Revised Project Description and Environmental Impact Assessment (EIA) Registration for the Nepisiguit Falls Generating Station Modification and Rehabilitation Project

Report for:
New Brunswick Power Generation Corporation
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Project No. 121810326
June 15, 2011

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1.0 INTRODUCTION

This document is intended to fulfill the requirements of a registration under the New Brunswick *Environmental Impact Assessment* (*EIA*) *Regulation* of the *Clean Environment Act* for the modification and rehabilitation of the Nepisiguit Falls Generating Station (NFGS). This document also serves as a Project Description for the purposes of the *Regulations Respecting the Coordination by Federal Authorities of Environmental Assessment Procedures and Requirements*, under the *Canadian Environmental Assessment Act* (*CEAA*), as the work is considered a "project" under *CEAA*. Additional information about the regulatory framework is provided in Section 1.7.

The modification and rehabilitation of the NFGS (the "Project") is proposed by the New Brunswick Power Generation Corporation ("NB Power"; "the Proponent") to extend the service life of the existing Nepisiguit Falls Generating Station (NFGS). Stantec Consulting Ltd. ("Stantec") prepared this document on behalf of the Proponent.

1.1 PROJECT OVERVIEW

NB Power purchased the NFGS from Smurfit-Stone Corporation in 2007. The station is a 10.8 MW hydroelectric generating station originally built in 1921 and consists of a forebay, forebay spillway dam, submerged gate, rubber dam, main dam and sluiceway, power house containing turbines and electrical generating equipment, and associated electrical terminal and transmission facilities.

The Project is located at the Nepisiguit Falls on the Nepisiguit River, in the community of Bathurst Mines, Gloucester County, NB (Figure 1.1). The Project is located in a remote part of the province, approximately 35 km south of the City of Bathurst, in northern New Brunswick.

The Project includes of the replacement of the existing coarse trash rack system and intake deck structure on the upstream face of the power house; refurbishment of the upstream face, crest, and downstream face of the forebay spillway dam; the installation of a new rubber dam on the top of the forebay spillway dam; removal of debris from the intakes of the power house and fine trash rack system; installation of post-tension anchors and ancillary works such as the installation of a new chain link fence and gate, extension of the existing retaining wall at the northend parking lot and the installation of new communication and electrical infrastructure at the NFGS. These activities will extend the service life of the NFGS. Replacement of the coarse trash rack system and intake deck require a dry working area, and therefore, installation of a Coffer Dam is necessary within the forebay to restrict the flow of water to the power house.

1.2 PURPOSE/RATIONALE/NEED FOR THE PROJECT

A study commissioned in 1998 by Smurfit–Stone to characterize the integrity of the NFGS recommended refurbishment and maintenance to bring the NFGS up to modern day standards and address known deficiencies. The refurbishment of the NFGS is being undertaken in a phased approach. The first phase was undertaken in 2000, and consisted of replacing the main dam and sluiceway with a rubber dam and a new submerged gate.

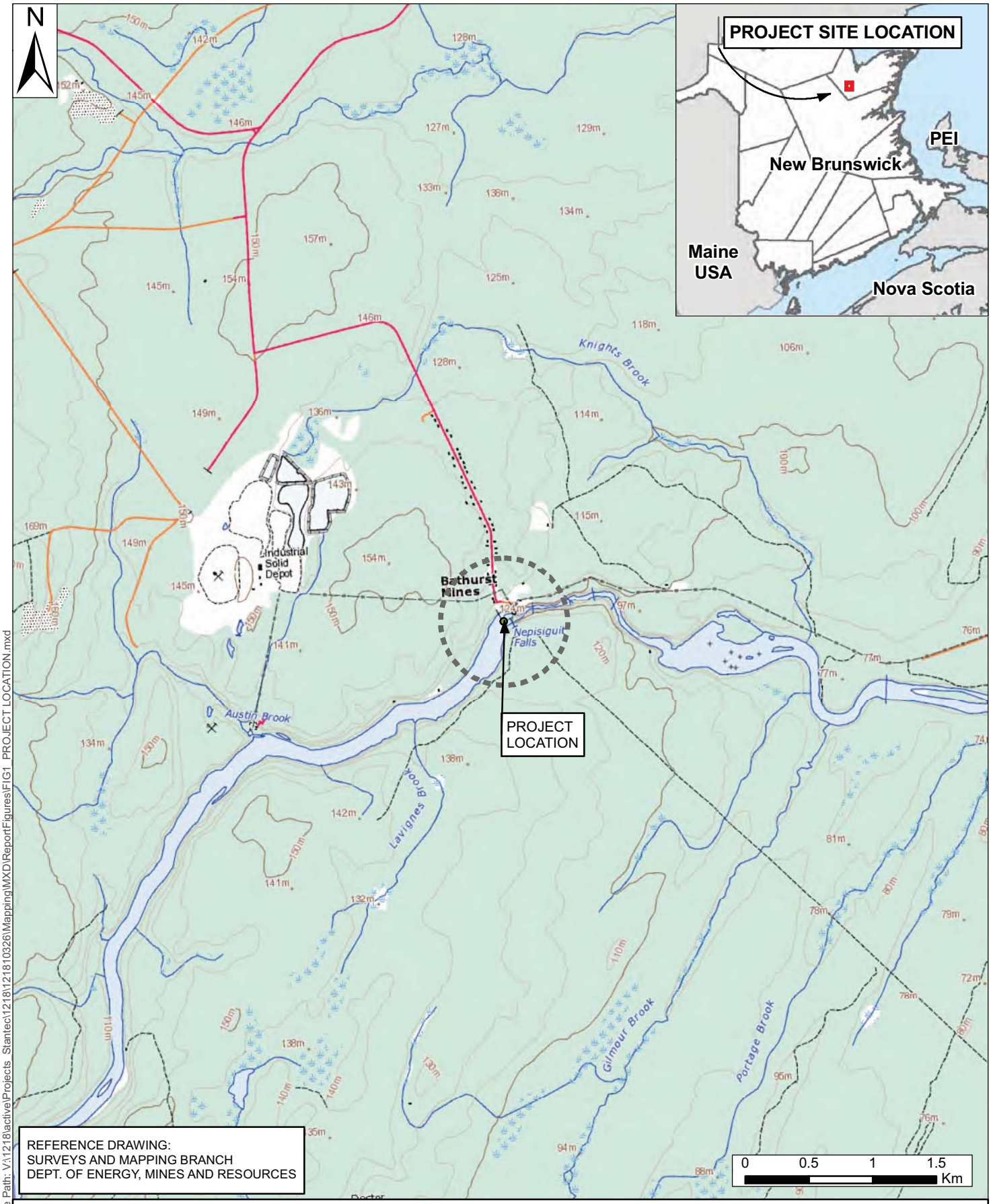
The purpose of the Project is to undertake the second phase of the refurbishment and maintenance, which has been planned for the NFGS since 1998. This phase includes the refurbishment of the forebay spillway dam and the installation of a new 1.2 m (3.9 ft) diameter, 85.3 m (280 ft) long rubber dam and various associated and other refurbishment works.

Prior to NB Power's purchase of the NFGS in 2007, the forebay spillway dam had an additional 1.2 m of hold back capacity from the use of wooden flashboards (Photo 1, Appendix B, which shows the forebay dewatered for construction of phase I). These flashboards did not allow for the required response to flood levels and ice jams in the winter months, and were therefore removed for 5 to 6 months of the year. This practice reduced the water capacity of the forebay, and thus lowered the service level and generating potential of the NFGS. The flashboards had to be removed manually during flooding and ice jams, which presented health and safety concerns. NB Power permanently removed the flashboards due to safety concerns.

Undertaking modification and rehabilitation activities on the forebay spillway dam structure, which is in poor repair (Photo 2, Appendix B), will increase its lifespan. Replacing the flashboard system with a rubber dam will reinstate the full operating potential of the NFGS by holding back water and restoring the generating capacity of the station to what it was prior to removal of the flashboards. This will increase efficiency in operation, and improve flood control.

The Project includes the replacement of the existing coarse trash rack system, which was damaged in December 2010 by high water levels and ice (further discussed in Section 2.2.7), although the primary cause was the cumulative effect of deterioration and corrosion, resulting in failure of the coarse trash rack system. The coarse trash racks protect the power house components by entraining debris that would otherwise run through the systems and cause damage to various mechanical components. The coarse trash racks also provide structural support to the intake deck on the forebay side of the power house.

The NFGS is an important part of NB Power's generation portfolio, as it represents dependable, renewable energy on a continuous basis that offsets the use of fossil fuels.



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NOTE: THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC PROJECT AND SHOULD NOT BE USED FOR OTHER PURPOSES.

PROJECT LOCATION

NEPISIGUIT FALLS GENERATING STATION UPGRADES

BATHURST MINES
GLOUCESTER COUNTY, NEW BRUNSWICK

Client: NEW BRUNSWICK POWER GENERATION CORPORATION

Scale:	Job No.:	Fig. No.:
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Date (yyyy/mm/dd):	Fig. By:	Appd. By:
2010/11/20	RJS	JB

Stantec

Map: Double Stereographic

1.3 PROPONENT CONTACT INFORMATION

The Proponent and contact information is as follows:

Name of Proponent:	New Brunswick Power Generation Corporation
Mailing Address of Proponent:	515 King Street P.O Box 2040 Fredericton, NB E3B 5G4
Environmental Assessment Contact Person:	Mr. R. Anthony Bielecki, P.Eng. Manager, Environment
Telephone Number:	(506) 458-6701
Fax Number:	(506) 458-4000
Electronic Mail Address:	ABielecki@nbpower.com

1.4 PROPERTY OWNERSHIP

The New Brunswick Power Corporation currently owns the property upon which the Project will be completed.

An aerial photograph showing the Nepisiguit Falls Generating Station and property boundaries is provided in Figure 1.2.

1.5 FUNDING

The Project will be financed entirely by the Proponent.

1.6 PROJECT-RELATED DOCUMENTS

In January, 2011, NB Power submitted a request for a Letter of Advice to the Department of Fisheries and Oceans (DFO), which was supported by a Regulatory Consultation Document; this included information based on the alternative means of carrying out the Project (*i.e.*, dewatering), with a discussion of possible Harmful Alteration Destruction or Disturbance of Fish Habitat (HADD) related to that option.

1.7 REGULATORY FRAMEWORK

1.7.1 New Brunswick *Environmental Impact Assessment Regulation*

The Project is an undertaking under Schedule A of the New Brunswick *Clean Environment Act, Environmental Impact Assessment Regulation*, as it will modify and rehabilitate an undertaking specified in Schedule A of the regulation (*i.e*., Item (b), a power generating facility greater than 3 MW). As such, the Project must be registered under the Regulation, and a review of the Project will be carried out to determine if and under what conditions the Project may proceed (Determination Review), or whether a Comprehensive EIA review is required. This EIA Registration is intended to fulfill the registration requirements under Section 5(1) of the EIA Regulation.

It is important to note that the building footprint will not change, nor will the Project alter the historic generating capacity of the NFGS.

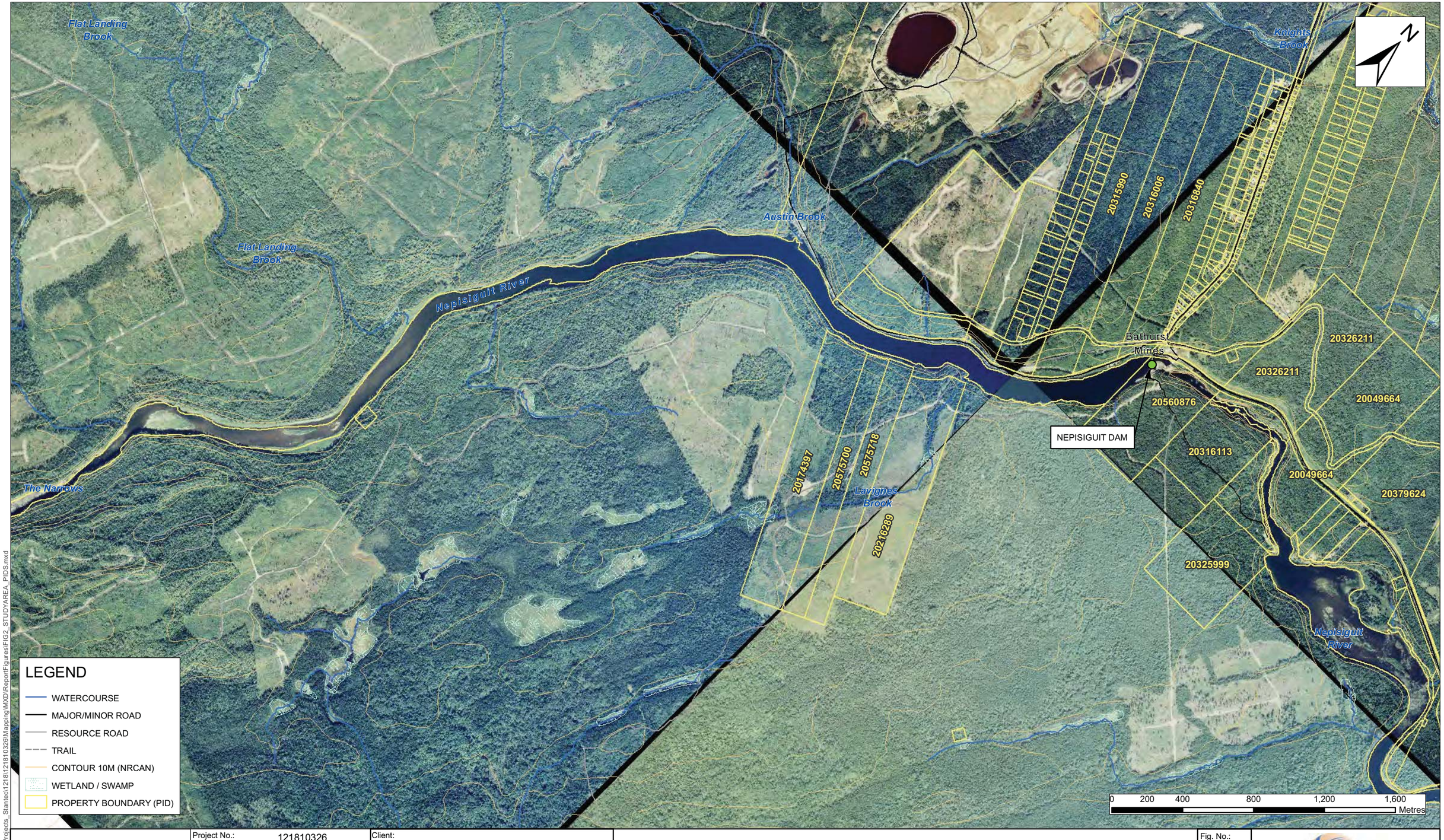
1.7.2 *Canadian Environmental Assessment Act* (*CEAA*)

The work is considered a Project under *CEAA*, as it is a modification to a physical work. An EA under *CEAA* is required if a federal authority exercises one of the powers or performs one of the duties listed in Section 5(1) of *CEAA*, in respect of a project. This Project is potentially subject to Section 5(d) of *CEAA,* which states that projects that require permits, licenses or approvals under the *Law List Regulations* require an EA.

The potential *Law List Regulations* triggers that could apply to this Project are listed below and discussed in the following sections:

- Item 6 of the *Law List Regulations*: an authorization under Section 35(2) of the *Fisheries Act* for harmful alteration, disruption, or destruction of fish habitat; and

- Item 11 of the *Law List Regulations*: an authorization under Section 5(1) of the *Navigable Waters Protection Act* for any works carried out in navigable waters



LEGEND

- WATERCOURSE
- MAJOR/MINOR ROAD
- RESOURCE ROAD
- TRAIL
- CONTOUR 10M (NRCAN)
- WETLAND / SWAMP
- PROPERTY BOUNDARY (PID)

SOURCE: DATA FROM SNB AND CLIENT UNLESS OTHERWISE NOTED. AERIAL IMAGERY PROVIDED BY SNB. IMAGERY DATE: 2001

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Fig. By:	RJS
Appd. By:	JB

Client: NEW BRUNSWICK POWER GENERATION CORPORATION

Project: NEPISIGUIT FALLS GENERATING STATION UPGRADES

AERIAL PHOTOGRAPH SHOWING PROJECT LOCATION

Fig. No.: 1.2

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1.7.2.1 *Fisheries Act*

The Project may require an Authorization from the federal Minister of the Department of Fisheries and Oceans (DFO) if, in the opinion of the Minister, the work would constitute a Harmful Alteration, Disruption or Destruction (HADD) of fish habitat under Section 35(2) of the *Fisheries Act*.

In consideration of the nature and duration of the work and planned mitigation to minimize adverse environmental effects, the Minister may determine that an Authorization is not required, if it is concluded that a HADD to fish habitat is not likely. NB Power is requesting a letter of advice from DFO on whether this Project constitutes a HADD to fish habitat.

If DFO determines that an Authorization under Section 35(2) is needed, an EA under *CEAA* would be required, and DFO would be a Responsible Authority. In the case that DFO determines that an EA under *CEAA* is required, NB Power is seeking an exemption to *CEAA* from DFO under the *Exclusion List Regulations*, Schedule 1(1). As the planned work will not change the historic generating capacity of the NFGS, and the physical structures in need of repair will be replaced or repaired with no change in function or capacity, the Project can be considered as "maintenance or repair of a physical work", as defined under Schedule 1(1), which would exclude it from the requirement of an EA under *CEAA*. Regardless, an EA has been carried out in Chapter 4 of this document in the event that an EA is ultimately required.

1.7.2.2 *Navigable Waters Protection Act*

The Nepisiguit River is considered navigable under the *NWPA.*

NB Power submitted an application to the Navigable Waters Protection Program (NWPP) for approval of the Project on October 13, 2010. Approval of the Project was received from the Minister of Transport, Infrastructure and Communities pursuant to Subsection 10(2) of the *NWPA*. Since that time, NB Power has chosen a different means of carrying out the work (*i.e*., construction of the Coffer Dam rather than full dewatering of the headpond), that warrants re-application to the NWPP. No change to potential project interactions with navigation is anticipated as a result of this change to the preferred means of carrying out the Project. Approval under Section 10(2) of the *NWPA* does not require an environmental assessment under *CEAA*.

2.0 PROJECT DESCRIPTION

The Project includes modification and rehabilitation of the existing NFGS, shown on Figure 2.1.

This section describes the key aspects of the Project, as currently conceived, including:

- a description of the Project components, including the likely infrastructure and components associated with the Project, and proposed mitigation for potential environmental effects;
- a discussion of the activities that will be carried out during Construction, Operation, and eventual Decommissioning and Abandonment of the Project, as currently conceived by the Proponent following discussions with provincial and federal regulatory authorities on the best manner to achieve the required Project modifications with minimal environmental effects;
- a discussion of alternative means of carrying out the Project; and
- a brief overview of potential accidents, malfunctions, and unplanned events.

Initial consideration of alternative means of carrying out the Project (Section 2.6) included options for working in the dry through the dewatering of the forebay and headpond. Although this was a feasible option, DFO has advised that the option for working in the dry by dewatering the headpond may be less desirable than installing a Coffer Dam without the dewatering. In consultation with DFO (December 20, 2010; March 28, 2011), NB Power has settled on the installation of a Coffer Dam within the forebay to create a dry work area for Construction as the preferred option. That work is described in this chapter.

