbca.com/wp-content/files\\_mf/1627327707ARBCA\\_V4\\_User\\_Guidance\\_July\\_21\\_2021.pdf](https://atlanticrbca.com/wp-content/files_mf/1627327707ARBCA_V4_User_Guidance_July_21_2021.pdf). Accessed November 2021.

Atlantic PIRI. 2021. Atlantic RBCA - Ecological Tier II Pathway-Specific Standards (PSS) for Sediment - Freshwater and Marine (mg/kg). pp 3-4.

CDA (Canadian Dam Association). 2007. NB Power Buys New Generating Station. Canadian Dam Association Bulletin, spring 2008 edition, pp 19-20.

Dillon (Dillon Consulting Limited). 2021. Environmental Impact Assessment (EIA) Registration, Nepisiguit Falls Generating Station Life Extension Project, Bathurst Mines, New Brunswick. Prepared by Dillon Consulting on behalf of the New Brunswick Power Corporation, Fredericton, New Brunswick.

NBDELG (New Brunswick Department of Environment and Local Government). 1987. Environmental Impact Assessment Regulation - Clean Environment Act.

## Personal Communications

RPC (Research & Productivity Council). 2021. Email. November 3, 2021.

## Site Photographs



Photo 1: Technicians collecting data in the water around the station (July 2021).



Photo 2: Area above the station (July 2021).



**Photo 3: Technician gathering data above the station, holding a minnow trap.**

# Laboratory Results

**TABLE 1**  
**METAL CONCENTRATIONS IN SEDIMENT**  
 NB Power  
 Nepisiguit, NB  
 Project No. 20-3641

Parameter	Atlantic PIRI Edological Tier II Pathways Specific Standards (PSS) for Sediment - Freshwater (mg/kg)	Sed above		Sed below
		08-Jul-21	08-Jul-21 (FD)	08-Jul-21
Aluminum	NB	12400	12800	11500
Antimony	25	< 0.1	< 0.1	0.1
Arsenic	17	7	6	8
Barium	NB	29	31	24
Beryllium	NB	0.5	0.5	0.5
Bismuth	NB	< 1	< 1	< 1
Boron	NB	< 1	< 1	< 1
Cadmium	3.5	0.3	0.33	0.21
Calcium	NB	1570	1570	1440
Chromium	90	21	22	18
Cobalt	NB	7.4	8	6.8
Copper	197	14	15	11
Iron	43,766	20500	21200	19900
Lead	91.3	11.4	11.3	10.7
Lithium	NB	13	13.4	11.9
Magnesium	NB	6500	6840	6160
Manganese	1,100	339	369	346
Mercury	0.486	< 0.01	< 0.01	< 0.01
Molybdenum	NB	0.4	0.4	0.5
Nickel	75	20	22	18
Potassium	NB	900	940	880
Rubidium	NB	8.6	8.9	7.7
Selenium	2	< 1	< 1	< 1
Silver	0.5	< 0.1	< 0.1	< 0.1
Sodium	NB	70	80	130
Strontium	NB	6	6	6
Tellurium	NB	< 0.1	< 0.1	< 0.1
Thallium	NB	< 0.1	< 0.1	< 0.1
Tin	NB	< 1	< 1	< 1
Uranium	NB	1.4	1.3	1.1
Vanadium	NB	24	27	23
Zinc	315	192	216	187

Notes:

"NB" denotes benchmark not available; "FD" denotes field duplicate.

**100**

denotes concentration exceeds the Atlantic PIRI Tier II PSS.

**TABLE 2**  
**BTEX & PETROLEUM HYDROCARBON CONCENTRATIONS IN SEDIMENT**  
 NB Power  
 Nepisiguit, NB  
 Project No. 20-3641

Sample	Sample Date	BTEX Concentration (mg/kg)				Petroleum Hydrocarbons (mg/kg)						Modified TPH	Resemblance
		Benzene	Toluene	Ethylbenzene	Xylenes	Purgeable C6 - C10	Purgeable	Extractable C16 - C21	Extractable C21 - C32	Extractable >C16-C32			
Sed above	08-Jul-21	< 0.02	< 0.05	< 0.02	< 0.05	< 2.5	< 12	89	73	160	<b>160</b>	UP	
Sed below	08-Jul-21	< 0.005	< 0.05	< 0.01	< 0.05	< 2.5	< 12	< 12	< 12	< 12	< 21	NR	
	08-Jul-21 (FD)	< 0.005	< 0.05	< 0.01	< 0.05	< 2.5	< 12	< 12	< 12	< 12	< 21	NR	
Atlantic PIRI Tier I ESLs - Typical Petroleum Hydrocarbon Sediment Ecological Screening Levels for the Protection of Freshwater Aquatic Life		1.2	1.4	1.2	1.3	NB	NB	NB	NB	NB	15 25 43 500	Gasoline (G) Fuel Oil (F) Lube Oil (L) Max	