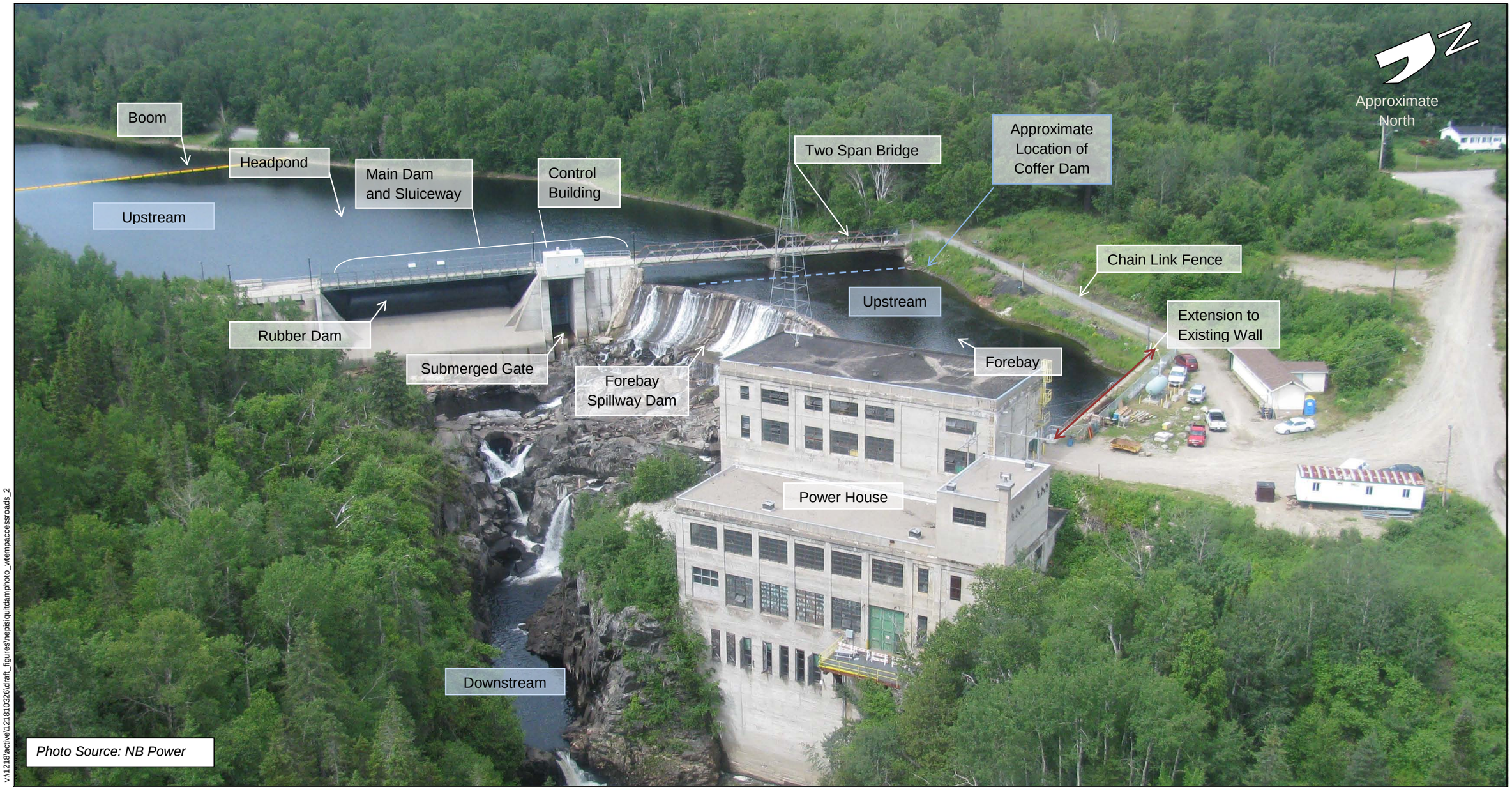
2.1 PROJECT COMPONENTS AND ACTIVITIES

Note: Where both imperial and metric measurements have been provided, imperial measurements will prevail. Metric conversions have been approximately converted for reference only; elevations in this report are related to a site datum that does not correspond precisely with sea level. To convert from the NB Power Nepisiguit Falls Datum to NB MSL Datum (NAD83), add 1.917 m (6.2899 ft).

2.1.1 Project Components

The Project involves the following:

- the refurbishment of the upstream face, crest, and downstream face of the spillway dam, which is at elevation 104.24 m (342 ft) to the top of the concrete;



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NOTE: THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC PROJECT AND SHOULD NOT BE USED FOR OTHER PURPOSES

PROJECT OVERVIEW
NEPISIGUIT FALLS GENERATING STATION UPGRADES

Client: New Brunswick Power Generation Corporation

Scale:	Job No.:	Figure No.:
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Date:	Fig. By:	Appd. By:
June 6, 2011	JLL	SMW

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- the installation of a new 1.2 m (3.9 ft) diameter, 85.3 m (280 ft) long rubber dam on the top of the spillway dam;
- the replacement of the damaged trash racks and intake deck outside the power house building;
- installation of post-tensioning anchors;
- various ancillary works including the installation of a new chain link fence and gate and extension to the existing retaining wall at the north-end of the forebay, removal of the cooling water chambers and general maintenance on the fine trash racks and butterfly valves; and
- the installation of various communications and electrical infrastructure.

2.1.2 Project Activities

The Project consists of eight main activities, as follows:

- installation of Coffer Dam;
- installation of a work platform;
- concrete demolition and surface repair;
- post-tension upgrade by setting of rock anchors;
- installation of the rubber dam;
- replacement of the trash rack system and intake deck;
- ancillary works; and
- removal of the Coffer Dam and work platform.

Each of these activities is further discussed below in Section 2.2 (Construction).

2.2 CONSTRUCTION

Construction will begin after approvals under the provincial EIA and federal EA (if applicable) processes have been received, and following approval of the Project under the applicable provincial and federal acts and regulations. Provided these approvals are granted, site preparation and physical construction could begin as early as June, 2012.

There are several stages to the construction process, as outlined below. There are several activities that will also take place once repairs to the NFGS are completed. These have been

included in this section as they will take place during or after the Construction phase of the Project, prior to removal of the Coffer Dam.

Appendix C provides the preliminary design drawings for the work, including:

1. plan view of the Coffer Dam;
2. cross section of the Coffer Dam;
3. plan view of the access road and work platform;
4. plan view of the spillway concrete repairs;
5. cross section of the spillway concrete repairs;
6. plan view of the rubber dam;
7. cross section of the rubber dam;
8. schematic of the Nepisiguit Falls Generating Station; and
9. schematic of the replacement coarse trash rack system and intake deck.

2.2.1 Installation of the Coffer Dam

A Coffer Dam will be constructed in the wet (without dewatering of the forebay and headpond) downstream of the two-span bridge. The Coffer Dam will consist of a rock berm, with an impermeable geomembrane on the upstream face as shown in Drawings 1 and 2 (Appendix C). The Coffer Dam will also provide road access for machinery required for Construction. Construction and removal of the Coffer Dam will proceed as follows:

- draw down of the headpond to approximately 102.1 m (335 ft) (approximately 2 m or 7 ft below normal operating levels) through the turbines, submerged gate or with the rubber dam;
- installation of turbidity curtains upstream and downstream of the Coffer Dam location;
- cleaning of the bottom of the forebay where the Coffer Dam will be placed, using a backhoe;
- placement of clean, durable, non-ore bearing rockfill (0 cm to 91.4 cm (0” to 36”) in size) into the forebay by machinery from the north bank;
- placement of a geomembrane and protective geotextile (the geomembrane will be placed between two surfaces of geotextile) on the upstream face of the Coffer Dam;

- placement of rip rap (7.6 cm to 38 cm (3" to 15") in size) material over the geomembrane;
- drainage of the forebay between the Coffer Dam and the power house; and
- ultimate removal of the Coffer Dam in wet conditions, following the completion of the Project, using backhoes to remove the placed materials.

Construction would begin after the spring freshet, and after June 1, 2012 as stated as a condition of NB Power's Watercourse and Wetland Alteration (WAWA) Permit (ALT 31667'10), provided in Appendix D. (The WAWA Permit referred to herein, is for the calendar year 2011 (January through December). A review of the WAWA Permits issued to NB Power for 2009 through 2011 include many of the same conditions, which are based on a submission of planned work for the year provided to NBENV by NB Power. It is assumed, that although some conditions in the WAWA Permit for 2012 may change, the standard conditions referenced herein will remain. NB Power during their year-end planning process, will apply for the new WAWA Permit and approval will be received prior to work being undertaken.)

The draw down to 102.1 m (335 ft) will be carefully controlled by use of the turbines, submerged gate or with the rubber dam, so that there is no sudden change in flow downstream. The draw down process is expected to take between 12 and 24 hours, depending on the flow conditions when the draw down process is started. When the water level within the forebay approaches the minimum operating level, 103.9 m (341 ft), the generating station will be shut down in accordance with NB Power's Operating Procedure NFOP0001 (NB Power 2010a).

The headpond water level will be monitored during draw down by the staff gauge in the power house and through a secondary staff gauge installed approximately 800 m upstream of the NFGS at the gate house. The upstream gauge is connected to the NFGS by a dedicated, direct line from the gate house to the plant, which reports headpond water levels in real time through a Program Logic Controller (PLC) directly to the Operators of the NFGS. Through the monitoring system, alarms are set at both maximum high water (105.3 m or 345.5 ft) during normal operation and minimum low water levels (103.6 m or 340 ft). Alarms will be set at 102.4 m (336 ft) during Construction. After installation of the Coffer Dam is complete, the staff gauge located in the power house will no longer be operable. This gauge will be replaced by a temporary manual gauge to be installed on the upstream side of the pier for the two-span bridge.

Once the water level has stabilized, site preparation activities including the demolition of the existing fence and handrails on the north bank and the preparation of the access point to the forebay area from the existing gravel road, will proceed.

Turbidity curtains will be installed from the upstream side of the suspended two-span bridge and over the intakes to the power house to prevent the movement of sediments in the area during Construction.

Construction of the Coffer Dam will require between 2 and 4 weeks. The Coffer Dam will be constructed of clean, non-ore bearing rockfill to an elevation of approximately 102.7 m (337 ft) and a length of approximately 41.1 m (130 ft) (Drawing 2, Appendix C). These estimates are based on preliminary engineering design and the length of the Coffer Dam may vary slightly during final engineering. The rockfill will be transported to the Project location by dump truck along existing roadways, and placed or lowered into the water. The rockfill will be placed into the water from the north bank until it has reached the design elevation of 102.7 m (337 ft).

Prior to the placement of rockfill, the area of the forebay floor will be cleared of debris using a backhoe to provide a stable, clean surface for the Coffer Dam. Debris collected will be disposed of according to NB Power's WAWA Permit.

Once the rock berm has reached its design elevation, an impermeable geomembrane will be placed in between two layers of geotextile (to provide protection) over the upstream face of the berm, and anchored in place by divers. The geomembrane will be covered with rip rap to create an impermeable surface.

Rockfill and rip rap will be obtained for the Coffer Dam construction from an approved borrow source to be chosen by the contractor after contract award. The location of this site will be identified by the contractor for approval by NB Power and NBENV prior to Construction.

Following completion of the Coffer Dam, the residual water that has not drained through the turbines and remains between the Coffer Dam and the power house will be removed using drains in the power house, and by pumping. Water collected in the sediment pond would be pumped out over existing vegetation a sufficient distance (at least 30 m from the watercourse) from the river to prevent suspended solids from re-entering the river. During the final stages of this dewatering process, a fish biologist will be on site with a fish-out team to monitor fish presence and undertake fish rescue as required. Any remaining pools in the dewatered forebay will be fished out using seine or dip nets, and the fish will be relocated to fish habitat upstream.

Floating debris that collects on the upstream side of the Coffer Dam will be removed, and disposed of in accordance with NB Power's WAWA permit.

2.2.2 Installation of the Working Platform

A temporary working surface will be constructed on the upstream side of the spillway dam, at an approximate elevation of 102.7 m (337 ft), as shown on Drawing 5 (Appendix C). The temporary working surface will be constructed of clean, non-ore bearing rockfill (0 cm to 91.4 cm (0" to 36") in size), and will be approximately 3.7 m (12 ft) wide and will extend on both sides of the Coffer Dam along the spillway dam.

A temporary Working Platform will be built on the downstream face of the spillway to allow workers access to the downstream face. Debris fencing will be installed below the Working Platform to capture falling debris.

2.2.3 Concrete Demolition and Surface Repair

Design details for the concrete work are provided in Drawings 4 and 5, Appendix C. Concrete work on the spillway dam includes removal of the deteriorating concrete surface of the spillway dam, resurfacing of the spillway dam and formation of the new concrete surface for the new rubber dam. This work will be conducted from the temporary working surface using an excavator with a jack hammer head. Clean up will be undertaken using the excavator bucket. Scaffolding or a moveable platform will be used on the downstream side of the spillway dam to allow for the installation of dowels, post-tension anchors, and rebar on the downstream face. Debris netting will be installed to protect workers and the spillway dam structure from falling debris. Concrete will be poured in stages from the bottom of the downstream face to the top cap. All form work will be removed to prepare for installation of the rubber dam.

Discharges from the use of concrete, cement, mortars and other Portland cement or lime-containing construction materials may have a high pH, and work will be planned and conducted to ensure that sediments, debris, concrete, and concrete fines are not deposited, either directly or indirectly into the aquatic environment. Any potentially contaminated water (*e.g.,* exposed aggregate wash-off, wet curing, equipment and truck washing), will be recuperated and sediment recovered during the process will be disposed of at an approved disposal facility.

2.2.4 Installation of Post-Tension Anchors

Scaffolding or a movable platform will be used on the downstream side of the spillway dam to allow for the installation of dowels, post-tension anchors, and rebar on the downstream crest. Post-tensioning is a method of strengthening of the spillway structure with high-strength steel strands or bars.

The upgrade will involve the drilling approximately 6.1 m (20 ft) into the bedrock within the forebay to set the post-tension anchors which will be connected to the spillway structure. The upgrade is intended to improve the overall stability of the spillway dam and to improve stability during potential seismic events.

2.2.5 Installation of the Rubber Dam

Design details of the rubber dam are provided in Drawings 6, 7a and 7b, Appendix C. The rubber dam will be installed on top of the refurbished spillway dam, from the temporary working surface over a one week period. The rubber dam will be rolled out along the spillway using a spreader beam and anchored to fixtures set in the concrete during surface repair. Photos 3 and 4 (Appendix B) show this process, as it was carried out in 1999 at the main dam. A representative of the manufacturer will be onsite to monitor installation.

2.2.6 Replacement of the Trash Rack System and Intake Deck

When originally planned, the Project was intended to undertake investigation, evaluation, cleaning and repair of the current trash rack system. In December 2010, the coarse screen

trash racks were damaged by extreme high water levels and ice (Photo 5, Appendix B; Drawings 8 and 9, Appendix C), resulting in failure of the coarse trash rack system. The damaged coarse trash racks on the outside of the power house shown in Photo 5 (Appendix B) are meant to stop large debris from entering the power house. The coarse trash rack system also provides the structural frame that supports the intake deck on the outside of the power house. Due to damage sustained to the coarse trash racks, the structural integrity of the intake deck has become compromised, and as a result, the intake deck has been condemned, for safety reasons. As a result of this damage, the coarse trash rack system is now considered inoperable. Preliminary engineering design is currently underway for a temporary coarse trash rack system which is anticipated to be installed during the summer of 2011.

The coarse trash rack system and intake deck will be replaced as part of the Project. This will include removal of the temporary trash rack system, removal of the damaged A-frames and concrete casing over the coarse trash racks (the existing intake deck), and installation of the new coarse trash rack system and intake deck. Although the final engineering and design of the new system has not been completed, full access in the dry to the area will be needed for personnel and machinery. This will be accomplished by use of the Coffer Dam (Section 2.2.1).

Heavy machinery will be used to clear the dewatered forebay floor of debris in front of the coarse trash racks. Debris collected will be disposed of in accordance to NB Power's WAWA Permit and in accordance with current NBENV guidelines at an approved facility. The temporary coarse trash racks and the damaged concrete (intake deck) will be removed from the power house. The new coarse trash rack system will be installed and anchored into place and the intake deck and surrounding concrete will be replaced.

As stated in Section 2.2.3, discharges and wastes from Construction involving the use of concrete, cement, mortars and other Portland cement or lime-containing construction materials will be recuperated and slurry wastes recovered during the process will be disposed of at an approved disposal facility.

2.2.7 Ancillary Works

Associated ancillary works that will be undertaken include the following:

- demolition of the fence and handrails on the north bank of the forebay installation of a new chain link fence;
- construction of an extension to the existing retaining wall at the north end of the forebay channel;
- removal fo the cooling water chamber located behind the existing coarse trash rack system;
- inspection and general repairs to the fine trash rack system and butterfly valves;

- installation of piping and wiring for the rubber dam;
- installation of buried conduits in the rehabilitated parts of the spillway;
- installation of power cable, grounding cables, wiring, and electrical accessories in one of the ducts located in the spillway crest; and
- installation of communication data link and telephone lines between the control building and the power house, to be installed in one of the ducts located in the spillway crest.

2.2.8 Removal of the Coffer Dam and Working Platform

At the end of Construction, the temporary work platform on the downstream face of the spillway dam will be removed. The Coffer Dam will be removed using a backhoe and the rockfill will be disposed of in accordance with NBENV requirements. The geomembrane will disposed of at a licensed disposal facility or washed and stored for potential future reuse. Re-watering of the forebay area will be accomplished by pumping water into the work area from the upstream side of the Coffer Dam to allow water levels to equalize prior full excavation. This would prevent any sudden pulse of water into the work area which could be release higher levels of suspended sediment downstream of the NFGS. Once equalized, the water level would be allowed to return to pre-Project conditions which would occur naturally once the Coffer Dam has been removed.

2.3 OPERATION

Operation of the NFGS following Construction of the Project will occur in much the same way as it currently operates and has operated for several decades, with the exception that the rubber dam will be put in place to restore water levels in the forebay to those that were present prior to the permanent removal of the flashboards. The rubber dam will be operated with automatic (both pressure and water level control) and manual controls. The rubber dam is inflated with air, which is used to control the head levels in the forebay. The current rubber dam (at the main dam) is controlled by air pressure and water level sensor (with manual capacity) via a control building directly adjacent to the main dam, which is visible on Figure 2.1. The main rubber dam will be tied into this structure.

The NFGS will be operated to produce up to 10.8 MW of electricity in consideration of any permitting or legislative commitments. The planned modifications and rehabilitation will not change the building footprint, nor will the Project alter the historic generating capacity of the NFGS.

2.4 DECOMMISSIONING AND ABANDONMENT

The Project will be designed, built, and maintained to operate efficiently over the long term and the life of the Project will be extended by active maintenance program, refurbishment, or equipment replacement, as appropriate. Thus, for the purpose of this EIA Registration, the NFGS would be operated for an estimated 50-75 years following the Project. Any

Decommissioning or Abandonment of the Project and associated facilities has not yet been contemplated by the Proponent, nor would it be possible to predict, with any certainty, the potential environmental requirements for Decommissioning and Abandonment of the Project this far into the future.

Once the Project is nearing the end of its useful life, a Decommissioning and Abandonment Plan would be developed in accordance with the regulations applicable at that time. The Decommissioning and Abandonment Plan would specify the procedures that would be followed with respect to the decommissioning, removal, and disposal of site equipment and structures, and for site remediation, if required. It would also contain measures to achieve targeted environmental goals and would have a contingency to allow for shutdown at any time during the anticipated Project life, if required. The Decommissioning and Abandonment Plan would be developed to reflect the environmental requirements in place at the time of decommissioning, including consideration of the waste disposal, diversion, or recycling requirements that would exist at that time.

Where possible, materials from Decommissioning and Abandonment would be recycled or reused, to reduce the total quantity of solid waste disposed to landfill and conserve the natural resources required for their production.

Therefore, Decommissioning and Abandonment will not be considered further in any significant detail in this assessment, except to provide (where appropriate) an overall indication of the types and magnitude of potential environmental effects and how they could be mitigated to not significant levels upon Decommissioning.

2.5 PROJECT SCHEDULE

Construction is planned for June 1, 2012 through September 30, 2012 in accordance with NB Power's WAWA Permit. If in-water work is required beyond September 30, 2012, due to unplanned events that affect the project schedule, this would be done in consultation with NBENV, NBDNR, and DFO, and any applicable permits and authorization.

The Project schedule is driven by two factors as follows:

1. Regulatory – the need to complete the Project during low flow conditions and outside of key migration and spawning times to reduce significant environmental effects on fish and fish habitat within the area of the Project.

2. Seasonal constraints – the need to complete the Project within the favorable construction season. Construction needs to be carried out "in the dry" and thus must be carried out during the dry season outside of the spring and fall recharge periods when heavier rainfall is anticipated. Construction in winter is not feasible.

2.6 ALTERNATIVE MEANS OF CARRYING OUT THE PROJECT

At the planning phase of the Project, NB Power considered two alternative means of carrying out the Project, with consideration to design requirements, construction logistics, potential environmental interaction, and feasibility.

This section presents an overview of the alternatives considered for the Project and a comparison of their characteristics in terms of: creating a safe and reliable work environment; construction scheduling; and potential environmental effects.

2.6.1 Preferred Option (use of Coffer Dam)

The Preferred Option described in Section 2.2 above involves the use of a Coffer Dam and conducting repairs under wet conditions. This option offers the following features:

- it does not require a full dewatering or re-watering of the headpond;
- it reduces potential harmful alteration, disruption or destruction (HADD) of fish habitat and the associated authorization and compensation processes which would otherwise result from dewatering of the headpond;
- it reduces the potential for substantial sediment suspension in the Nepisiguit River, and thus the movement of potentially contaminated sediment is also reduced;
- it provides a safe, dry work area for completion of the trash rack and intake deck replacement; and
- it will be conducted in a manner which will allow time during Construction for fish to move out of the construction area.

However, this option has a higher overall construction cost than other alternatives considered. When considered against potential environmental effects, construction logistics, health and safety, and in consultation with DFO and NBENV, the Preferred Option has been identified by NB Power as the best means of completing the Project in the least environmentally intrusive manner possible.

This option requires minimal lowering of headpond levels. With proper mitigation for sediment, the potential for adverse environmental effects as a result of sedimentation, the movement of potentially contaminated sediment, and direct environmental effects to fish and fish habitat are reduced. Dual use of the Coffer Dam as a barrier for water and as an access road will provide similar access to the spillway dam as the alternative option, and all other work will proceed as with the alternative option (*e.g.,* work on the spillway dam will be undertaken from a platform, trash rack replacement will be carried out in dry conditions).

2.6.2 Alternative Option (Dewatering of the Headpond)

Initial consideration of alternative means of carrying out the Project included an option for working in the dry through dewatering of the headpond. This option provided ideal work conditions during Construction, required less physical site preparation work to be carried out, and was less expensive to carry out than the Preferred Option. In consultation with DFO, however, potential adverse environmental effects associated with dewatering of the headpond for an extended period of time were determined to outweigh the benefits with respect to construction logistics, worker safety, land use, and feasibility.

The Alternative Option offered the following features:

- only one dewatering and re-watering event is required;
- it included the potential for a large HADD while the headpond is dewatered, requiring a federal environmental assessment, authorization, and compensation;
- it increased the probability of suspending sediments in the Nepisiguit River during dewatering and re-watering;
- it increased the potential for sedimentation during rain events from the exposed banks;
- the work was to be carried out completely in the dry, providing a safe and reliable work area;
- it required a detailed fish rescue plan to be developed to relocate any fish stranded in the entire dewatered headpond area;
- it required a temporary access road to be constructed on the forebay bottom, and removal in the dry to avoid sedimentation; and
- its overall construction costs were lower than the Preferred Option.

2.6.3 Comparison of the Alternative Option and the Preferred Option

Although the Alternative Option met the objectives of the Project, this option was abandoned as a result of potential adverse environmental effects identified through the regulatory consultation process.

Dewatering and re-watering activities have the potential to introduce Total Suspended Solids (TSS) to the river and cause turbidity. Heavy precipitation events while the headpond is dewatered may also result in suspension of fine sediment from the exposed banks. Suspended solids are known to have potential adverse environmental effects on fish and fish habitat, depending on concentration and duration (Newcomb 2003). An accidental release of sulphidic sediments from the former Bathurst Mine is reported to have historically entered the headpond and resulted in mortality of fish downstream. The possibility has been identified that a deposit of

such sediments in the headpond might be exposed and result in a secondary episode of toxicity to fish as a result of the alternative option. Changes to flow patterns during dewatering may also cause these sediments to be disturbed and transported downstream.

Dewatering of the headpond also has the potential to result in a large area of HADD (though temporary), which could be unfeasible to compensate. The temporary HADD would be a direct result of the lowered water level in the headpond that would expose fish habitat to the elements (*e.g.,* drying from the sun, heavy rainfall events) prior to re-watering.

This alternative would also limit access to the local recreational fishery upstream of the NFGS (R. Baker, pers. comm. 2010; D. Haché, pers. comm. 2010; Scott and Crossman 1993). Consultation with DFO during the planning stages of the Project indicated that a fishery closure may be recommended to mitigate potential health and safety concerns associated with the public accessing the river by traveling over the exposed muddy banks.

As described in Section 2.2, the nature of the replacement of the coarse trash rack system and intake deck require that part of the Project be completed in dry conditions. In order to replace the coarse trash rack system, access to the upstream face of the power house in the dry is required, to allow for personnel and machinery access. The installation of a Coffer Dam upstream of the spillway provides a reasonable way to create dry conditions required complete the work, while minimizing the environmental effects.

The potential environmental effects of dewatering are considered more substantial that its benefits to the Project. Therefore, in light that a reasonable alternative (*i.e.,* Coffer Dam) has been identified that also meets the overall Project objectives, NB Power, in consultation with DFO has settled on the Coffer Dam option as the Preferred Option.

2.6.4 Other Alternative Options

Other alternative options (*e.g.,* installation and removal of the Coffer Dam in dry conditions, use of a temporary access road without draw down or dewatering) were considered, and deemed to be not technically and/or economically feasible. These were rejected at an early stage due to clear deficiencies in terms of scheduling, potential environmental effects, and/or cost. It would be possible to construct a Coffer Dam in dry conditions, with less effort than described above for construction in the wet, and without the issues of sedimentation. However, the basic design presented in Drawing 9 (Appendix C) would still be preferred, and thus the time required to dewater and build the structure would interfere with the overall construction schedule. In addition, as the primary reason for investigating the Coffer Dam option would be to remove the requirement to dewater, this option is considered to be less viable than those presented, as it would require 2 dewatering events, with the first one lasting between 2 to 4 weeks.

2.7 APPROVALS, PERMITS, AND AUTHORIZATIONS

The following list of authorizations and permits is typical for a Project of this type, however additional approvals may be required.

- Harmful Alteration, Disruption, or Destruction (HADD) of fish habitat authorization under Section 35(2) of the *Fisheries Act*.
- Authorization from the Minister of Transport, Infrastructure and Communities pursuant to Subsection 10(2) of the *Navigable Waters Protection Act* (*NWPA*).
- WAWA permits pursuant to the *Watercourse and Wetland Alteration Regulation–Clean Water Act.*

Other permits, approvals, or other forms of authorizations may be required from federal, provincial, and local authorities throughout the Construction and Operation phases of the Project.

2.8 ACCIDENTS, MALFUNCTIONS AND UNPLANNED EVENTS

Accidents, Malfunctions and Unplanned Events will be prevented and mitigated through a systematic approach to environmental protection.

The key Accidents, Malfunctions and Unplanned Events that could potentially occur during Construction and/or Operation of the Project are described below. Mitigation measures to prevent the occurrence of such events, and response procedures to be implemented in the event they do occur, will be developed prior to the commencement of each Project phase, as applicable.

Based on the nature of the Project, the key accidents, malfunctions, or unplanned events that could foreseeably occur as a result of the Project (though not likely to occur) include the following:

- loss of containment;
- failure of the Coffer Dam;
- hazardous material spill;
- erosion and sediment control failure;
- fire;
- discovery of a heritage resource;
- vehicle accident; and

- wildlife encounter.

These accidents, malfunctions and unplanned events are further described, and assessed, in Section 4.4.

3.0 SUMMARY OF EXISTING CONDITIONS

3.1 GEOGRAPHIC LOCATION

The Project is located at the Nepisiguit Falls on the Nepisiguit River, in the community of Bathurst Mines, Gloucester County, NB (Figure 1.1). The Project is located in a remote part of the province, approximately 35 km south of the City of Bathurst, in northern New Brunswick.

For the purpose of this document, the spatial boundaries for the Project include the Project Development Area (PDA) and the Local Assessment Area (LAA), defined as follows. The PDA includes the area of physical ground disturbance associated with the development of the Project facilities (Figure 2.1), as represented by the physical Project activities described in the Project Description. The LAA includes the PDA and other adjacent areas with a radius of 500 m around the NFGS (Figure 1.1), which given the Project Description generally represent the outer limits where Project-related environmental effects might reasonably be expected to occur.

3.2 ATMOSPHERIC ENVIRONMENT

Through NBENV, the Province of New Brunswick operates a network of ambient air quality monitoring stations within the province to measure the ground-level concentrations of a variety of air contaminants. The nearest monitoring station to the Project is located in Bathurst. The Bathurst monitoring stations are relatively new, having been operated since 2005 and May 2006 for ground-level concentrations of $PM_{2.5}$ and O_3, respectively. The most recent reported data from NBENV is for the year 2008 (NBENV 2010).

Monitoring results for $PM_{2.5}$ for the Bathurst station in 2008 showed no hourly values exceeding 30 µg/m³ (the Canada Wide Standard or CWS). The annual average concentration of $PM_{2.5}$ measured at the Bathurst station was 6.3 µg/m³, which is well below the CWS. The CWS is 30 µg/m³ by 2010 (24-hour averaging time) where achievement is based on the annual 98th percentile ambient measurement, averaged over three consecutive years. No provincial guideline or standard exists for $PM_{2.5}$.

The Project is located in a largely rural area within the community of Bathurst Mines, in Gloucester County, with no substantive industrial sources (which tend to release air contaminants) located nearby. Thus, sources of air contaminants in the immediate vicinity of the Project are mainly limited to vehicle and home heating emissions. The nearest facilities reporting to the National Pollutant Release Inventory (NPRI) is Brunswick Mine located approximately 19.5 km northeast of the NFGS (Environment Canada 2008). Given that in 2006 the rate of compliance with the ambient air quality standards is 100% for the Bathurst ambient monitoring station and there are no nearby industrial emissions sources, the air quality in the PDA is expected to be very good.

Existing sound quality conditions in the vicinity of the Project were not measured for this assessment, based on the nature and relatively limited scale of the Project. However, given the

largely rural area of the Project, existing sound pressure levels near in the vicinity of the NFGS are expected to be typical of sound pressure levels in a rural area. Based on the professional experience of the Atmospheric Environment Team, the existing sound pressure levels in the area are likely in the range of 40 to 60 dB_A, during daytime periods and 20 to 40 dB_A during evening and nighttime periods with a 24-hour equivalent (L_{eq}) in the range of 45 to 55 dB_A. Sound pressure levels at properties within 200 m of provincial Route 430 are likely 50 to 60 dB_A as a 24-hour L_{eq}.

Sources of existing sound are expected to be traffic on provincial Route 430 and Nepisiguit Falls Road, normal operation of the NFGS, natural sounds (animals, wind and rain) as well as local anthropogenic sounds (*e.g.,* all terrain vehicles, snowmobiles, lawnmowers, power tools, snow blowers).

3.3 WATER RESOURCES

No municipal potable water wellfield or watershed areas are located within the LAA. There are approximately 12 potable water wells for private residences within a 500 m radius of the NFGS on Route 430 and Nepisiguit Falls Road. The closest private potable water well is located approximately 120 m north of the NFGS.

3.4 AQUATIC ENVIRONMENT

The Nepisiguit River is a recognized Environmentally Sensitive Area (ESA) (ESA #161) within the province and is known for its unique geology and riparian and aquatic habitats. The habitat above the falls and NFGS consists of lake-like conditions for approximately 4 km above the NFGS, characterized by slow moving waters and some sediment-laden substrate. Further upstream, as well as below the falls, the habitat is typical of a northern New Brunswick river system in a relatively undisturbed natural context.

The Nepisiguit Falls are a natural barrier to fish passage, thus the fish species assemblage below the NFGS, which includes Atlantic salmon and other diadromous fish, is more diverse than it is above the NFGS. Above the NFGS, Hatch (2008) stated that the only fish species known to use the river and tributaries is brook trout. It is likely that other species such as dace, minnows, stickleback, suckers, and potentially American eel also use the river. Data reported by Nepisiguit Salmon Association and Pabineau First Nation (R. Baker, pers. comm. 2010) list brook trout, dace, sculpin and American eel as the most frequently encountered species above the falls. The forebay and catchment upstream are known for its trout population. During recent site reconnaissance, large adult brook trout were observed feeding in front of the coarse trash racks. There is no known presence of smallmouth bass in this reservoir, unlike other larger reservoirs in the province (Hatch 2008; R. Baker, pers. comm. 2010).

3.5 TERRESTRIAL ENVIRONMENT

The Project is located within the Northern Uplands Ecoregion, within the Tjigog ecodistrict. The Tjigog ecodistrict stretches from Bathurst to Dalhousie and is characterized by Ordovician

metasedimentary and mafic volcanic of the Tetagouche Group that is intersected by a series of major and minor northeast trending faults (NBDNR 2007).

The ecodistrict is characterized by its waterways including the Jacquet, Tetagouche and Nepisiguit Rivers. The Nepisiguit River is used for navigation and fishing, despite the presence of natural barriers (*i.e.,* falls) along its length. These are often portaged by those navigating the entire system.

Forested area in the LAA consists of intermediate to mature intolerant hardwoods such as white birch (*Betula papyrifera*), trembling aspen (*Populus tremuloides*), and red maple (*Acer rubrum*); and softwood species such as red spruce (*Picea rubens*), black spruce (*Picea mariana*), balsam fir (*Abies balsamea*), and scattered eastern white pine (*Pinus strobus*). Wildlife in the area is not expected to be of an unusual abundance or diversity (NBDNR 2007). The LAA does not contain any important or specialized habitat, and is typical of northern New Brunswick.

3.5.1 Wildlife

According to the AC CDC, there have been nine wildlife species (8 birds and 1 mammal) of conservation concern have been previously observed within a 5 km radius of the PDA, of which three species are ranked S2 or higher (AC CDC 2010).

One “regionally endangered” under NB *ESA* avian species, Bald Eagle (*Haliaeetus leucocephalus*), was recorded in the AC CDC database as being observed within a 5 km radius of the PDA. Bald Eagles nest in conspicuous stick nests, usually at or near the tops of large trees, such as white pines.

Two “Threatened” under COSEWIC avian species, Chimney Swift (*Chaetura pelagic*) and Common Nighthawk (*Chordeiles minor*) were recorded in the AC CDC database results as being observed within a 5 km radius of the Project. The Chimney Swift typically nests in chimneys, though other structures such as hollow tree trunks can be used, and is associated with urban settings, though it also forages and breeds over a variety of natural habitats including river-edge forest, the edge of tropical lowland evergreen forest and second-growth scrub. The Common Nighthawk traditionally nests on the ground in open areas such as burns and clearcuts.

The AC CDC report recorded possible occurrences of two other rare or uncommon avian species within a 5 km area of the Project, although no specific observations have been made. The Harlequin Duck (*Histrionicus histrionicus*) is commonly found along rocky coasts and nests inland up streams and rivers. The Red-shouldered Hawk (*Buteo lineatus*) can be found in forests with open understory, especially bottomland hardwoods, riparian areas, and flooded swamps.

The Canada Lynx (*Lynx canadensis* – S1), is listed as "regionally endangered" under the NB *ESA*. Lynx are secretive woodland cats that rely on snowshoe hare populations. The observation of Canada Lynx from AC CDC report was made approximately 4 km northwest of the PDA.

The AC CDC report also recorded the potential for Wood Turtle (*Glyptemys insculpta*) within a 5 km radius of the Project. Wood Turtle is listed as Special Concern by *SARA* and Threatened in NBDNR General Status Ranks. Wood Turtle are considered a semi-aquatic species, and prefer riparian areas with patchy cover, and clear meandering watercourses with gravely-sandy substrate and banks.

Typical assemblages of wildlife are anticipated to be present proximate to the PDA, including moose (*Alces alces*), white-tailed deer (*Odocoileus virginianus*), American black bear (*Ursus americanus*), fox (*Vulpes vulpes*), American mink (*Mustela vison*), beaver (*Castor canadensis*), striped skunk (*Mephitis mephitis*), porcupine (*Erethizon dorsatum*), raccoon (*Procyon lotor*), and varying hare (*Lepus americanus*). Small mammals such as red squirrel (*Tamiasciurus hudsonicus*), voles, shrews and mice are anticipated to be common and widespread.

No Important Bird Areas (IBAs) are located within the LAA of the Project. The closest IBAs to the PDA are the Nepisiguit Highlands (NB024) and the Tabusintac Lagoon and River Estuary (NB002) which are located approximately 60 km west, and 75 km east of the Project, respectively.

No locations of critical or sensitive habitat for wildlife are known within the 5 km radius of the NFGS.

3.5.2 Rare Plants

The AC CDC report included one rare or uncommon vascular plant species that was observed within a 5 km radius of the PDA. Drummond's rockcress (*arabis drummondii* – S2) was recorded approximately 1 km downstream of Nepisiguit Falls, along the Nepisiguit River. The usual habitat for this species is dry to moist calcareous soils, along dry ledges or sandy and rocky riverbanks where little over-shading would occur.

Three other rare or uncommon plant species that were reported by AC CDC as possibly located within a 5 km radius of the PDA, although no specific occurrences have been noted. These species include: Southern twayblade (*Listera australis* – provincially Endangered), Prototype Quillwort (*Isoetes prototypes* – provincially Endangered) and Giant pinedrops (*Pterospora andromedea* – no provincial or COSEWIC/*SARA* ranking).

Southern twayblade is typically found in peat bog habitat, among mosses. This species grows above the water level, also on the fen floor and on the sides of hummocks around trees where very little competing shrub cover would be found.

Prototype Quillwort is a true submerged aquatic species and is usually found in cold, spring-fed shallow lakes with soft sediment bottoms.

Giant pinedrops is generally located in dry woods containing conifers such as pines, hemlock, spruce, balsam fir, or white cedar, and frequently including poplar or birch. This species typically occurs in forested habitats with a well-developed needle duff.

3.6 WETLAND ENVIRONMENT

There are no wetlands identified on the NBDNR wetland layer within the LAA of the Project.

One Environmentally Sensitive Area (ESA), Doctor Bells Meadow is located approximately 5 km south of the PDA. This ESA is known for its good quality dry, inland sedge meadow, which is rare in northern NB. The area is completely surrounded by a mature fir-spruce forest, and is dotted with small ponds, lakes and streams, making it an excellent breeding habitat for Black Duck and Ring-necked Ducks. Doctor Bells Meadow is hydrologically connected up-gradient from the downstream reach of the Nepisiguit River.

3.7 LAND USE AND ECONOMY

The majority of the area surrounding the Nepisiguit River and the NFGS is provincial Crown land, with the exception of the outlet of the Nepisiguit River at Bathurst and scattered small parcels of privately owned land. Some of this privately owned land is located at Bathurst Mines, surrounding the NFGS, where there are privately owned land parcels for approximately 2 km upstream of the NFGS. As most of the land in the area belongs to the Crown and is under license to Fornebu Lumber Company Inc., land use activities in the surrounding areas are largely forestry based. Some recreational activity including recreational hunting and fishing is known to occur in the LAA and beyond. Some recreational camp sites are located in general proximity of the NFGS, within an approximate 5 km radius from the NFGS.

The Nepisiguit River Salmon Club Inc. (Nepisiguit Salmon Association) is a lessee of the property owned by the Proponent. The Nepisiguit Salmon Association was formed by volunteers in 1976 and, along with the Pabineau First Nation community, undertook the challenge to restore Atlantic salmon to the Nepisiguit River. NB Power gives full cooperation to the Nepisiguit Salmon Association to divert some water from their fire protection system into pipes to allow the water to flow at 30 to 37 litres per minute (8 to 10 gallons per minute) through several incubation boxes.

The Project is located in the Nepisiguit Junction census boundary, in Gloucester County. As of the 2006 Census (Statistics Canada 2010), 5,144 people lived in 2,272 dwellings within the parish. The community of Bathurst Mines is in the Parish of Bathurst which has a Local Service District that has jurisdiction in the LAA.

Residential land use is concentrated along Nepisiguit Falls Road (Figure 1.1), with approximately 12 private properties located within 500 m of the Project. The closest residential property is approximately 119 m north of the NFGS. The community is largely rural in nature and many residents are likely employed in Bathurst and industries in the region (*e.g.,* NB Power, Brunswick Mines).

3.8 HERITAGE RESOURCES

The NFGS was constructed over a two year period between 1919 and 1921 to provide power to a mill owned by the Bathurst Power and Paper Co. During construction the forebay area would have been cleared of vegetation, excavated and the forebay and power house constructed into the original bedrock banks of the river. The area subsequently would have flooded to create the forebay and the natural downfall removed to accommodate the power house. Upgrades, maintenance and other construction activities which have taken place over the last 90 years, including those conducted in 1993 and 2000 have further excavated the natural river banks and bedrock substrate.

A review of the Archaeological Service Sites Database did not reveal any registered archaeological sites within the LAA. There are several known archaeological sites within a 30 km radius of PDA, all of which are plane crash sites from between 1943 and 1956. According to Michael Nicholas, senior archaeologist from Archaeological Services (M. Nicholas, pers. comm. 2010), the lack of registered resources in and around Nepisiguit Falls may be attributed to the lack of study in the area.

3.9 ABORIGINAL LAND AND RESOURCE USE

The Tjigog ecodistrict lies within the traditional Mi'kmaq territory of Gespegeog. The Pabineau First Nation is located approximately 20 km downstream of the Project.

The Nepisiguit River (Winpegigewig) means troubled river, or rough flowing water in Mi'kmaq and is a major white water river in the province. A path (Sentier Nepisiquit Mi'gmaq Trail) on the south side of the river is used to bypass the falls. There is a trail system, which follows the shoreline of the Nepisiguit River approximately 128 km to Mount Carleton and was used by the Mi'kmag people for a variety of purposes, including access to tribal hunting, fishing, trapping, and gathering sites, spring and fall migration, as well as a thoroughfare over which they traveled to interact and trade with other First Nation communities (Chaleur Trail Network 2010).

At this time, it is unknown whether natural resources in the LAA are collected by First Nations. The nature of the site (a hydro generating station), and the imposed site access restrictions by NB Power, would lessen the probability that resources in or adjacent to the LAA would be used for traditional purposes by Aboriginal persons.

3.10 ROAD TRANSPORTATION

The road transportation network around the NFGS includes the following.

- Route 430 is a local highway and resource road though a mostly undeveloped area of northeastern New Brunswick. Route 430 is approximately 111 km in length and connects Bathurst in the north to Miramichi south through Heath Steele Mines where it becomes unpaved, approximately 40 km southwest of the LAA.

- Nepisiguit Falls Road is a local road approximately 5 km long, and connects Route 430 in the north to the NFGS through the rural residential community of Bathurst Mine.

- Route 360 is a connector highway through an undeveloped area. Route 360 is approximately 20 km long and connects to Route 430 to the north and Routes 8 and 160 at Allardville to the west of the NFGS.

4.0 ENVIRONMENTAL EFFECTS ASSESSMENT

4.1 METHODOLOGY

To determine the potential for interactions between the Project and the environment, a qualitative rating system is employed. The interactions between the Project and each Valued Environmental Component (VEC) are ranked based on the following rating system, according to the professional judgment and experience of the study team.