**Notes:**

"NB" denotes benchmark not available; "UP" denotes unknown peaks; "FD" denotes field duplicate.

**7500** denotes concentration exceeds the 2021 Atlantic PIRI Tier I ESLs

**TABLE 3  
POLYCYCLIC AROMATIC HYDROCARBON CONCENTRATIONS IN SEDIMENT**

NB Power  
Nepisiguit, NB  
Project No. 20-3641

Parameter	Units	RDL	Atlantic PIRI Edological Tier II Pathways Specific Standards (PSS) for Sediment - Freshwater (mg/kg)	Sed above		Sed below
				08-Jul-21	08-Jul-21 (FD)	08-Jul-21
Naphthalene	mg/kg	0.01	0.391	< 0.01	< 0.01	< 0.01
Acenaphthylene	mg/kg	0.01	0.128	< 0.01	< 0.01	< 0.01
Acenaphthene	mg/kg	0.01	0.0889	< 0.01	< 0.01	< 0.01
Fluorene	mg/kg	0.01	0.144	< 0.01	< 0.01	< 0.01
Phenanthrene	mg/kg	0.01	0.515	< 0.01	< 0.01	< 0.01
Anthracene	mg/kg	0.01	0.245	< 0.01	< 0.01	< 0.01
Fluoranthene	mg/kg	0.01	2.355	< 0.01	< 0.01	< 0.01
Pyrene	mg/kg	0.01	0.875	< 0.01	< 0.01	< 0.01
Benz(a)anthracene	mg/kg	0.01	0.385	< 0.01	< 0.01	< 0.01
Chrysene/Triphenylene	mg/kg	0.01	0.862	< 0.01	< 0.01	< 0.01
Benzo(b+j)fluoranthene	mg/kg	0.01	13.4	< 0.01	< 0.01	< 0.01
Benzo(k)fluoranthene	mg/kg	0.01		< 0.01	< 0.01	< 0.01
Benzo(e)pyrene	mg/kg	0.01	0.782 <sup>#1</sup>	< 0.01	< 0.01	< 0.01
Benzo(a)pyrene	mg/kg	0.01	0.782	< 0.01	< 0.01	< 0.01
Indeno(1,2,3-c,d)pyrene	mg/kg	0.01	3.2	< 0.01	< 0.01	< 0.01
Benzo(g,h,i)perylene	mg/kg	0.01	0.32	< 0.01	< 0.01	< 0.01
Dibenz(a,h)anthracene	mg/kg	0.01	0.135	< 0.01	< 0.01	< 0.01

**Notes:**

#1. Benzo(e)pyrene benchmark is not available; however, it is structurally similar to benzo(a)pyrene. On this basis, the available benzo(a)pyrene benchmark was applied as a surrogate benchmark.

"FD" denotes field duplicate sample.