0 = No interaction. The environmental effects are not significant and are not considered further in this report.

1 = Interaction occurs, however, based on past experience and professional judgment the interaction would not result in a significant environmental effect, even without mitigation; or interaction would not be significant due to application of codified environmental protection practices that are known to effectively mitigate the predicted environmental effects. The environmental effects are not significant and are not considered further in this report.

2 = Interaction could result in an environmental effect of concern even with mitigation; the potential environmental effects are considered further in this report.

Where a potential Project-VEC interaction (*i.e.,* a ranking of 2) is identified through the qualitative rating system, further discussion of the potential interaction is provided in the subsequent section. However, where no interaction or no substantive interaction is identified (*i.e.,* a ranking of 0 or 1), the rationale of why no interaction exists, or why a limited interaction can be adequately mitigated without resulting in significant environmental effects, is provided, but the environmental effects are considered not significant and are not discussed further in this report.

The evaluation is provided in tabular form for ease in evaluation and communication.

4.2 POTENTIAL INTERACTIONS OF THE PROJECT WITH THE ENVIRONMENT

4.2.1 Project-Environment Interaction Matrix

Based on the Project Description and the methodology described briefly above, the potential interactions between the Project and the environment are summarized in Table 4.1.

Table 4.1 Potential Interactions of the Project with the Environment

Project Phase, or Activities/Physical Works Associated with the Project	Atmospheric Environment	Water Resources	Aquatic Environment	Terrestrial Environment	Wetland Environment	Land Use and Economy	Heritage Resources	Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons	Road Transportation	Effects of the Environment on the Project
Construction	1	1	2	1	0	1	1	1	1	1
Operation	0	0	0	0	0	1	0	0	0	1
Decommissioning and Abandonment	1	1	1	1	0	1	1	1	1	0

KEY:
0 = No interaction. The environmental effects are not significant and are not considered further in this report.
1 = Interaction occurs; however, based on past experience and professional judgment the interaction would not result in a significant environmental effect, even without mitigation; or interaction would not be significant due to application of codified environmental protection practices that are known to effectively mitigate the predicted environmental effects. The environmental effects are not significant and are not considered further in this report.
2 = Interaction could result in an environmental effect of concern even with mitigation; the potential environmental effects are considered further in this report.

4.2.2 VECS with No Interaction, or No Significant Interaction with the Project

The VECs below have been identified as having either no interaction, or no significant interaction, with the Project:

- Atmospheric Environment;
- Water Resources;
- Terrestrial Environment;
- Wetland Environment;
- Land Use and Economy;
- Heritage Resources;
- Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons;
- Road Transportation; and
- Effects of the Environment on the Project.

Further information on the justification for the 0 or 1 rankings is provided for each VEC below.

4.2.2.1 Atmospheric Environment

The Atmospheric Environment is characterized by Air Quality (ambient air quality and air contaminant emissions) and Sound Quality.

Operation has been ranked as 0 in Table 4.1 because there is no interaction between this phase of the Project and the Atmospheric Environment under normal operating conditions. Emissions to the atmosphere (*i.e.,* dust, emissions from combustion engines, and sound) during Operation will be returned to pre-Project conditions which were established in 1921 when the NFGS was constructed and will be relative and typical of the area (*e.g.,* water falling over the dam).

Construction and Decommissioning and Abandonment have been ranked as 1 in Table 4.1 due to the potential change in Air Quality and Sound Quality which would occur during these phases of the Project. During Construction and Decommissioning and Abandonment, emissions of air contaminants to the environment may occur primarily from the operation of construction equipment associated with the Project (*e.g.,* emissions from the combustion of fuel and dust). Particulate matter emissions may be associated with earth moving activities.

Emissions generated during Construction are expected to be relatively low, at times intermittent, and of short duration (limited to the construction period June 1 through September 30, 2012). Overall emissions from heavy equipment during construction activities are not expected to exceed ambient air quality standards for New Brunswick. Equipment will be maintained in good working order to ensure that emissions are within manufacturer's performance specifications. The emission of particulate matter (*i.e.,* dust) during Construction would be primarily restricted to the PDA where heavy machinery will be mobile. Dust will be managed effectively in dry periods using standard dust suppression best management practices (*e.g.,* water) on the exposed earth in the PDA including the access road and parking lot adjacent to the NFGS. Emissions from the Project will be short term, intermittent over the 4-month construction period, and will not have any substantive interactions with Air Quality.

Construction will involve the use of some heavy equipment. No blasting or pile driving is required for this Project, although some drilling may be necessary for the installation of dowels, post-tension anchors, and rebar in the spillway dam.

Increased Sound Quality from the Project is anticipated to be relatively low and typical of a construction site (*e.g.,* backup alarms on heavy machinery, increased traffic, and heavy machinery engines). Heavy equipment (*e.g.,* trucks, backhoes and other equipment) required for Construction will be equipped with mufflers and be maintained in good working order to reduce unnecessary sound emission. Though sound emissions may be heard during Construction at residential properties within the LAA, Construction has been scheduled during daytime hours and over a relatively short 4-month construction period. In the event that an

extended construction schedule is required to complete the Project within the 4-month period, residents within the LAA will be notified.

Decommissioning and Abandonment activities will be similar to those required for Construction and are not expected to result in significant environmental effects to the Atmospheric Environment. Decommissioning and Abandonment activities will be subject to a regulatory approval process and activities necessary to complete this phase of the Project will be identified in the Decommissioning and Abandonment Plan to be developed at the appropriate time at the end of the Project life.

In consideration of the planned mitigation, limiting construction activities to daytime hours, dust control and noise attenuating mufflers on heavy equipment, significant environmental effects on the Atmospheric Environment are not anticipated as a result of the Project. The environmental effects of the Project on Atmospheric Environment, including cumulative environmental effects, are rated not significant during all phases and are not discussed further in the assessment.

4.2.2.2 Water Resources

Water Resources comprises both Surface Water and Groundwater Resources in the LAA.

Operation has been ranked as 0 in Table 4.1 because there is no interaction between Water Resources and this phase of the Project. The Project as planned will not enhance the generation capacity or change its operating water levels beyond that which has been in place since the facility was established in 1921, and therefore no change in surface water or ground water quality or quantity is anticipated as a result of normal operation.

Construction and Decommissioning and Abandonment have been ranked as 1 in Table 4.1 because of the interaction between surface water flow, and groundwater quality or quantity in private potable wells within the LAA.

During Construction, draw down of the headpond is planned to accommodate access to the upstream face of the spillway dam. NB Power is committed to maintaining a minimum downstream flow of at least 8.5 m^3/s (300 cfs) defined NB Power's Standard Operating Procedure NFOP0001 Headpond Elevation and Draw Down (NB Power 2010a). The limited draw down will ensure that suspended sediments are kept to a minimum. Total suspended solids along with turbidity levels and headpond water levels will be monitored throughout Construction (Section 2.2.1).

Construction will not likely result in a change in potable groundwater, as no intrusive ground disturbing activities (*e.g.,* blasting or pile driving) are planned as part of the Project. Although several residences are located within the zone of influence (within 500 m), the Project as planned is not anticipated to affect the potable water supplies, as no intrusive ground disturbing activities (*e.g.,* blasting or pile driving) are planned as part of the Project. By nature of the facility, run-of-the-river, the short duration of the Construction when draw down is planned is unlikely to affect recharge of groundwater supplies in the LAA.

Surface water run-off during Construction will be managed through typical construction mitigation measures (*e.g.,* sediment or silt fence, use of geotextiles materials), and water quality will be measured to maintain TSS and turbidity levels to acceptable concentrations in accordance with standard guidelines (CCME 1999).

Decommissioning and Abandonment activities will be similar to those required for Construction and are not expected to result in significant environmental effects to Water Resources. Decommissioning and Abandonment activities will be subject to a regulatory approval process and activities necessary to complete this phase of the Project will be identified in the Decommissioning and Abandonment Plan to be developed at the appropriate time at the end of the Project life.

As such, the Project as planned is not expected to result in significant adverse residual environmental effects to Water Resources. The environmental effects of the Project, including cumulative environmental effects, on Water Resources are rated not significant during all phases.

4.2.2.3 Terrestrial Environment

The context of the Terrestrial Environment includes Wildlife (*i.e*., birds and animals) and Wildlife Habitat and Rare Plants.

Operation has been ranked as 0 in Table 4.1 because no interaction is anticipated with this phase of the Project and the Terrestrial Environment as electrical hydro generation does not occur within the Terrestrial Environment, and no change in operating levels that could affect the Terrestrial Environment will result from the Project.

Construction and Decommissioning and Abandonment have been ranked as 1 in Table 4.1 due to the potential disturbance of wildlife habitat in the LAA, potential loss of wildlife habitat and potential interactions with wildlife species of special status, Species at Risk (SAR) and Species of Special Concern (SOCC) during Construction.

Wildlife

During Construction, heavy equipment will be operated and may cause interactions with the Terrestrial Environment. These interactions include the potential for indirect noise disturbance, and the direct mortality of wildlife and/or habitat loss, including SAR/SOCC or their habitat.

Construction activity may affect some local wildlife populations by increasing sound levels within the LAA, however this would be temporary and for short in duration (limited to the 4-month construction period). Increased traffic during Construction may have similar interactions with the Terrestrial Environment; however, sound levels originating from an increased traffic are not anticipated to be higher than that of normal operation of the NFGS. Although sound generated by Construction may deter some species *e.g.,* birds, from inhabiting the LAA during Construction, the disturbance will be short-term and intermittent, and there is an abundance of

similar suitable habitat within and outside of the LAA. Construction will be conducted in compliance with the *Migratory Bird Convention Act*.

As introduced in Section 3.5.1, according to the AC CDC, there have been nine wildlife species (8 birds and 1 mammal) of conservation concern previously observed (3 avian species and 1 mammal are ranked S2 or higher in NBDNR General Status Ranks) and three possible occurrences of other rare or uncommon species were noted within a 5 km radius of the PDA. These species include: Bald Eagle, Chimney Swift, Common Nighthawk, and Canada Lynx, as well as Harlequin Duck, Red-shouldered Hawk and Wood Turtle.

During Construction, no planned Project activities will take place in the Terrestrial Environment outside of the PDA that would adversely affect wildlife or its habitat. Although the species of special conservation concern may be found within the LAA the likelihood of direct mortality of wildlife within the PDA during Construction is low due to the limited footprint required for Construction. There is no special important habitat for species of special conservation concern identified by the AC CDC report within the PDA which is not available within the LAA and beyond.

Habitat

During Construction draw down has the potential to temporarily disturb the riparian zones upstream of the NFGS. Riparian zones provide important wildlife habitat for breeding and foraging as well as wildlife corridors between the aquatic and terrestrial environments for a variety of wildlife species. Although riparian habitat of the headpond will be affected by draw down, the environmental effects that will result from the lower water level (larger exposed banks) would be short-term (limited to the 4-month construction period) and reversible (will return to normal at the completion of Construction).

There are no intrusive ground disturbing activities required during Construction for the Project. Clearing or grubbing of vegetation will be limited to the north bank of the forebay within the PDA where the chain-link fence will be removed in preparation for the installation of the Coffer Dam. Therefore, there is no loss of significant habitat area, or will any specific habitat for species of special concern be disturbed as a result of the Project.

Rare Plants

Four rare or uncommon vascular plants were identified in the AC CDC report, of which one (Drummond's rockcress) was identified within the LAA. Drummond's rockcress was identified approximately 1 km downstream of the NFGS (Section 3.5.2). There is no direct or indirect interaction with this area during Construction, downstream flow will be maintained at 8.5 m^3/s (300 cfs) throughout Construction in order to sustain water levels in the downstream reach of the Nepisiguit River and there for no environmental effects on this species are anticipated.

Decommissioning and Abandonment activities would be similar to those required for Construction and are not expected to result in significant environmental effects to the Terrestrial

Environment. Decommissioning and Abandonment activities will be subject to a regulatory approval process and activities necessary to complete this phase of the Project will be identified in the Decommissioning and Abandonment Plan to be developed at the appropriate time at the end of the Project life, and would be carried out in such a manner that significant adverse environmental effects do not occur.

In consideration of the limited footprint of the Project, and implementation of standard mitigation and careful Project planning, no significant adverse environmental effects to the Terrestrial Environment are expected to occur as a result of the Project. The environmental effects of the Project on the Terrestrial Environment, including cumulative environmental effects, are rated not significant during all phases.

4.2.2.4 Wetland Environment

Wetland Environment has been ranked as 0 in Table 4.1 for all phases of the Project as there are no known wetlands or specialized habitats identified within the LAA.

One Environmentally Sensitive Area (ESA), Doctor Bells Meadow (ESA 267) is located 5 km south of the PDA. Doctor Bells Meadow is hydrologically connected up-gradient from the downstream reach of the Nepisiguit River. Due to the geographic distance of the Meadow from the PDA and that downstream flow through the NFGS will be maintained throughout Construction and Operation, it is unlikely changes to the hydrology regime in the LAA will affect Doctor Bells Meadow.

Overall, the Project is not expected to result in significant adverse residual environmental effects to the Wetland Environment. The environmental effects of the Project, including cumulative environmental effects, on the Wetland Environment are thus rated not significant during all phases.

4.2.2.5 Land Use and Economy

Land Use and Economy were ranked as 1 in Table 4.1 during all phases of the Project due to the potential change in land use as result of draw down of the headpond, potential change in economy (*e.g.,* increased employment and expenditures in the LAA) as a result of construction activities.

The principal environmental effect on land use will be from changes to water levels upstream of the Project as a result of the draw down during Construction. Draw down will expose the soft river bank for a short period, which could eliminate natural access points for fishing, swimming or canoeing upstream of the NFGS. This change is not anticipated to preclude these recreational activities beyond the upstream LAA, which by nature of the facility is already restricted for safety reasons. Notification of the Project, its timelines and anticipated environmental effects will be provided through the public, stakeholder and Aboriginal engagement process. As described in Section 2.2.1, water levels in the headpond will be

controlled and monitored and downstream flow will be maintained throughout Construction and Operation of the Project.

Construction-related employment and direct and indirect expenditures within the local area will result in a short-term increase in employment and GDP as a result of increased spending by the labour force in the area, no significant positive or negative environmental effects as a result of the Project are anticipated. While local business and industry will be positively affected during Construction, Decommissioning and Abandonment and marginally during Operation (when general maintenance is required), no long-term environmental effects of the Project in terms of substantial increased employment or expenditures are foreseen.

Decommissioning and Abandonment activities, if and when they occur, would restore the site to near natural conditions (circa 1919 prior to construction of the NFGS). While this would result in a significant change in land use within the LAA and potentially the greater Nepisiguit River watershed, the environmental effects on land use would diminish quickly as recreational land users adapted to the natural state of the river.

As such, significant adverse residual environmental effects to Land Use and Economy are not expected to occur as a result of the Project. The environmental effects of the Project on Land Use and Economy, including cumulative environmental effects, are rated not significant during all phases.

4.2.2.6 Heritage Resources

Heritage Resources during Operation was ranked 0 in Table 4.1 because there is no interaction with Heritage Resources under normal operating conditions. Operation of the NFGS does not involve ground breaking activities or the addition of Project-related infrastructure in previously undisturbed areas.

Construction and Decommissioning and Abandonment have been ranked as 1 in Table 4.1 due to the potential for ground disturbing activities to uncover previously undiscovered or unknown heritage resources.

A significant archaeological resource is defined as a site that contains features (non-removable indications of past human use and activity, such as a fire hearth, a living floor, or a burial site) in addition to artifacts determined by the provincial regulatory agency to be significant. The disturbance of an individual artifact is not normally considered significant.

While the LAA could be generally considered to be of high archaeological potential due to its location on a major watercourse, the discovery of an archaeological or heritage resource during any phase of the Project is not anticipated because of the relatively limited extent of disturbance associated with the Project (*e.g.,* movement of vehicles on existing access roads, placement of mobile trailers on existing laydown areas) and the fact that previous development in the forebay has taken place. There is the potential for the unplanned disturbance to or discovery of heritage

resource during Construction and Decommissioning and Abandonment, which would be considered an unplanned event and is discussed in Section 4.4.3.6.

In the event that Project personnel encounter a known or suspected heritage resource during any phase of the Project, work in the immediate area of the find (10 m radius) will be halted, and Archaeological Services of the New Brunswick Department of Wellness, Culture and Sport will be contacted (506-453-3014) in accordance with the *Heritage Conservation Act (2010)*. Work in the immediate area of the find will be suspended until direction from Archaeological Services is received. The heritage resources may not be removed by anyone other than a licensed archaeologist (Archaeological Services 2009).

A potential environmental effect of the Project on Heritage Resources would be the permanent loss or destruction of a heritage resource material. Based on the Archaeological Services *Guidelines for Conducting a Heritage Resource Impact Assessment in New Brunswick* (Archaeological Services 2009) and existing historical information for the area, the Project is likely to interact with an area considered to hold a high potential for undocumented heritage resources. In accordance with the *Heritage Conservation Act (2010)* a walkover of the exposed area that will be disturbed during Construction, below the high water mark, will be conducted by a permitted professional archaeologist immediately following draw down and dewatering. The results of the walkover will be reported to Archaeological Services along with recommendations for mitigating the impact from erosion to resources exposed as a result of the Project.

Decommissioning and Abandonment activities, if and when they occur, would restore the site to near natural conditions, and subject to confirmation as part of the Decommissioning and Abandonment Plan to be developed for the Project at the appropriate time, would be carried out in such a manner that significant adverse environmental effects do not occur.

As such, significant adverse environmental effects to Heritage Resources are not expected to occur as a result of the Project. The environmental effects of the Project on Heritage Resources, including cumulative environmental effects, are rated not significant during all phases.

4.2.2.7 Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons

Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons has been ranked as 0 in Table 4.1 during Operation because access to the PDA and to some extent the LAA (area immediately upstream of the NFGS to the boom and downstream as far as the tailrace (Figure 2.1)) would be restricted for safety concerns.

Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons has been ranked as 1 in Table 4.1 during Construction and Decommissioning and Abandonment because of the potential to affect access to areas that are currently used for traditional purposes.

The EIA must determine how the Project may affect the current use of land and resources for traditional purposes by Aboriginal persons ("traditional use"). This is normally informed through engagement with Aboriginal leadership (*i.e.,* Chiefs and in some cases, umbrella organizations, where the Chiefs desire that level of discussion). NB Power will engage the Aboriginal community to understand whether there is any current use of land and resources for traditional purposes by Aboriginal persons.

NB Power will initiate discussion with the Chief of the Pabineau First Nation, which is the most proximal community to the PDA, and will follow the direction and interest of the Chief and undertake engagement with the Aboriginal community in consideration of the wishes of the Chief in respect of how they wish to be engaged, if at all. Any documented Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons that would be adversely affected in a significant way by the Project will be addressed as part of those discussions.

Decommissioning and Abandonment, if and when it occurs, would restore the area to near natural conditions and would be expected to interact positively with Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons, subject to confirmation as part of the Decommissioning and Abandonment Plan to be developed towards the end of the useful life of the NFGS.

As such, it is not expected that the Project will cause any residual significant adverse environmental effect to the Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons. Therefore, the environmental effects of the Project on Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons, including cumulative environmental effects, are rated not significant for all phases.

4.2.2.8 Road Transportation

The Road Transportation Network is typically characterized by Level of Service, Road Network Infrastructure, and Traffic Safety.

Road Transportation has been ranked as 0 in Table 4.1 during Operation because no interaction between Road Transportation and this phase of the Project is anticipated. Under normal operating conditions no change in change in traffic volumes, patterns or safety are anticipated beyond what there is currently.

Road Transportation has been ranked as 1 in Table 4.1 for both Construction and Decommissioning and Abandonment due to a potential change in traffic volumes and traffic safety on the exiting road network.

No new roads will be constructed that would interfere with the existing road network infrastructure in and around the community of Bathurst Mines. Route 430 is the local highway and the only road leading into the NFGS. During Construction and Decommissioning and Abandonment, Route 430 will be used to transport components of the Project to and from site and by more heavy equipment traffic (*e.g.,* large trucks) than typical. However, given the low

current traffic volumes on Route 430, traffic disruptions, and thus changes to the current level of service of the road during Construction are not anticipated to be significant.

As the Project is relatively small, and will not require large numbers of heavy equipment, it is not anticipated that any damage to the road network infrastructure will occur as a result the movement of equipment and personnel to the site.

Project-related vehicles will observe all traffic rules and provincial and federal highway regulations, trucking activity for Construction will take place on designated routes, and traffic control will be implemented if needed; therefore, changes to current traffic safety levels are not anticipated.

Decommissioning and Abandonment activities will be similar to those required for Construction and are not expected to result in significant environmental effects on Road Transportation. Decommissioning and Abandonment activities will be subject to a regulatory approval process and activities necessary to complete this phase of the Project will be identified in the Decommissioning and Abandonment Plan to be developed at the appropriate time at the end of the Project life.

As such, Project-related adverse environmental effects are not anticipated on the existing road transportation network. Therefore, the environmental effects of the Project on Road Transportation, including cumulative environmental effects, are rated not significant for all phases.

4.2.2.9 Effects of the Environment on the Project

A number of planning, design and construction strategies have been considered as part of the Project to minimize the potential effects of the environment on the Project so that the risk of serious damage to the Project, or interruption of service can be reduced to acceptable levels.

Compliance with these and other design codes and construction practices will ensure that the Project is developed, conceived, constructed and operated in such a manner that it inherently accounts for environmental forces that, if not accounted for, could cause a significant adverse effect on the Project. Environmental factors such as floods, severe weather, seismicity, ice jams, and other environmental forces will be addressed as part of the Project design.

Ice jams and associated flooding have the potential to damage the dam structure. River ice related problems are common at the Project location through the winter and spring seasons, from early winter when frazil and anchor ice are generated, through the formation and growth of ice covers, to the eventual breakup and jamming in the spring. In many areas of the province, ice jams frequently cause flooding and other damage (Environment Canada 1989). Ice jams are caused by the breakup and rapid accumulation of fragmented river ice. They can cause sudden and dramatic increases in the water level, resulting in severe flood damages. The ice itself can cause damage to structures or can be driven overland. Ice will be managed according to current practices in place for the existing structure.

Extreme rain events during Construction can create difficult and unsafe working conditions and may result in work stoppages. Rain is an expected work difficulty and the construction schedule considers delays due to potential rain events. In the event of extreme rain, compliance with NB Power's WAWA permit and standard construction practices for erosion and sediment control will ensure that erosion and sedimentation are addressed appropriately to minimize the potential environmental effects. Extreme precipitation during all phases of the Project will be managed according to current practices in place for the existing structure.

The data from the Geological Survey of Canada's National Earthquake Database (NEDB) (http://www.seismo.nrcan.gc.ca) show very few seismic events in the vicinity of the Project. Epicentres cluster in three regions: Passamaquoddy Bay region; Central Highlands (Miramichi) region; and Moncton region. The Project includes a post-tensioning upgrade to the existing spillway dam which is intended to strengthen and stabilize the structure against a seismic event. The intent of this upgrade is to ensure the integrity of the spillway dam based on the level of risk for an earthquake in the area. Service could be interrupted due to earthquake damage in an extreme event, but this is an unlikely scenario.

The Project has been conceived and will be constructed and operated in such a manner that significant effects of the environment on the Project are not likely to occur. These effects have been considered through design standards and building codes. Further mitigation includes the scheduling of construction activities to accommodate weather interruptions. As such, a significant effect of the environment on the Project during all phases of the Project, including cumulative effects, are not likely to occur and therefore, rated not significant.

4.2.3 VECs Which May Result in an Interaction with the Project that Requires Further Evaluation

The only VEC which may result in an interaction with the Project that requires further evaluation is the Aquatic Environment, discussed in Section 4.3 below.

4.3 AQUATIC ENVIRONMENT

4.3.1 Scope of Assessment

This section defines the scope of the environmental assessment for the Aquatic Environment in consideration of the regulatory context, potential VEC-interactions and existing knowledge.

4.3.1.1 Rationale for Selection of Valued Environmental Component and Regulatory Context

The Aquatic Environment includes watercourses (rivers, lakes, and streams) that provide habitat for fish and other aquatic species. The Aquatic Environment has been identified as a VEC due to its importance in supporting aquatic life.

The Aquatic Environment is protected primarily through the federal *Fisheries Act* and particularly the DFO Policy for the Management of Fish Habitat, where habitat is harmfully altered, disrupted or destroyed. The *Fisheries Act* also regulates other aspects of the protection of fisheries including barriers to fish passage, the release of deleterious substances, and direct mortality. Provincial legislation, including the New Brunswick *Clean Water Act*, is also protective of the Aquatic Environment directly through the *Clean Environment Act* (*Water Quality Regulation*), and indirectly through the *Clean Water Act* (*Watercourse and Wetland Alteration Regulation*). The federal *Species at Risk Act* (*SARA*), and the New Brunswick *Endangered Species Act* (NB *ESA*) are also potentially relevant to this VEC.

4.3.1.2 Selection of Environmental Effects and Measurable Parameters

The environmental assessment of the Aquatic Environment is focused on the following environmental effect:

- Change in Aquatic Environment.

Change in Aquatic Environment as an environmental effect is intended to broadly encompass potential environmental effects to the Aquatic Environment relating to fish survival as well as fish habitat quality and water quality upon which fish depend for survival. The Project has the potential to affect the Aquatic Environment through changes in water quality and fish habitat which, if unmitigated, have the potential to affect or change fish populations. In light of the value placed on the Aquatic Environment by regulatory agencies, stakeholders, and the public, the environmental assessment of the Aquatic Environment focuses on several measurable parameters. The measurable parameters used for the assessment of the environmental effect and the rationale for their selection is provided in Table 4.2.

Table 4.2 Measurable Parameters for the Aquatic Environment

Environmental Effect	Measurable Parameter	Rationale for Selection of the Measurable Parameter
Change in Aquatic Environment	Fish Mortality	• Fish mortality is an important measurable parameter for Change in Aquatic Environment as it is the ultimate measure for a Change in Aquatic Environment. Destruction of fish by means other than fishing is forbidden by the *Fisheries Act*. All Project activities having the potential to cause the death of fish (*e.g.,* dewatering) must be managed or mitigated in order to prevent such an environmental effect.
	Productive Capacity of Fish Habitat	• The Decision Framework for the Determination and Authorization of Harmful Alteration, Disruption or Destruction of Fish Habitat (DFO 1998) states that when reviewing project proposals, habitat managers strive, pursuant to the No Net Loss guiding principle, to maintain the current productive capacity of fish habitats supporting Canada's fishery resources, such that the habitat is able to produce fish suitable for human consumption.
	Water Quality	• Water quality suitable for fish populations to live can be measured by using several key parameters that include Total Suspended Sediments (TSS), Dissolved Oxygen (DO), Temperature, and pH. DO, temperature and pH are measured *in-situ,* while TSS is measured using laboratory analytical methods. • Total Suspended Sediments (TSS, mg/L) is an indicator of the amount of suspended sediment in a watercourse. It can be a good measure of the quality or viability of fish habitat. • Dissolved Oxygen (DO, mg/L) is an indicator of the quality of habitat. DO in water is necessary to sustain fish populations. • Water temperature (Celsius degrees) is also an important measure of the quality of water as fish habitat. Fish are limited in various life stages by minimum and maximum temperatures. Changes in temperature can affect the quality of habitat and, in the extreme, can result in mortality. • pH is an indicator of fish habitat. Optimal fish habitat exists within a range of pH, outside of which levels can be stressful for fish and their habitat (including other biota on which they rely for food) or result in mortality.

The measurable parameters in Table 4.2 were based on the professional judgment of the study team and discussions with regulatory agencies. Measurable parameters have clear units of measurement and are indicative of water quality, fish habitat quality, and fish survival, which are supportive of fish populations.

4.3.1.3 Temporal Boundaries

The temporal boundaries for the assessment of the potential environmental effects of the Project on the Aquatic Environment include the periods of Construction (beginning no earlier than June 1, 2012 and ending September 30, 2012), Operation of the NFGS (for an estimated 50-75 years), and Decommissioning and Abandonment (following Operation, at the end of the useful life of the NFGS). In general, any potential Project environmental effects on the Aquatic Environment will begin and peak during Construction but diminish during Operation similar to current levels in the absence of the Project.

4.3.1.4 Spatial Boundaries

This section describes the spatial boundaries for the environmental assessment of the Aquatic Environment. Two levels of spatial boundaries have been determined: the Project Development Area and the Local Assessment Area. These boundaries are defined below.

Project Development Area (PDA): The PDA includes the area of ground (or river bed) disturbance associated with the Project. The PDA is the area bound on the north by the existing access road, to the east by the power house and existing parking area, to the south by the spillway dam, and the west by the two-span bridge. With respect to the Aquatic Environment, the PDA represents the physical area where direct environmental effects of Construction -are most likely to occur. Such effects would be largely direct in nature (*e.g*., placement of geotechnical materials for a Coffer Dam, and dewatering of an area between the Coffer Dam and the NFGS).

Local Assessment Area (LAA): The LAA includes the area of the headpond extending approximately 4 km upstream of the NFGS and downstream approximately 5 km to the Middle Landing where Route 360 crosses the Nepisiguit River. With respect to the Aquatic Environment, the LAA represents the area where indirect or secondary environmental effects of Construction are likely to be most pronounced or discernible. Such effects could be direct (*e.g.,* dewatering of some near-shore areas of the headpond) or indirect (*e.g.,* effects on water or habitat quality either within or downstream of the NFGS, caused by re-suspension of silt or disturbance of otherwise stable mine waste).

4.3.1.5 Administrative and Technical Boundaries

Administrative and technical boundaries were considered in assessing the environmental effects of the Project on the Aquatic Environment.

The administrative boundaries for the Aquatic Environment were introduced in Section 1.7 above, in terms of the legislative, regulatory and policy instruments at the provincial and federal level to protect fish and fish habitat. Administrative boundaries for the Aquatic Environment include:

- the *Fisheries Act* (particularly Sections 32 and 35) which requires the protection of fish habitat in all watercourses that bear fish;
- the Department of Fisheries and Oceans' (DFO 1986) Policy for the Management of Fish Habitat, as well as the Practitioners Guide to Habitat Compensation (DFO 2010);
- the Decision Framework for the Determination and Authorization of Harmful Alteration, Disruption or Destruction of Fish Habitat (DFO 1998);
- the New Brunswick *Wetland and Watercourse Alteration Regulation* of the *Clean Water Act* which applies to all activities within 30 m of a watercourse; and

- the New Brunswick *Water Quality Regulation* of the *Clean Environment Act*.

The federal *Species at Risk Act* (*SARA*), and the New Brunswick *Endangered Species Act* are also potentially relevant to the Aquatic Environment, where such species are found to be present in the LAA.

4.3.1.6 Residual Environmental Effects Rating Criteria

A significant adverse residual environmental effect on the Aquatic Environment is defined as a Project-related environmental effect that results in any of the following:

- an unmitigated or non-compensated loss of fish habitat as defined under the *Fisheries Act* and associated DFO policies regarding the management of and compensation for loss of fish habitat;
- a Project-related destruction of fish that was not authorized under Section 32 of the *Fisheries Act*;
- a Project-related alteration or release that would contravene New Brunswick environmental legislation, including:
    - an alteration to the watercourse or the riparian zone within 30 m of the watercourse that is not given approval under the *Watercourse and Wetland Alteration Regulation – Clean Water Act*, or
    - a degradation of water quality or release of a contaminating substance that would constitute water pollution as defined in the *Water Quality Regulation – Clean Environment Act.*

4.3.2 Existing Aquatic Environment

Note: Where both imperial and metric measurements have been provided, imperial measurements will prevail. Metric conversions have been approximately converted for reference only; elevations in this report are related to a site datum that does not correspond precisely with sea level. To convert from the NB Power Nepisiguit Falls Datum to NB MSL Datum (NAD83), add 1.917 m (6.2899 ft).

The PDA is located in northeastern New Brunswick near the community Bathurst Mines, in Gloucester County. The NFGS is located approximately 37 km upstream of Bathurst at Nepisiguit Falls on the Nepisiguit River (Figure 1.1). The Nepisiguit River watershed has an approximate drainage area of 1,810 km^2. The minimum flow through the NFGS is 8.5 m^3/s (300 cfs) (Generation In-Plant Procedure No. NFOP0002; NB Power 2010a) which was set in consultation with DFO, in order to maintain flow downstream of the NFGS.

The river reach impounded by the NFGS (*i.e.,* the headpond) is approximately 4 km long and 90 m to 160 m wide. The headpond has a surface area, at full supply level, of approximately 56 ha. Below the falls, a river width of 70 m to 110 m is common, although narrower sections of 25 m to 50 m width are found in areas where river grades are steeper. River widths of 70 m to 100 m are also common in the reach above the headpond. The river is for the most part bedrock controlled, and quite shallow, except near the generating station where the forebay has been artificially deepened in order to provide a small amount of water storage, as well as hydraulic head for power generation. The spillway dam has a sill at approximately 96.0 m (315 ft) elevation in relation to the NFGS site datum.

Normal operating range of the headpond during the summer months is approximately 104.1 m to 104.2 m (341.5 ft to 342 ft), with the minimum operating level of 103.9 m (341 ft) and a maximum headpond elevation of approximately 105.5 m (346 ft)—with all measurements in relation to the NFGS site datum. The headpond elevation with the main rubber dam deflated would be approximately 100.9 m (331 ft), which would be similar to the natural the run-of-the-river elevation.

This indicates a normal (operating) water depth of at approximately 3.4 m (11 ft) at the face of the spillway dam. Assuming that the river bed in some areas may be as much as 2 m below the sill at the spillway, the normal water depth in the deepest parts of the headpond is not likely to be greater than about 6 m.

In 1969, a spill of waste from the former Bathurst Iron Mine into the Nepisiguit River just upstream from the NFGS resulted in a large kill of juvenile salmon in the lower portion of the river. Salmon catches between 1970 and 1975 appear to have been substantially depressed; however, the river appears to have recovered by 1980 (based on data presented in Locke *et al.* 1997).

Research of existing documentation, and consultation with DFO as well as local fisheries groups, was undertaken to confirm the fish community present in the Nepisiguit River. The Nepisiguit River is Atlantic salmon (*Salmo salar*) bearing downstream of the falls; however, the falls present a natural barrier to fish passage and no anadromous species are found upstream of the falls or the NFGS. The species assemblage above the NFGS consists of brook trout (*Salvelinus fontinalis*), white sucker (*Catostomus commersonii*) and various other coarse fish species such as dace and minnow (R. Baker, pers. comm. 2010; DFO 2010; Scott and Crossman 1998). Additionally, American eel (*Anguilla rostrata*) are likely able to navigate the dam and falls as elvers and are known to be upstream of the facilities (R. Baker, pers. comm. 2010; DFO 2010; Scott and Crossman 1998). There is no known presence of smallmouth bass in this reservoir, unlike other larger reservoirs in the province (Hatch 2008; R. Baker, pers. comm. 2010).

Brook trout are reported to overwinter in the headpond, but move upstream in May-June to occupy better habitat during the summer, and in preparation for spawning in the fall (R. Baker, pers. comm. 2010). There is a brook trout fishery in and upstream of the headpond during May-

June, and fish that are kept tend to be large (into the 2 kg range, R. Baker, L. Gagnon and R. Lavigne, pers. comm. 2010). A trout stocking program was undertaken upstream of the NFGS in the 1990's, but very little has been done since then (R. Baker, pers. comm. 2011). Mr. Baker (President of the Nepisiguit Salmon Association, NSA) reported that it is unlikely that trout use the headpond during the summer, and that there is likely limited use by other fish species during the summer, as there is much better feeding habitat upstream.

The NSA Newsletter for January 2010 (NSA 2010) reports that NB Power became a sponsoring partner for the stocking portion of its salmon enhancement program (working in the river below the NFGS) in 2009. Other sponsors of salmon enhancement activities include (but are not necessarily limited to) the Wildlife Trust Fund, Dieppe Fly Tying Club, Xstrata Zinc – Brunswick Mine, Atlantic Salmon Conservation Fund, and ACOA (NSA 2010). The NSA released 42,104 fry to the Nepisiguit River below the falls in 2009 (the 23'rd consecutive year in which such releases have been made, and the 21'st consecutive year in which incubation took place at the hydroelectric facility at Nepisiguit Falls, NSA 2010). Adult returns to the river were approximately 3,000 fish (1,500 grilse and 1,500 salmon) in 2009. Spawning escapement was estimated at 8.5 million eggs (NSA 2010).

4.3.3 Potential Project-VEC Interactions

Table 4.3 below lists each Project activity and physical work for the Project, and ranks each interaction as 0, 1, or 2. These rankings are defined in Table 4.3 and are indicative of the level of interaction each activity or physical work will have with the Aquatic Environment.

Table 4.3 Potential Project Environmental Effects to the Aquatic Environment

Project Activities and Physical Works	Potential Environmental Effect
	Change in Aquatic Environment
Construction	
Installation of the Coffer Dam	2
Installation of the Working Platform	2
Concrete Demolition and Surface Repair	1
Installation of Post-Tension Anchors	0
Installation of the Rubber Dam	0
Replacement of the Trash Rack System and Intake Deck	0
Ancillary Works	0
Removal of the Coffer Dam and Working Platform	2
Operation	
General Operation	0
General Maintenance Activities	0
Decommissioning and Abandonment	
Removal of Facilities and Site Reclamation	1

Notes:
Project-Related Environmental Effects were ranked as follows:
0 No interaction. The environmental effects are rated not significant and are not considered further in this report.
1 Interaction will occur. However, based on past experience and professional judgment, the interaction would not result in a significant environmental effect, even without mitigation, or the interaction would clearly not be significant due to application of codified practices. The environmental effects are rated not significant and are not considered further in this report.
2 Interaction may, even with codified mitigation, result in a potentially significant environmental effect and/or is important to regulatory and/or public interest. Potential environmental effects are considered further and in more detail in the EA.

The following section provides the rationale for why no interaction exists, or why a limited interaction (*i.e.,* a ranking of 0 or 1 in Table 4.3) can be adequately mitigated without resulting in significant environmental effects and are not discussed further in this report.

Installations of the Post-Tension Anchors, Installation of the Rubber Dam, Replacement of the Trash Rack System and Intake Deck and Ancillary Works as part of Construction have been ranked as 0 in Table 4.3 as there is no anticipated interaction between these activities and the Aquatic Environment under normal conditions. These activities will be completed "in the dry" in the area of the PDA that will be dewatered between the Coffer Dam and the power house, and on the spillway dam and power house itself.

General Operation and General Maintenance Activities are also ranked as 0 in Table 4.3 as there is no anticipated interaction between these activities and the Aquatic Environment. The Project (installation of the new rubber dam on the spillway dam that will replace the function of the wooden flashboards removed from the spillway dam by NB Power, replacement of the trash rack system, post-tensioning upgrade) will not change the generating capacity of the NFGS beyond what is currently licensed, nor will it change water levels (inflow or outfall) in the Nepisiguit River watershed which were established in 1921 after the development of the NFGS. Therefore, while the Project will result in safety and stability enhancements at the NFGS, and will allow important repairs to be completed, it will not change the way the dam operates, nor will it result in any changes to the Aquatic Environment during Operation.

Concrete Demolition and Surface Repair has been ranked as 1 in Table 4.3 because of the limited potential for this activity to cause a Change in Aquatic Environment. Discharges from work involving the use of concrete, cement, mortars and other Portland cement or lime-containing construction materials will be collected, and sediment recovered from the process will be disposed of at an approved disposal facility. All work related to Concrete Demolition and Surface Repair will be undertaken in accordance with NB Power's WAWA Permit (Conditions of Approval No. 2, 12, 16, 18, and 20; Appendix D), and generally accepted construction practices (*e.g.,* installation of debris netting, using machinery with long-reaching arms). The probability for a large amount of debris or deleterious material entering the watercourse from this activity is considered an accidental event, as described in Sections 4.4.3.3 and 4.4.3.4. Concrete Demolition and Surface Repair will therefore have no substantive interaction with the Aquatic Environment, and any environmental effects would be not significant.

Decommissioning and Abandonment activities, if and when they occur, would restore the site to near natural conditions (circa 1919 prior to construction of the NFGS). These activities have been ranked as 1 in Table 4.3 because, while they would result in a significant change in the Aquatic Environment within the LAA and potentially the greater Nepisiguit River watershed, the environmental effects of Decommissioning and Abandonment would be carried out in such a manner that significant adverse environmental effects do not occur.

Thus, in consideration of the nature of the interactions and the planned implementation of known and proven mitigation, the potential environmental effects of the Project activities and physical works ranked as 0 or 1 in Table 4.3 on the Aquatic Environment are rated not significant, and are not considered further in the assessment.

4.3.4 Assessment of Project-Related Environmental Effects

The following interactions were ranked as 2 in Table 4.3 and are considered further in the assessment of Project-related environmental effects:

- installation of the Coffer Dam;
- installation of the Working Platform; and
- removal of the Coffer Dam and Working Platform.

A summary of the environmental effects assessment and prediction of residual environmental effects resulting from interactions ranked as 2 on the Aquatic Environment is provided in Table 4.4.