**100** denotes concentration exceeds the Atlantic PIRI Tier II PSS



**TABLE 4**  
**ORGANOCHLORINE PESTICIDE CONCENTRATIONS IN SEDIMENT**

NB Power  
Nepisiguit, NB  
Project No. 20-3641

Parameter	Units	RDL	Atlantic RBCA Ecological Tier II Pathway-Specific Standards (PSS) for Sediment (Freshwater)	Sed Above		Sed Below
				08-Jul-21	08-Jul-21 (FD)	08-Jul-21
a-BHC	µg/g	0.01	NB	< 0.01	< 0.01	< 0.01
b-BHC	µg/g	0.01	0.00138	< 0.01	< 0.01	< 0.01
g-BHC (Lindane)	µg/g	0.01	NB	< 0.01	< 0.01	< 0.01
d-BHC	µg/g	0.01	0.00274	< 0.01	< 0.01	< 0.01
Heptachlor	µg/g	0.01	0.08	< 0.01	< 0.01	< 0.01
Aldrin	µg/g	0.01	NB	< 0.01	< 0.01	< 0.01
Heptachlor epoxide	µg/g	0.01	NB	< 0.01	< 0.01	< 0.01
2,4'-DDE	µg/g	0.01	0.006	< 0.01	< 0.01	< 0.01
Endosulfan I	µg/g	0.01	NB	< 0.01	< 0.01	< 0.01
4,4'-DDE	µg/g	0.01	0.00667	< 0.01	< 0.01	< 0.01
Dieldrin	µg/g	0.01	NB	< 0.01	< 0.01	< 0.01
2,4'-DDD	µg/g	0.01	0.0624	< 0.01	< 0.01	< 0.01
Endrin	µg/g	0.01	0.006	< 0.01	< 0.01	< 0.01
Endosulfan II	µg/g	0.01	NB	< 0.01	< 0.01	< 0.01
4,4'-DDD	µg/g	0.01	NB	< 0.01	< 0.01	< 0.01
2,4'-DDT	µg/g	0.01	NB	< 0.01	< 0.01	< 0.01
Endrin aldehyde	µg/g	0.01	NB	< 0.01	< 0.01	< 0.01
Endosulfan sulfate	µg/g	0.01	NB	< 0.01	< 0.01	< 0.01
4,4'-DDT	µg/g	0.01	NB	< 0.01	< 0.01	< 0.01
Endrin ketone	µg/g	0.01	0.019	< 0.01	< 0.01	< 0.01
Methoxychlor	µg/g	0.01	NB	< 0.01	< 0.01	< 0.01
Mirex	µg/g	0.01	NB	< 0.01	< 0.01	< 0.01

**Notes:**

"NB" denotes benchmark not available; "FD" denotes field duplicate.

**100**

denotes concentration exceeds Atlantic PIRI Ecological Tier II PSS.

**TABLE 5**  
**GRAIN SIZE OF SEDIMENT**  
 NB Power  
 Nepisiguit, NB  
 Project No. 20-3641

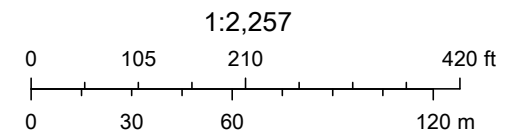
Parameter	Units	RDL	Sed Above	Sed Below
			08-Jul-21	08-Jul-21
PHI -2 (4mm)	% Finer	0.1	100.	100.
PHI -1 (2 mm)	% Finer	0.1	99.0	93.6
PHI 0 (1 mm)	% Finer	0.1	92.7	74.8
PHI 1 (0.5 mm)	% Finer	0.1	69.1	41.4
PHI 2 (0.25 mm)	% Finer	0.1	8.2	0.7
PHI 3 (0.125 mm)	% Finer	0.1	2.4	0.4
PHI 4 (62.5 µm)	% Finer	0.1	1.5	0.3
PHI 5 (31.25 µm)	% Finer	0.1	1.1	0.3
PHI 6 (15.6 µm)	% Finer	0.1	0.8	0.1
PHI 7 (7.8 µm)	% Finer	0.1	0.6	0.1
PHI 8 (3.9 µm)	% Finer	0.1	0.4	< 0.1
PHI 9 (1.9 µm)	% Finer	0.1	0.3	< 0.1
Gravel	%	0.1	1.0	6.4
Sand	%	0.1	97.5	93.3
Silt	%	0.1	1.1	0.3
Clay	%	0.1	0.4	< 0.1

# Figures

Figure 1. Nepisiguit Falls Generating Station Sediment Samples Approximate Locations



11/19/2021, 9:09:05 AM



Department of Environment & Local Government/Ministère de

GeoNB

This map is a graphical representation which approximates the size, configuration and location of features. This map is not intended to be used for legal descriptions or to calculate exact dimensions or area.

# Appendix D

## *Site Photographs*



**Photo 1:** Looking south across the river from the boat launch (July 2021)



**Photo 2:** Looking downstream at the safety boom from the boat launch (July 2021)



**Photo 3:** Retrieving a fyke net upstream of the safety boom (July 2021)



**Photo 4:** Dillon staff processing seine net captures at the boat launch (July 2021)



**Photo 5:** Dillon staff angling in the impoundment of the NFGS (July 2021)