Table 4.4 Summary of Residual Project-Related Environmental Effects on the Aquatic Environment

Project Phases, Activities, and Physical Works	Potential Project-Related Environmental Effects	Proposed Mitigation/ Compensation Measures	Residual Environmental Effects Characteristics						Significance	Prediction Confidence	Likelihood	Cumulative Environmental Effects?	Recommended Follow-up and Monitoring
			Direction	Magnitude	Geographic Extent	Duration and Frequency	Reversibility	Ecological/Socio-economic Context					
Construction • Installation of the Coffer Dam • Installation of the Working Platform; and • Removal of the Coffer Dam and Working Platform	Change in Aquatic Environment • Harmful alteration, disruption, or destruction (HADD) of fish habitat; • Release of deleterious substances (TSS or hazardous substances) into the freshwater environment; • Potential for incidental mortality.	• Installation of the Coffer Dam to minimize the draw down required and to reduce fish habitat to be disrupted; • Implement well established and proven erosion and sedimentation control measures (*e.g.,* silt curtains, check dam, settling pond); • Turbid water collected in the settling pond will be pumped over existing vegetation a sufficient distance away (more than 30 m from the watercourse); • Complete the Project during normal low flow periods (June 1 through September 30, 2012); • Conduct fish rescue as necessary within the forebay in the area between the Coffer Dam and power house during dewatering; • HADD compensation in accordance with the DFO Policy for the Management of Fish Habitat; • Proper storage of hazardous materials; and • Compliance with all provincial and federal legislation, permits, approvals and guidelines.	A	L	L	ST/ S	R	D	N	H	M	N	• Water quality monitoring within the LAA for TSS during Construction activities if visible plumes occur. • Evaluation of sediments in the vicinity of the former Bathurst Mines will be undertaken to identify and remove potentially toxic mine waste that might otherwise be exposed to the atmosphere. • Water levels and tributary access in the headpond will be monitored to confirm fish passage is maintained.

Table 4.4 Summary of Residual Project-Related Environmental Effects on the Aquatic Environment

Project Phases, Activities, and Physical Works	Potential Project-Related Environmental Effects	Proposed Mitigation/ Compensation Measures	Residual Environmental Effects Characteristics						Significance	Prediction Confidence	Likelihood	Cumulative Environmental Effects?	Recommended Follow-up and Monitoring
			Direction	Magnitude	Geographic Extent	Duration and Frequency	Reversibility	Ecological/Socio-economic Context					
Residual Environmental Effects for all Phases									N	H	L	N	

KEY:

Direction
P Positive.
A Adverse.

Magnitude
L Low: No or negligible Change in Aquatic Environment; alteration authorized by provincial and/or federal authorities.
M Moderate: Measurable change that does not result in a change in the sustainability of fish populations.; alteration authorized by provincial and/or federal authorities
H High: Measurable change that results in a change in the sustainability of fish populations; alteration not authorized by provincial and/or federal authorities.

Geographic Extent
S Site-specific: Within the PDA.
L Local: Within the LAA.

Duration
ST Short term: Occurs and lasts for short periods (*e.g.,* days/weeks).
MT Medium term: Occurs and lasts for extended periods of time (*e.g.,* years).
LT Long term: Occurs during Construction and/or Operation and lasts for the life of Project.
P Permanent: Occurs during Construction and Operation and beyond.

Frequency
O Occurs once.
S Occurs sporadically at irregular intervals.
R Occurs on a regular basis and at regular intervals.
C Continuous.

Reversibility
R Reversible.
I Irreversible.

Ecological/Socio-economic Context
U Undisturbed: Area relatively or not adversely affected by human activity.
D Developed: Area has been substantially previously disturbed by human development or human development is still present.
N/A Not Applicable.

Significance
S Significant.
N Not Significant.

Prediction Confidence
Based on scientific information and statistical analysis, professional judgment and effectiveness of mitigation:
L Low level of confidence.
M Moderate level of confidence.
H High level of confidence.

Likelihood
Based on professional judgment:
L Low probability of occurrence.
M Medium probability of occurrence.
H High probability of occurrence.

The Project has the potential to affect the Aquatic Environment due to:

- temporary alteration or disruption of fish habitat;
- the unplanned or accidental release of deleterious substances or sediments into watercourses; and
- potential incidental mortality of fish.

Installation of the Coffer Dam, Installation of the Working Platform and removal of the Coffer Dam and Working Platform may result in the temporary alteration or disruption of fish habitat in the LAA as a result of the Project through the release TSS or hazardous substances into the water and temporary lowering of water level. High concentrations of suspended sediment in water may be deemed a deleterious substance under the *Fisheries Act*, may adversely affect fish habitat, and may be injurious to fish. TSS and other substances may also be considered pollutants under applicable New Brunswick legislation. A temporary alteration or disruption of fish habitat upstream of the NFGS may occur as a result of water level draw down, which is necessary to accommodate Project activities. Fish mortality could occur directly or indirectly as a result of these construction activities. Mine waste present in the headpond, if re-suspended into the water column or left exposed to the atmosphere (leading to oxidation of sulphide minerals) could also lead to the introduction of deleterious substances (or pollution) into the water column.

Effective Project planning, design, avoidance, and the application of known and proven mitigation measures will be implemented as part of the Project to avoid or minimize the environmental effects on the Aquatic Environment. The following mitigation measures will be employed:

- install a Coffer Dam to minimize the draw down required and to reduce potential environmental effects on fish habitat;
- implement well established and proven erosion and sedimentation control measures around the Coffer Dam (*e.g.,* silt curtains, check dam, settling pond);
- collect turbid water in the settling pond, and dispose of this water by pumping over existing vegetation a sufficient distance away (more than 30 m from the watercourse) to prevent suspended solids from entering the river;
- complete work having the potential to affect the Aquatic Environment during normal low flow period (June 1 through September 30, 2012);
- conduct fish rescue as necessary within the forebay during dewatering;
- implement any required HADD compensation in accordance with the DFO Policy for the Management of Fish Habitat;

- implement proper storage, handling, use, and disposal procedures for any hazardous materials; and
- comply with all provincial and federal legislation, permits, approvals and guidelines.

Fish habitat in the LAA will be temporarily disturbed during Construction as a result of draw down of the headpond, installation of the Coffer Dam and dewatering of the PDA. The following estimates of the watered and temporary dewatered area of the forebay are based on existing information (*e.g.,* aerial photographs, GIS information). The numbers presented in Table 4.5 are based on the following assumptions:

- the maximum bank exposure during the construction period is 16.5 m, near the NFGS;
- the zone of influence upstream of the NFGS is 4 km; and
- the area of exposed bank tapers from 16.5 m at the NFGS to 0 m at the 4 km mark.

Table 4.5 Estimated Area (Watered and Dewatered) of the Reservoir

	Approximate Area (m^2)
Area of water within the 4 km zone of influence when the NFGS is in operation	548,000
Area of exposed banks within the 4 km zone of influence when the headpond is dewatered	65,600
Area of the forebay between the Coffer Dam and the power house	5,000
Area of total potential temporary HADD (exposed bank and dewatered forebay)	**70,600**

While approximately 70,600 m^2 of headpond (exposed banks and dewatered work area representing about 13% of the total area of the headpond) will be temporarily dewatered as a result of the draw down required for the Project, with planned mitigation to avoid direct mortality of fish and disturbance of fish and fish habitat, the likelihood of adverse environmental effects to fish habitat quality or quantity is expected to be low.

Installation of the Coffer Dam, in addition to allowing certain aspects of the Project to be completed “in the dry”, will also provide mitigation for erosion and sedimentation which could result from the Project. The Coffer Dam will allow the water channel upstream of the NFGS to be maintained at close to normal low flow conditions. This will reduce the potential for re-suspension and erosion of sediments previously deposited. By maintaining the water level in the headpond, the probability of erosion along the floor and banks of the headpond that could result in suspension of sediment to the water column is minimized. Installation of the Coffer Dam will also reduce the level of draw down of the headpond required for the Project, and therefore minimize the amount of exposed bank that could potentially be eroded during heavy precipitation. Fish rescue within the dewatered area will prevent undue mortality of fish.

Erosion and sedimentation may increase the amount of suspended solids in the water column and may increase the amount of fine material that settles over the substrate. Such materials can smother fish eggs that occur on the river bottom, or can smother benthic invertebrates that

are a primary food source for many fish species. High levels of suspended solids in the water column can occlude fish gills, causing suffocation. Therefore, erosion and sedimentation control measures and mitigation will be implemented as part of the Project. These measures include installation of the Coffer Dam itself, installation of silt curtains on the upstream face of the two-span bridge and over the intake structures (during construction of the Coffer Dam, and dewatering of the PDA), and installation of a check dam and settling pond (and drainage channels as necessary) within the PDA to catch water that may accumulate in the work area as a result of heavy rain as well pumping of water from the forebay area over vegetation away from watercourses.

Turbid water pumped from the forebay area will be routed through a check dam/settling pond where it will be allowed to settle, and then pumped over existing vegetation a sufficient distance away (at least 30 m from the watercourse) to remove suspended sediments and prevent sediment from entering the watercourse. Pumping will be conducted in accordance with NB Power's WAWA Permit (Condition of Approval No. 13) to prevent TSS in the watercourse from increasing more than 25 mg/L above background levels.

Historically, an accidental release of sulphidic sediments from the former Bathurst Mine entered the headpond and resulted in mortality of fish downstream. The possibility has been identified that a residual deposit of such sediments in the headpond might be exposed, or suspended and result in a secondary episode of toxicity to fish. As discussed above, by choosing the Coffer Dam alternative, the likelihood that sediments will be suspended and transported from the riverbed is low. Although considered unlikely, in the event that such sediments are identified and are exposed to the atmosphere following draw down, it would be prudent to remove them in order to prevent possible sulphide oxidation and acid generation, with associated potential leaching of heavy metals. Therefore, following draw down, an evaluation of exposed sediments will be undertaken in the vicinity of the former Bathurst Mines. The evaluation will include a walk over of the area between the outfall from the Bathurst Mines site and the NFGS to identify any potential deposits which may be present. If exposed sulphidic sediments are identified as being present, NB Power will notify DFO and consult with them to develop an appropriate action plan and mitigation.

If draw down of the headpond results in loss of access to tributary streams by brook trout or other fish, then spawning areas may be rendered inaccessible. The New Brunswick Atlas shows approximately seven (7) tributary streams entering the headpond, although most of these are very small, and only one (Austin Brook, approximately 2 km upstream from Bathurst Mines) is named. It is presently unknown whether these tributary streams provide spawning habitat, or whether such habitat is accessible by fish in the headpond. Based on the proposed vertical draw down of 2.1 m (7 ft) of the headpond, and because stream channels extending to the historical river elevation would have existed prior to flooding of the headpond, it is unlikely that these tributaries will be rendered inaccessible as a result of the lower water levels. NB Power will have an aquatic biologist monitor the water levels in the headpond and tributary access to confirm fish passage is available. Access conditions between the river and the normal water level of the headpond will be investigated after the headpond is drawn down. If blockages are

present (*e.g.,* minor sediment delta formation that has occurred since the construction of the NFGS) and access can be restored without risk of environmental damage, and if other impediments to fish passage are not present in the tributaries, then efforts will be made to ensure that the tributaries remain accessible to potentially spawning brook trout throughout the period of temporary headpond draw down.

The forebay likely provides feeding habitat for several fish species. Near-shore habitat likely provides nursery habitat for various cyprinids as well as feeding habitat for these species. Deeper water provides overwintering habitat for large brook trout and possibly American eel. No permanent loss of fish habitat is anticipated as a result of the Project, as these repairs will be conducted within the existing developed footprint of the NFGS and associated structures and no permanent in-water structures are part of the Project.

The Project will have no effect on the inherent productive capacity of fish habitat for eels in the upper river, or on the downstream passage of adult American eel. However, the proposed project may affect the ability of juvenile American eel (elvers) to enter the upper river. Presently, elvers must ascend the natural falls, and then ascend the wetted face of the dam before entering the headpond. The deteriorated condition of the portion of the dam to be repaired may assist upstream migration of elvers, to the extent that leakage and spill caused by the deteriorated condition of the concrete create such wetted conditions. The proposed repairs will prevent leakage, and installation of the rubber dam may introduce a new obstacle to upstream migration of elvers. Therefore, NB Power will consult with DFO regarding mitigation and/or management measures to assist elvers reaching the head of the natural falls to pass the dam and enter the headpond.

Following installation of the Coffer Dam, the work area between the Coffer Dam and the power house will be dewatered temporarily. Dewatering will be facilitated through the turbines and sluice gates or by pumping of water over existing vegetation in accordance with NB Power's WAWA Permit (Condition of Approval No. 13). During the dewatering process there is the potential for direct mortality of fish. A fish biologist will be on-site with a fish out team to monitor fish presence and undertake fish rescue as required. Any remaining pools in the dewatered forebay will be fished out using dip nets and seine nets, and the fish relocated to fish habitat upstream. It is not anticipated that there will be large numbers of fish in the forebay downstream of the Coffer Dam during dewatering as consultation with NFGS Operation personnel and the Nepisiguit Salmon Association indicates that fish move from the forebay into the upper watershed in May and early June (R. Lavigne, pers. comm. 2011; R. Baker, pers. comm. 2011). In the event where large numbers of fish are identified in the forebay area during dewatering, the fish biologist will have the authority to halt the dewatering process to complete the fish rescue.

While recognizing that the *Fisheries Act* requires consideration of all fish species, the DFO Policy for the Management of Fish Habitat (DFO 1986) and Decision Framework (DFO 1998) make specific reference to maintenance of the current productive capacity of habitat for fish suitable for human consumption. Since the Nepisiguit Falls is impassable to fish, the primary

fish species for consideration in the headpond and upstream portions of the Nepisiguit River is brook trout. Conclusions in relation to brook trout will be assumed to be generalized to other fish species. Electrofishing data collected by NSA and PFN (2010) show that the fish species present above the dam are predominantly brook trout, dace (species not identified), slimy sculpin and occasional American eel.

Minns (1997) developed an approach to the "no net loss" of productivity for fish habitat in Canada, taking the approach that no net loss of productivity is the guiding principle for Canadian policy. Minns noted that the productivity of a river reach (P, kg/year) is the product of unit area productivity rate (P, kg/ha/year) and the area of the habitat (A, ha). The unit area productivity rate can itself be broken down into the product of biomass (B, kg/ha) and the tissue turnover or instantaneous growth rate (G, equivalent to the P:B ratio, having units of 1/year). Hence, the current productive capacity of the reach (P) depends upon the interplay between the area of the habitat, the biomass, and the instantaneous growth rate of fish. Importantly, provided the growth rate of fish is unchanged, the productive capacity of a river reach can remain unchanged if the biomass of fish increases in proportion to the temporary reduction of habitat area (*i.e.*, if the 13% reduction in habitat area is matched by a 13% increase in fish population density).

The brook trout population upstream of the falls is independent of the population downstream, since downstream fish cannot ascend the falls, and genes associated with the sea-run population of brook trout cannot enter the upstream population. In addition, studies (Elliott 1989, Northcote 1981) have shown that salmonid populations living upstream from falls experience strong selection for resistance to downstream migration, since such migration is irreversible and would deplete the population. Therefore, while some fish will from time to time be entrained through the penstocks or spilled over the dam, this will be a relatively rare event. The normal response to stress (*e.g.,* high flows or crowding) for fish living in the headpond will be upstream migration rather than downstream migration. Fish that overwinter in the headpond are reported (R. Baker, pers. comm. 2010, 2011) to make precisely this kind of migration in May-June, when the headpond will be dewatered. Therefore, draw down of the headpond will coincide with the natural migratory behavior of the fish, such that any stress that might be imposed on the fish due to draw down and/or increased crowding will be relieved by their natural migratory behavior.

Productivity of salmonid fish populations in spawning areas (*i.e.,* in low-order streams, but not in the headpond) is normally dominated by the production of juveniles, particularly 0+ and 1+ cohorts (Elliott 1984, 1987, 1989). In these areas of good and highly productive habitat, high rates of egg deposition result in high levels of juvenile emergence, and subsequent survival and production of fish may be density-dependent (Elliott 1984, 1987, 1989) if the population size approaches the carrying capacity of the habitat. External events, such as catastrophic spates or drought often regulate the overall population density, although recovery from these events can be rapid due to the high capacity of salmonids to deposit eggs. Data collected by NSA (NSA 2010, NSA and PFN 2010, R. Baker pers. comm.) show that brook trout densities in the main stem of the Nepisiguit River upstream of the headpond ranged from 500 to 1,000/ha in 2009, and were around 1,300/ha in 2010, with fish ranging from 5 to 23 cm in length. In 2010,

trout densities at six sites located above the falls ranged from 440 to 2,560/ha. Historical data reported by NSA and PFN (2010) show trout densities ranging from 110 to 1,870/ha between 1997 and 2010 at the Heath Steele Bridge site, and from 100 to 2,100/ha between 2003 and 2010 at the "Below Indian Falls" site. These densities are not particularly high for salmonids in good habitat, where densities of more than 1 fish per square metre (10,000/ha) are not uncommon. The variability in brook trout population density observed in the Nepisiguit River is typical of wild salmonid populations.

In less optimal habitats, or where spawning habitat is not present (*i.e.,* in rearing habitat such as the Nepisiguit Headpond), production is usually much lower, often below the threshold for the onset of density dependence (Elliott 1989). Production in such habitats may come to be dominated by older and larger fish, as is the case for the Nepisiguit headpond. Although these larger fish may form a major part of the biomass present in the habitat, they contribute little to production (because they have a much lower instantaneous growth rate, or production to biomass (P:B) ratio, than juvenile fish). At the same time, these large adult fish may reduce the resources available to juveniles (Elliott 1989), or actively prey upon them.

The population density of adult fish in the headpond during the summer months will be considerably lower than the carrying capacity of this habitat for two main reasons. Firstly, while large fish use the headpond as overwintering habitat, the area supports a strong recreational fishery in May and June. This harvest of fish will reduce the overall biomass and population density below the carrying capacity of the habitat. Secondly, the natural tendency is for the overwintering fish to migrate upstream to better rearing habitat for the summer months, and in preparation to move into spawning habitat in the late summer and fall.

A 13% reduction in the surface area of the headpond reach is not likely to result in a reduction of the current productive capacity of this reach for fish suitable for human consumption (*e.g.,* adult brook trout), since the fish population density in the subject reach is likely to be substantially below its carrying capacity due to fishing pressure and natural migratory movement upstream. The immediate result of the drawn down the headpond will be to nominally increase the population density by 13%. A modest increase in fish population density within the headpond has the effect of increasing the biomass (kg/ha) of the affected reach by an equivalent amount. Increased biomass would only reduce the growth rate of fish, and hence reduce the current productive capacity of the reach, if the population density was already at or above the carrying capacity of the system, or at a level that resulted in negative density-dependent effects. Therefore, the productive capacity of the headpond for brook trout is not likely to be substantively changed by the proposed temporary reduction in water level, and HADD will not occur.

Environmental effects monitoring during Construction will include the collection of water samples upstream and downstream of the Project, in the event that a visible silt plume is present or during periods of heavy rain. Water samples collected will be analyzed for TSS to ensure that mitigation (*e.g.,* silt curtains, check dams, and the Coffer Dam) is performing adequately, and that TSS does not increase more than 25 mg/L above background levels, in

accordance with Condition of Approval No. 13 of NB Power's WAWA Permit. Water samples collected during Construction will be compared to the background water quality data collected for the same period in 2011 (baseline water quality sampling is currently underway and will continue until freeze over 2011). Results of the water quality sampling program will be provided to DFO once the program is completed at the end of 2011.

Construction is planned between June 1, 2012, and September 30, 2012, in accordance with NB Power's WAWA Permit (Condition No. 7) during the low-flow period and outside of key spawning and migration periods to reduce residual environmental effects on the Aquatic Environment. In the event that in-water work is required beyond September 30 as a result of unplanned events that affect the Project schedule, this would be done in consultation with NBENV and DFO, and would be subject to any applicable permits and authorizations.

If DFO requires compensation for the temporary alteration or disruption of fish habitat and/or potential incidental mortality of fish (notwithstanding best efforts to complete fish rescue during dewatering of the forebay and drawdown of the headpond) as a result of the Project, details of the compensation will be determined through the HADD Authorization application process. NB Power would suggest that this compensation be provided through fish habitat enhancement activities in the Nepisiguit River, which NB Power is already involved in.

In particular, NB Power has contributed $10,000 in both 2009 and 2010 towards Atlantic salmon stocking and habitat evaluation and enhancement activities that are carried out in the Nepisiguit River by the Nepisiguit Watershed Association. These activities resulted in the release of over 42,000 Atlantic salmon fry in 2009, and over 300,000 fry in 2010 (NSA 2010; NSA and PFN 2010). NB Power's contributions to the NSA's overall annual operating budget in 2009 and 2010, suggests that NB Power could be credited with contributing approximately 35,000 Atlantic salmon fry to the river. NB Power is prepared to commit to continue funding NSA at a level of $10,000 per year over the next five years. Based upon the historical performance of the NSA, averaging over 200,000 fry stocked per year, it is reasonable to suggest that this continued funding by NB Power would provide support for an additional 100,000 to 175,000 salmon fry stocked to the river over the next five years.

NB Power also provides in-kind support to the NSA in the form of a water supply, electrical power, and a location for the operation of an Atlantic salmon egg rearing tank at the Nepisiguit Falls Generating Station. The survival of eggs to the fry stage is typically well over 90%, and this contributes materially to the overall success of stocking activities carried out by NSA.

NB Power has therefore already demonstrated willingness to enhance the productive capacity of fish habitat in the Nepisiguit River, and is prepared to commit to an additional five years of such support as compensation for possible reduction of the productive capacity of the headpond, as well as any incidental mortality of fish while the headpond is dewatered during the Construction period.

With the proposed Project design, planned mitigation, and compensation as required by DFO, the Project is not likely to result in significant adverse environmental effects on the Aquatic Environment.

4.3.5 Assessment of Cumulative Environmental Effects

Since there are no likely significant Project environmental effects, it follows that there can be no significant cumulative environmental effects of the Project in combination with past, present and future projects or activities that have been or will be carried out. There are no environmental effects of the Project that would overlap in a significant way with other projects and activities that have been or will be carried out that would cause a significant cumulative environmental effect to occur.

4.3.6 Determination of Significance

Although Installation of the Coffer Dam, Installation of the Working Platform and Removal of the Coffer Dam and Working Platform will result in a temporary alteration or disruption of fish habitat upstream of the NFGS due to draw down, the productive capacity of the headpond will not likely be affected, and through adequate and effective mitigation measures that will be applied through Construction this temporary alteration or disruption is not likely to result in a significant Change in Aquatic Environment.

The potential for increased TSS in the watercourse will be mitigated through the use of proven and standard erosion and sediment control measures (*e.g.*, silt curtains, check dams and pumping of water over existing vegetation). The presence of exposure of potentially sulphidic sediments (including the potential for sulphidic sediments to oxidize, cause acidification, and/or leach heavy metals) will be verified by a visual survey of the exposed banks. In the event that such sediments are identified, they will be removed from the exposed river bed and disposed of in an appropriate manner. Re-suspension of sediment from the watercourse bottom is reduced by using the Coffer Dam and reducing the amount of draw down, thus minimizing the potential to mobilize TSS or potentially contaminated sediment. The temporary loss of access to tributaries within the 4 km zone of influence as a result of draw down (alteration of fish habitat) will be investigated and if blockages are present and access can be restored without risk of environmental damage, efforts will be made to ensure that the tributaries remain accessible throughout the period of temporary headpond dewatering.

Incidental mortality of fish during Construction is considered to be a minor environmental effect, as most fish will escape freely to deeper water (*i.e.,* swim out of the construction area during the placement of the rockfill material that will comprise the Coffer Dam), or will be rescued by a team of biologists and environmental technicians during the dewatering process.

With the proposed Project design, including installation of a Coffer Dam to reduce the draw down required for the Project, planned mitigation, implementation of proven environmental protection measures (*e.g.,* silt curtains, check dams), and compensation as required by DFO, the environmental effects on the Aquatic Environment as a result of the Project are rated not

significant. The cumulative environmental effects of the Project in combination with these other projects or activities that have been or will be carried out are also rated not significant because there are no overlapping environmental effects of the Project with other projects and activities that have been or will be carried out that could cause significant cumulative environmental effects. These conclusions have been determined with a high level of confidence.

4.3.7 Follow-up and Monitoring

Follow-up and monitoring programs for the Aquatic Environment will consist of:

- Water quality monitoring within the LAA if visible plumes occur and during heavy rain events. The water quality monitoring plan and sampling locations will be determined prior to Construction and will include periodic monitoring for TSS during peak construction activities when visible plumes are noticed.

- Visual evaluation of exposed sediments after draw down of the headpond will be undertaken in the vicinity of the former Bathurst Mines. The evaluation will identify sulphidic sediments which may be exposed to the atmosphere as a result of the lower water level in order to prevent possible sulfide oxidation and acid generation, and potential leaching of heavy metals.

- Monitoring of water levels in the headpond and tributary access to confirm fish passage is available. If blockages are present and access can be restored without risk of environmental damage, and if other impediments to fish passage are not present in the tributaries, then efforts will be made to ensure that the tributaries remain accessible to potentially spawning fishes throughout the period of temporary headpond draw down.

4.4 ACCIDENTS, MALFUNCTIONS, AND UNPLANNED EVENTS

Accidents, Malfunctions, and Unplanned Events are accidents or upset events or conditions that are not planned as a part of routine Project activities during any Project phase. Even with the best planning and application of mitigation, Accidents, Malfunctions, and Unplanned Events could occur during any phase of the Project. These could occur as a result of abnormal conditions, wear and tear, human error, equipment failure, and other possible causes. Many accidents, malfunctions, and unplanned events are, however, preventable and can be readily addressed or prevented by good planning, design, equipment selection, hazards analysis and corrective action, emergency response planning, and mitigation.

4.4.1 Methodology

In this section, the potential Accidents, Malfunctions, and Unplanned Events that could occur during any phase of the Project and potentially result in significant adverse environmental effects are described, discussed, and assessed. The focus of the assessment is on credible accidents or scenarios that have a reasonable probability of occurrence and for which the

resulting environmental effects could be significant in relation to the identified thresholds of significance for each VEC (previously identified, as applicable).

It is noted that Accidents, Malfunctions and Unplanned Events are evaluated individually, in isolation of each other, as the probability of a series of accidental events occurring in combination with each other is not likely to occur. It is not credible to assess the occurrence of a series of accidental events occurring in parallel or as a result of each other, nor would it be possible to predict or prevent such occurrences, even with the best of planning. These possible events, on their own, generally have a very low probability of occurrence and thus their environmental effects are of low likelihood. They have an even lower probability or likelihood of occurring together—thus their combination is not considered credible, nor of any measurable likelihood of occurrence.

Various credible accidents, malfunctions, and unplanned events have been selected to complete the assessment. Since it is impossible to review and assess all possible accidents, malfunctions and upset conditions, scenarios which represent higher consequence events that would more than adequately address the consequences of less likely or lower consequence scenarios have been chosen for assessment.

4.4.2 Identification of Accidents, Malfunctions, and Unplanned Events

The credible Accidents, Malfunctions and Unplanned events that have been selected, based on experience and professional judgement, are described below.

Loss of Containment: Loss of Containment includes a partial or total failure of the NFGS or any of its components, resulting in temporary or permanent damage to structures and equipment as well as the unplanned release of water downstream.

Failure of the Coffer Dam: Failure of the Coffer Dam during Construction includes a partial or total failure of the Coffer Dam resulting in a significant delay in the Project schedule, loss or damage to equipment, temporary or permanent damage to structures, and/or the release of sediment and/or debris downstream. In the case where a large sudden breach occurred, failure of the Coffer Dam could result in significant damage to equipment, serious injury, or even loss of life. As the Coffer Dam will be removed following Construction, this unplanned event is not relevant to the subsequent Operation or Decommissioning and Abandonment phases of the Project.

Hazardous Materials Spill: A spill of petroleum, oil and lubricants (POLs) or other liquid hazardous materials may occur during refueling of machinery or through breaks or leaks in hydraulic lines of equipment.

Erosion and Sediment Control Failure: Erosion and sediment control structures (*e.g.,* check dams, sediment fencing) may fail as a result of improper installation, lack of maintenance, or an unplanned event

Fire: A Fire could occur during any phase of the Project due to an equipment accident, human carelessness, or natural causes such as a forest fire under dry conditions.

Discovery of a Heritage Resource: Heritage Resources (including artifacts) may be uncovered during ground disturbing activities, through erosion, or by exposing new soil (*e.g.,* through dewatering).

Vehicle Accident: Project-related vehicle accidents that could occur on road transportation network, including vehicle accidents involving wildlife.

Wildlife Encounter: There is the potential for encounters by Project-related workers with wildlife during Construction or Operation and Maintenance, including wildlife strikes.

It is difficult to predict the precise nature and severity of these events. However, the probability of serious accidental events or those causing significant adverse environmental effects is low, particularly when construction and operation procedures incorporate contingency and emergency response planning.

4.4.3 Environmental Effects Assessment

The potential interactions between the selected Accidents, Malfunctions, and Unplanned Events that could occur during the Construction or Operation and Maintenance of the Project and each relevant VEC are identified in Table 4.6 below.

Table 4.6 Potential Interactions of Project-Related Accidents, Malfunctions, and Unplanned Events with the Environment

Accident, Malfunction, or Unplanned Event	Atmospheric Environment	Water Resources	Aquatic Environment	Terrestrial Environment	Wetland Environment	Land Use and Economy	Heritage Resources	Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons	Road Transportation
Loss of Containment	0	1	1	1	0	1	1	1	0
Failure of the Coffer Dam	0	1	1	0	0	0	0	0	0
Hazardous Materials Spill	0	1	1	1	0	1	1	1	0
Erosion and Sediment Control Failure	0	1	1	0	0	1	1	1	0
Fire	1	0	0	1	0	1	0	1	1
Discovery of a Heritage Resource	0	0	0	0	0	0	1	0	0
Vehicle Accident	0	0	0	1	0	0	0	0	1
Wildlife Encounter	0	0	0	1	0	0	0	0	0

Table 4.6 Potential Interactions of Project-Related Accidents, Malfunctions, and Unplanned Events with the Environment

Accident, Malfunction, or Unplanned Event	Atmospheric Environment	Water Resources	Aquatic Environment	Terrestrial Environment	Wetland Environment	Land Use and Economy	Heritage Resources	Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons	Road Transportation

Key:
0 No interaction. The environmental effects are rated not significant and are not considered further in this report.
1 Interaction will occur. However, based on past experience and professional judgment, the interaction would not result in a significant environmental effect, even without mitigation, or the interaction would clearly not be significant due to application of codified practices. The environmental effects are rated not significant and are not considered further in this report.
2 Interaction may, even with codified mitigation, result in a potentially significant environmental effect and/or is important to regulatory and/or public interest. Potential environmental effects are considered further and in more detail in the EA.

None of the identified Project-related Accidents, Malfunctions, or Unplanned Events will interact with the VECs ranked as 0 in Table 4.6, as no mechanisms for interaction have been identified.

As no potential interaction with these VECs has been identified, the environmental effects of these Accidents, Malfunctions, and Unplanned events are rated not significant and will not be discussed further.

4.4.3.1 Loss of Containment

Loss of Containment has the potential to interact with the Freshwater Environment, the Aquatic Environment, the Terrestrial Environment, Land use and Economy, Heritage Resources, and Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons as indicated by their ranking of 1 in Table 4.6. There is potential for Loss of Containment during Construction activities; there are no features of the future Operation of the Project that would increase the risk of Loss of Containment compared to the current operation of the NFGS. The potential environmental effects of Loss of Containment during future Decommissioning and Abandonment activities will be assessed in a future Decommissioning and Abandonment plan.

Loss of Containment includes a partial or total failure of the NFGS or any of its components, resulting in temporary or permanent damage to structures and equipment as well as the unplanned release of contained water in the reservoir downstream. Loss of Containment may occur from the failure of NFGS components due to damage or advanced age. Entrained debris could damage both the butterfly valve at the top of the system and the wicket gates at the bottom of the system, which are necessary to control the flow through the generating station (Figure 2.1). In addition to substantial damage that this could cause to all components (*e.g.,* turbine runner, scroll case, power shaft), damage to the valve and wicket gates could

realistically result in the uncontrolled release of water. This could result in the sudden uncontrolled draining of the forebay, lowering the headpond permanently. In addition to rendering the plant inoperable, this could result in higher than acceptable sedimentation in the river due to the fast moving water. Destruction of fish habitat through erosion of the river bed as a result of the uncontrolled flow, direct mortality to fish, or damage to property downstream including the Pabineau First Nation salmon counting fences could occur.

The very nature of the Project to improve the structural integrity of the spillway dam and to replace damaged components is intended to prevent Loss of Containment and other catastrophic accidents, malfunctions, or unplanned events that might conceivably occur if no action were taken. The Project and the existing submerged gate and the main rubber dam, have been designed and engineered to withstand the water pressures of the Nepisiguit River and are inspected regularly for signs of stress. Should any damage or stress be found during inspections of the structures, damage will be repaired and corrective action taken to prevent the Loss of Containment.

In order to mitigate the possibility of Loss of Containment caused by failure of the coarse trash racks, temporary coarse trash racks will be installed in late summer 2011 to assist with the catchment of debris in the river. NB Power has implemented an advanced inspection and cleaning schedule for the fine screen trash racks, which have become overloaded with large debris. Low flow conditions through the summer and full ice cover over the winter months are expected to provide some additional protection against floating large debris accumulating in the fine screen trash racks.

Further to the mitigation described above is the need to complete the Project within the proposed Project schedule, from June 1, 2012 through to September 30, 2012. Completion of the Project within the proposed timeframe will reduce the possibility of a large piece of debris causing substantial and irreparable damage to the facilities.

NB Power's Standard Operating Procedures for draw down and controlling headpond elevation and Emergency Response Plans for the NFGS will be adhered to throughout all phases of the Project. All personnel including contractors who will be on site will undergo generating station safety orientation as per standard NB Power health and safety protocols.

In consideration of planned and existing mitigation, including the Project as planned, the potential adverse environmental effects on the Terrestrial Environment, Land use and Economy, Heritage Resources, and Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons from an unplanned Loss of Containment are rated not significant.

4.4.3.2 Failure of the Coffer Dam

Failure of the Coffer Dam has the potential to interact with Water Resources and the Aquatic Environment, as indicated by their ranking of 1 in Table 4.6. There is potential for Failure of the Coffer Dam during Construction activities. The Coffer Dam will be removed following

Construction of the Project, therefore there are no possible interactions during the future Operation or Decommissioning and Abandonment of the Project.

Failure of the Coffer Dam during Construction includes a partial or total Failure of the Coffer Dam resulting in a delay in the Project schedule, loss or damage to equipment, temporary or permanent damage to structures, and/or the release of sediment and/or debris downstream. In the case where a large sudden breach occurred, Failure of the Coffer Dam could result in damage to equipment, serious injury, or even loss of life.

The Coffer Dam is a critical component to carrying out the Project as planned, and will be engineered, designed and constructed with the highest of care to ensure that it meets generally accepted engineering practice and principles to avoid its potential failure. Standard acceptable engineering design considers and accounts for the associated loadings or stresses which will be imposed on the Coffer Dam. A number of planning, design and construction strategies will be considered as part of the engineering for the Coffer Dam to minimize the risk of construction delays, serious damage to equipment and/or structures which could result from a Failure of the Coffer Dam. Mitigation measures include, but are not limited to, designing the Coffer Dam to relevant codes and scheduling of activities to accommodate weather interruptions, and regular inspections by the Project Engineer of the Coffer Dam.

In the event that leakage, shifting or stability issues are observed, corrective action will be taken immediately to prevent Failure of the Coffer Dam. Where this occurs, repairs would be immediately conducted and equipment not required for the repair to the Coffer Dam would be evacuated from the site to prevent damage, until the corrective actions are completed and inspection and approval is provided by the Project Engineer.

Failure of the Coffer Dam has the potential to introduce suspended sediment or debris into the river. Daily inspections of the Coffer Dam will identify potential weakness or soft spots in the Coffer Dam which would lead to the Failure of the Coffer Dam itself. During Construction, the butterfly valves and wicket gates in the powerhouse will be closed, which would contain any water spilled to the forebay area. Debris would be caught in the fine trash rack system and removed according to NB Power standard operating procedures. Suspended sediments would be monitored in the downstream flow and in case of a sudden change notification would be made to NBENV, DFO, the Nepisiguit Salmon Association, and Pabineau First Nation in accordance with NB Power's Generation In-plant Procedure NFOP0002 (Downstream Water Elevation) (NB Power 2010a).

In consideration of planned and existing mitigation, the potential adverse environmental effects on Water Resources and the Aquatic Environment from an unplanned Failure of the Coffer Dam are rated not significant.

4.4.3.3 Hazardous Material Spills

A Hazardous Materials Spill has the potential to interact with Water Resources, the Aquatic Environment, the Terrestrial Environment, Land Use and Economy, Heritage Resources, and

Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons, as indicated by their ranking of 1 in Table 4.6. There is a heightened potential for Hazardous Material Spills during Construction activities due to increased activities on the site. There are no features of the future Operation of the Project that would increase the risk of Hazardous Material Spills compared to the current operation of the NFGS. The potential environmental effects of Hazardous Material Spills during future Decommissioning and Abandonment activities will be assessed in a future Decommissioning and Abandonment plan.

A spill of petroleum, oil and lubricants (POLs) or other liquid hazardous materials may occur during any phase of the Project (though more likely during Construction) during refueling of machinery or through breaks or leaks in hydraulic lines of equipment. Such spills are usually highly localized and easily cleaned up by on-site crews using standard equipment and spill response materials. In the unlikely event of a large spill, soil, groundwater and surface water contamination could occur if not properly contained.

NB Power will take necessary precautions, including the designating fuel storage and fuelling areas according to provincial policy and NB Power's WAWA permit (Conditions of Approval No. 2, 18 and 19) , to ensure that Construction activities will not result in the release of harmful material or substances. NB Power will take necessary measures for containing and cleaning up spills which may occur. NB Power's Nepisiguit Falls Emergency Response Plan – Spills (NFEV0001) (NB Power 2010b) outlines procedures and roles and responsibilities for containing and cleaning up spills in a safe and efficient manner, and in accordance with federal and provincial reporting requirements.

In consideration of planned and existing mitigation, the potential adverse environmental effects on Water Resources, the Aquatic Environment, the Terrestrial Environment, Land use and Economy, Heritage Resources, and Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons from an unplanned Hazardous Materials Spill are rated not significant.

4.4.3.4 Erosion and Sediment Control Failure

Erosion and Sediment Control Failure has the potential to interact with Water Resources, the Aquatic Environment, Land use and Economy, Heritage Resources, and Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons, as indicated by their ranking of 1 in Table 4.6. There is a heightened potential for Erosion and Sediment Control Failure during Construction activities due to the nature of the Project and increased activity at the site. There are no features of the future Operation of the Project that would increase the risk of Erosion and Sediment Control Failure compared to the current operation of the NFGS. The potential environmental effects of Erosion and Sediment Control Failure during future Decommissioning and Abandonment activities will be assessed in a future Decommissioning and Abandonment plan.

Erosion and Sediment Control Failure may occur during any phase of the Project due to extreme precipitation events. Such an event could result in the erosion of in-situ soils, resulting in a release of sediment to receiving watercourses. This could affect the VECs described above through changes to water quality, and potential adverse environmental effects to fish and fish habitat.

Standard erosion and sediment control measures, including the use of sediment and silt fencing, check dams, placement of rip-rap and geotextiles, as outlined in the conditions of NB Power's WAWA permit (Conditions of Approval No. 10, 11, 13, 15, 16 and 21) will be followed. Inspection and monitoring of erosion and sediment control measures will be conducted daily during all phases of the Project, particularly during and after extreme precipitation events that result in visible overland flow of water. Erosion and sediment control structures found to be damaged will be repaired immediately and any other remedial action will be taken as necessary.

In consideration of planned and existing mitigation, the potential adverse environmental effects on Water Resources, the Aquatic Environment, Land use and Economy, Heritage Resources, and Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons from an unplanned Erosion and Sediment Control Failure are rated not significant.

4.4.3.5 Fire

Fire has the potential to interact with the Atmospheric Environment, the Terrestrial Environment, Land Use and Economy, and Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons, as indicated by their ranking of 1 in Table 4.6. There is a heightened potential for Fire during Construction activities due to the nature of the Project and increased activity at the site. There are no features of the future Operation of the Project that would increase the risk of Fire compared to the current operation of the NFGS. The potential environmental effects of Fire during future Decommissioning and Abandonment activities will be assessed in a future Decommissioning and Abandonment plan.

A Project-related Fire could occur during any phase of the Project due to an equipment accident, human carelessness, or natural causes such as a forest Fire under dry conditions, but the potential for occurrence is greater during Construction of the Project due to increased human activity on the site. If a Fire were to occur as a result of the Project, the immediate concern would be for human health and safety; additional concerns include habitat loss, direct mortality to wildlife, and loss or damage of property. The emissions from a Fire would likely consist mainly of smoke (particulate matter) and CO_2, but could also include CO, NO_x, SO_2, and other products of incomplete combustion. A large Fire could cause air pollution and possible air contaminant levels greater than the ambient air quality standard over distances of several kilometres, but such cases would be of short duration and are not expected to occur.

Proper materials management (*i.e.,* of fuel and other hazardous materials) and operational procedures (*i.e.,* storage, handling and transfer) in accordance with NB Power's Emergency Response Plan – Spills (NB Power 2010b) will reduce the potential for, and extent of, accidental

Project-related Fires. In the unlikely event of a large Fire, local emergency response and fire fighting capability will be called to respond to reduce the severity and extent of damage and to protect the safety of workers.

In consideration of planned and existing mitigation, the potential adverse environmental effects on the Atmospheric Environment, the Terrestrial Environment, and Land Use and Economy, and Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons from an unplanned Fire are rated not significant.

4.4.3.6 Discovery of a Heritage Resource

Discovery of a Heritage Resource has the potential to interact with the Heritage Resources VEC, as indicated by its ranking of 1 in Table 4.6. There is a heightened potential for Discovery of a Heritage Resource during Construction activities due to increased activity at the site. There are no features of the future Operation of the Project that would increase the risk of Discovery of a Heritage Resource compared to the current operation of the NFGS. The potential environmental effects of Discovery of a Heritage Resource during future Decommissioning and Abandonment activities will be assessed in a future Decommissioning and Abandonment plan.

There is a low probability that a previously undiscovered heritage resource (including artifacts) may be uncovered as a result of the Project. No intrusive ground-disturbing activities are planned for the Project, and limited dewatering of the forebay will occur. The temporary access road, platform and debris removal required will be undertaken under dry conditions (behind the Coffer Dam), on the forebay floor which has been dewatered in the past. Once the Project is complete, the forebay will be returned to its natural state prior to re-watering. Though the NFGS itself has been present on site for nearly a century and could be considered in itself a heritage resource, the Project is intended to preserve the operation of this facility and as such is intended to protect this built heritage resource.

In the unlikely event that Project personnel encounter a known or suspected heritage resource during any phase of the Project, work in the immediate area of the find (10 m radius) will be halted, and Archaeological Services of the New Brunswick Department of Wellness, Culture and Sport will be contacted in accordance with the *Heritage Conservation Act* (2010). Work in the immediate area of the find will be suspended until direction from Archaeological Services is received. The heritage resources may not be removed by anyone other than a licensed archaeologist (Archaeological Services 2009).

With these measures and planned mitigation, and given the limited likelihood of discovering a heritage resource, the potential environmental effects of Discovery of Heritage Resource on the Heritage Resources VEC are rated not significant.

4.4.3.7 Vehicle Accident

A Vehicle Accident has the potential to interact with the Road Transportation Network VEC, as indicated by its ranking of 1 in Table 4.6. The potential for fires or hazardous substance spills,

which could be associated with vehicle accidents, have been addressed elsewhere. There is a heightened potential for a Vehicle Accident during Construction activities due to increased activity at the site. There are no features of the future Operation of the Project that would increase the risk of a Vehicle Accident compared to the current operation of the NFGS. The potential environmental effects of a Vehicle Accident during future Decommissioning and Abandonment activities will be assessed in a future Decommissioning and Abandonment plan.

A Vehicle Accident could potentially occur during Construction when an anticipated increase in heavy truck traffic to the PDA is likely to occur. Worker traffic and truck traffic to and from the site, and the operation of heavy equipment on-site during Construction, have the potential to result in vehicle accidents.

Project-related vehicles will observe all traffic rules and provincial and federal highway regulations. Trucking activity for Construction will take place on designated routes, and traffic control will be implemented if needed.

With these measures and planned mitigation, and by the very limited nature of the Project itself, the potential environmental effects of a Vehicle Accident as part of the Project are rated not significant.

4.4.3.8 Wildlife Encounter

A Wildlife Encounter has the potential to interact with the Terrestrial Environment VEC, as indicated by its ranking of 1 in Table 4.6. There is a heightened potential for a Wildlife Encounter during Construction activities due to increased activity at the site. There are no features of the future Operation of the Project that would increase the risk of a Wildlife Encounter compared to the current operation of the NFGS. The potential environmental effects of a Wildlife Encounter during future Decommissioning and Abandonment activities will be assessed in a future Decommissioning and Abandonment plan.

There is the potential for workers to come into contact with fish and/or wildlife during the Construction of the Project. This could have adverse environmental effects on both worker (*e.g.,* disruption of work activity, or bodily harm) and fish or wildlife (*e.g.,* disturbance of critical life cycles). Current and planned frequent human activity in the area of the Project reduces the potential for wildlife encounters (*i.e.,* posing a risk to public or worker health and safety or to the survival of the wildlife).

In case of persistent or dangerous wildlife encounters, NB Power personnel shall notify NBDNR of the situation. Fish rescue operations will take place prior to Construction, if necessary, and will be undertaken in consultation with DFO to prevent destruction of fish in situations where construction-related activities place fish in imminent danger of injury or death.

With these measures and planned mitigation, the potential environmental effects of a Wildlife Encounter as part of the Project are rated not significant.

4.4.4 Determination of Significance

The Project is being designed, and will be constructed and operated with full regard for health, safety and environmental protection to minimize its potential environmental effects that could result during the normal course of Construction, Operation, Decommissioning and Abandonment, as well as those that could result from Accidents, Malfunctions, and Unplanned Events.

The careful planning of the Project and the implementation of proven and effective mitigation will minimize the potential for Accidents, Malfunctions, and Unplanned events to occur. There are no potential environmental effects that could occur as a result of Accidents, Malfunctions, or Unplanned Events that would be expected to cause a significant adverse environmental effect to any VEC, during any phase of the Project. In the very unlikely and improbable event that an Accident, Malfunction, or Unplanned Event of any considerable magnitude were to occur, it would be of a short duration, low frequency, or limited geographic extent such that significant adverse environmental effects to any VEC would be very unlikely to occur.

Overall, given the nature of the Project and credible Accidents, Malfunctions, and Unplanned Events considered, and in light of the proposed mitigation, the potential environmental effects of all Project-related Accidents, Malfunctions, and Unplanned Events on all VECs, including cumulative environmental effects, during all phases of the Project, are rated not significant.

5.0 PUBLIC, STAKEHOLDER AND ABORIGINAL ENGAGEMENT

As a part of the EIA process for the Project, the Proponent will provide the potentially affected public and other stakeholders with a meaningful opportunity to provide comment, and will provide a report of these comments and how they were addressed, to NBENV for consideration.

5.1 PUBLIC AND STAKEHOLDER ENGAGEMENT

Public consultation will be undertaken on a number of levels including: direct engagement with individuals and stakeholders; public information sessions; direct notification about the Project to elected officials and neighbours of the Project, advertisements in local media; and follow-up meetings as required.

Key stakeholders will be contacted, and those who express an interest in the Project will be provided with a project information sheet, including a map showing the location of the Project, and a written description of key features of the Project. At the front end of the process, one-on-one semi-structured telephone interviews may be scheduled and conducted with some stakeholders who are identified as key informants or representatives of significant groups, organizations or associations, in order to qualify information and develop the basis to plan future face to face meetings. Most interviews will take place over the phone, though if required some may take place in person. A preliminary list of potential stakeholders is provided in Table 5.1.

Table 5.1 Preliminary List of Stakeholders

Government	
Provincial MLA Nepisiguit	Ryan Riordon
Provincial MLA Bathurst	Brian Kenny
Federal MP Acadie-Bathurst	Yvon Godin
Federal MP Miramichi	Tilly O'Neill-Gordon
City of Bathurst	Stephen Brunet (Mayor)
Recreation and Natural Resource Groups	
Nepisiguit Snowmobile Club	TBD
Nepisiguit River Management Committee	Robert Baker
Nepisiguit Salmon Association	Robert Baker
New Brunswick Professional Outfitter Guide Association	Phil Ossinger
Nepisiguit River Camps II	D. Gray
New Brunswick All Terrain Vehicle Association	Daniel Boucher
New Brunswick Federation of Snowmobile Clubs	Ross Antworth
Xstrata	James Cormier – Sr. Environment & Risk Advisor

The purpose of all events is to inform and update stakeholders on the Project, answer any questions, solicit input, and to collect and communicate any concerns back to appropriate NB Power personnel and, therefore as relevant, into the environmental assessment and regulatory process.

It is anticipated that at least one public information session will be scheduled during the lifecycle of the Project; a second public information session may be organized for the First Nations community if so desired by the Aboriginal leadership. NB Power will schedule the public information session following the filing of the Project Description/EIA Registration. The public information sessions will provide a venue for interested residents and citizens to learn more about the Project, ask questions or raise concerns with appropriate NB Power or consultant staff either in one on one or casual small group conversations in an open and unstructured multi-hour setting. Display boards will feature pertinent Project information, diagrams and mapping. There will be handouts with relevant summary information. The public information session will be held in a nearby meeting room or community hall in proximity to the Project location.

The public information session will be advertised in local media and landowners proximal to the NFGS will receive a personal invitation to attend. Comments from the public and stakeholders on the Project will be considered in the EIA during the review process.

NB Power may choose to hold one or more special meetings with directly affected stakeholders, *e.g.,* First Nations, local enterprise or elected officials to discuss their interests and concerns in a more focused and structured setting, depending on the outcomes of early consultation and the public information session.

Copies of the Project Description/EIA Registration document will be made available at the following locations for public viewing:

- online at NB Power's website;
- the Project Assessment Branch of NBENV in Fredericton;
- the Regional Office of NBENV in Bathurst; and
- Bibliothèque Publique Smurfit-Stone (Bathurst).

A summary report on public engagement activities will be filed with NBENV within 25 days of the public information session.

5.2 ABORIGINAL ENGAGEMENT

First Nations will be engaged through communication with Pabineau First Nation. Their input will be sought on the overall engagement process for their communities and others that they may identify as being potentially affected by the Project. First Nations communities are constructed communities, and members who live outside of the community may have an equal interest in the Project to those currently residing at Pabineau First Nation. For this reason, NB Power will remain open to engaging with more First Nations communities or organizations (*e.g.,* Assembly of First Nations Chiefs of New Brunswick, UNBI), particularly if specifically requested to do so by any First Nation organization.

Aboriginal engagement will be initiated early and continue throughout the course of the EIA review. As described above, NB Power will initiate discussion about the Project with the Chief of the Pabineau First Nation after registration of the Project. The Proponent will follow the direction and interest of the Chief and undertake engagement with the Aboriginal community in consideration of the wishes of the Chief in respect of how they wish to be engaged, if at all. The Proponent will work with any Province of New Brunswick and Government of Canada officials that may be conducting engagement with First Nations regarding the Project.

5.3 REPORTING

NB Power will implement an issues management and reporting protocol to ensure that issues, inputs and concerns that arise through public consultation are inputted to a tracking system and forwarded to appropriate NB Power and consultant staff for review, response and action. This could take many forms. All issues will be considered with regard to the most appropriate follow-up. All issues will be tracked so that they are dealt with in a time-appropriate manner. A summary of consultation efforts, issues, and solutions will be submitted to NBENV within 25 days of the public information sessions.

6.0 CLOSURE

This report has been prepared by Stantec Consulting Ltd. (Stantec) for the sole benefit of the New Brunswick Power Generation Corporation (NB Power). The report may not be relied upon by any other person or entity, other than for its intended purposes, without the express written consent of Stantec and NB Power.

This report was undertaken exclusively for the purpose outlined herein and was limited to the scope and purpose specifically expressed in this report. This report cannot be used or applied under any circumstances to another location or situation or for any other purpose without further evaluation of the data and related limitations. Any use of this report by a third party, or any reliance on decisions made based upon it, are the responsibility of such third parties. Stantec accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions taken based on this report.

Stantec makes no representation or warranty with respect to this report, other than the work was undertaken by trained professional and technical staff in accordance with generally accepted engineering and scientific practices current at the time the work was performed. Any information or facts provided by others and referred to or used in the preparation of this report were assumed by Stantec to be accurate. Conclusions presented in this report should not be construed as legal advice.

The information provided in this report was compiled from existing documents and data provided by NB Power and by applying currently accepted industry standard mitigation and prevention principles. This report represents the best professional judgment of Stantec personnel available at the time of its preparation. Stantec reserves the right to modify the contents of this report, in whole or in part, to reflect the any new information that becomes available. If any conditions become apparent that differ significantly from our understanding of conditions as presented in this report, we request that we be notified immediately to reassess the conclusions provided herein.

STANTEC CONSULTING LTD.

(Draft Report – Final signed by)	***(Draft Report – Final signed by)***
Sara Wallace, M.Sc.F. Environmental Scientist Environmental Management (506) 452-7000	Denis L. Marquis, M.Sc.E., P.Eng. Principal, Environmental Management Senior Reviewer (506) 452-7000

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7.2 PERSONAL COMMUNICATIONS

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Appendix A

New Brunswick EIA Registration – Additional Information Requirements

Additional Information

("General Information Requirements" in NB EIA Guide)

The following is intended to fulfill the additional information required for registration of the Project, as outlined in the New Brunswick EIA Guide, entitled "A Guide to Environmental Impact Assessment in New Brunswick, November 2007" (NBENV 2007).

1.0 THE PROPONENT

i)	Name of Proponent	New Brunswick Power Generation Corporation
ii)	Address of Proponent	515 King Street P.O Box 2040 Fredericton, NB E3B 5G4
iii)	Chief Executive Officer (or designate)	Mr. R. Anthony Bielecki, P.Eng., Manager, Environment
iv)	Principal Contact Person for the purposes of Environmental Impact Assessment	Mr. R. Anthony Bielecki, P.Eng., Manager, Environment (506) 458-6701 (506) 458-4000 Email: ABielecki@nbpower.com
v)	Property Ownership	The New Brunswick Power Corporation currently owns the property upon which the Project will be completed. The Nepisiguit River Salmon Club Inc. is named as a lease of the land identified by Service New Brunswick's Property Identification Number (PID) 20560876.

2.0 THE PROJECT

i)	Name of the Undertaking	NEPISIGUIT FALLS GENERATING STATION MODIFICATION AND REHABILITATION PROJECT
ii)	Project Overview	See Section 1.1 of the EIA Registration document.
iii)	Purpose / Rationale / Need for Undertaking	See Section 1.2 of the EIA Registration document.
iv)	Project Location	The Project is located at the Nepisiguit Falls on the Nepisiguit River adjacent to the community of Bathurst Mines, Gloucester County, NB. The Project is located in a remote part of the province, approximately 35 km south of the City of Bathurst, in northern New Brunswick.

v)	Siting Considerations	The Project will be constructed within the footprint of the existing forebay, dam and hydroelectric generating station at Nepisiguit Falls. The property has been used for the purpose of generating electricity since 1921. No alternative sites were considered as they would not meet the Project purpose. The Project is located within 30 metres of a watercourse by nature of the Project (*i.e.,* a dam and hydroelectric generating station). No wetlands, including riparian wetlands, were identified within the Project development area, nor would any wetlands be affected by Project activities. The Project is not located within a designated wellfield or watershed. No Project activities are anticipated to influence potable wells during any phase of the Project. The Project is not located within Coastal Zone A or B (not applicable as the Project is not located near the coast of the marine environment).
vi)	Physical Components and Dimensions of the Project	A description of the Project components is provided in Section 2.1 of the EIA Registration document. Project design details are provided in Appendix C. Please refer to Figure 2.1 Project Overview and Appendix C for engineering design drawings showing: Cross Section of Forebay Spillway Dam Work Area; Rubber Dam Plan View and Front Elevation; Rubber Dam Cross Section; Spillway Concrete Repair Works Plan and Details; and Access and Work Platform Plan.
vii)	Construction Details	An overview of the construction activities for the Project is provided in Section 2.2 of the EIA Registration document. Construction will begin in June, 2012 with completion by September 30, 2012. Site access would be provided via the current onsite access roads owned by NB Power. Access to the Nepisiguit Falls Generating Station would take place on approved routes including Nepisiguit Falls Road which connects to Highway Route 430 to Bathurst.
viii)	Operation and Maintenance Details	An overview of the operation of the Project is provided in Section 2.3 of the EIA Registration document. The estimated life span based on current design standards of the Project is 50-75 years.
ix)	Future Modifications, Extensions, or Abandonment	Not applicable at this time.
x)	Project-Related Documents	No other documents are publically available.

3.0 DESCRIPTION OF THE EXISTING ENVIRONMENT

The descriptions of all relevant features that are found within the Project location and surrounding areas that could be potentially affected by the Project are provided in Chapter 4 of the EIA Registration.

4.0 SUMMARY OF ENVIRONMENTAL IMPACTS

Potential environmental effects, or "impacts", of the various Project phases are provided in Section 4.2.2 of the EIA Registration document. An initial "screening" of potential interactions between the Project and associated VECs is provided in Section 4.2, and where applicable, the environmental effects are discussed, assessed and rated not significant. The Aquatic Environment VEC, where more substantive interactions may occur as a result of the Project is subjected to a more detailed environmental effects assessment.

5.0 SUMMARY OF PROPOSED MITIGATION

Proposed mitigation for the Project is addressed within Chapter 2 (Project Description) and Chapter 4 (Environmental Effects Assessment) for each phase of the Project as scoped, and specifically within each relevant subsection of each of the VECs of the EIA Registration document, where appropriate or applicable.

6.0 PUBLIC INVOLVEMENT

A brief summary of the planned stakeholder, public, and Aboriginal consultation and engagement activities planned as part of the Project is provided in Chapter 5 of the EIA Registration document.

7.0 APPROVAL OF THE UNDERTAKING

Permits, licenses, approvals, or other authorizations that may be required for the Undertaking are discussed in the Section 2.8 of the EIA Registration document.

8.0 FUNDING

Funding for the Project is being provided solely by New Brunswick Power Corporation, and no provincial or federal funding is being provided.

9.0 SIGNATURE

(Original submission signed by)

Mr. R. Anthony Bielecki, P.Eng.
Manager, Environment

Date:

Appendix B

Site Photos

View of the Spillway Dam Showing Wooden Flashboards and Forebay Flood Dewatered (1993)

Photo No.: 1

Client: New Brunswick Power Corporation

Stantec

View of the Forebay Spillway Dam

Photo No.: 2

Client: New Brunswick Power Corporation

Stantec

Rubber Dam being Rolled out on Main Dam, 1999

Photo No.: 3

Client: New Brunswick Power Corporation

Stantec

Final Fitting of the Rubber Dam on the South End of the Main Dam, 1999 6

Photo No.: 4

Client: New Brunswick Power Corporation

Stantec

View Damaged Trash Racks
December 2010

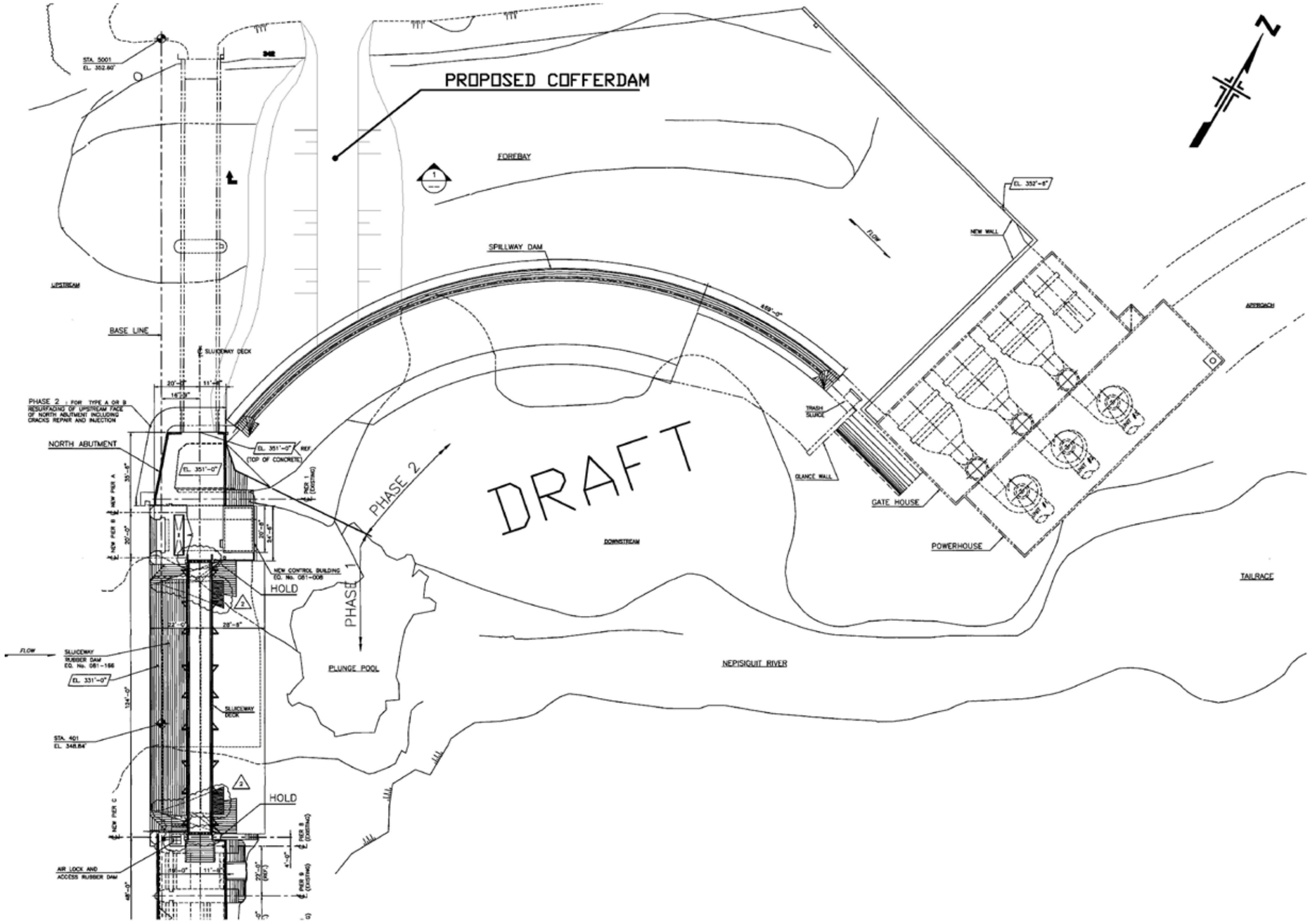
Photo No.:
5

Client: New Brunswick Power Corporation

Stantec

Appendix C

Project Plans and Profiles



Plan View of the Proposed Coffer Dam	**Scale:**	**Job No.:**	**Figure No.:**	
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	Date:	**Provided By:**	**Appd. By:**	
Client: **NB Power Generation Corporation**	May 18, 2011	NB Power	BLJ	

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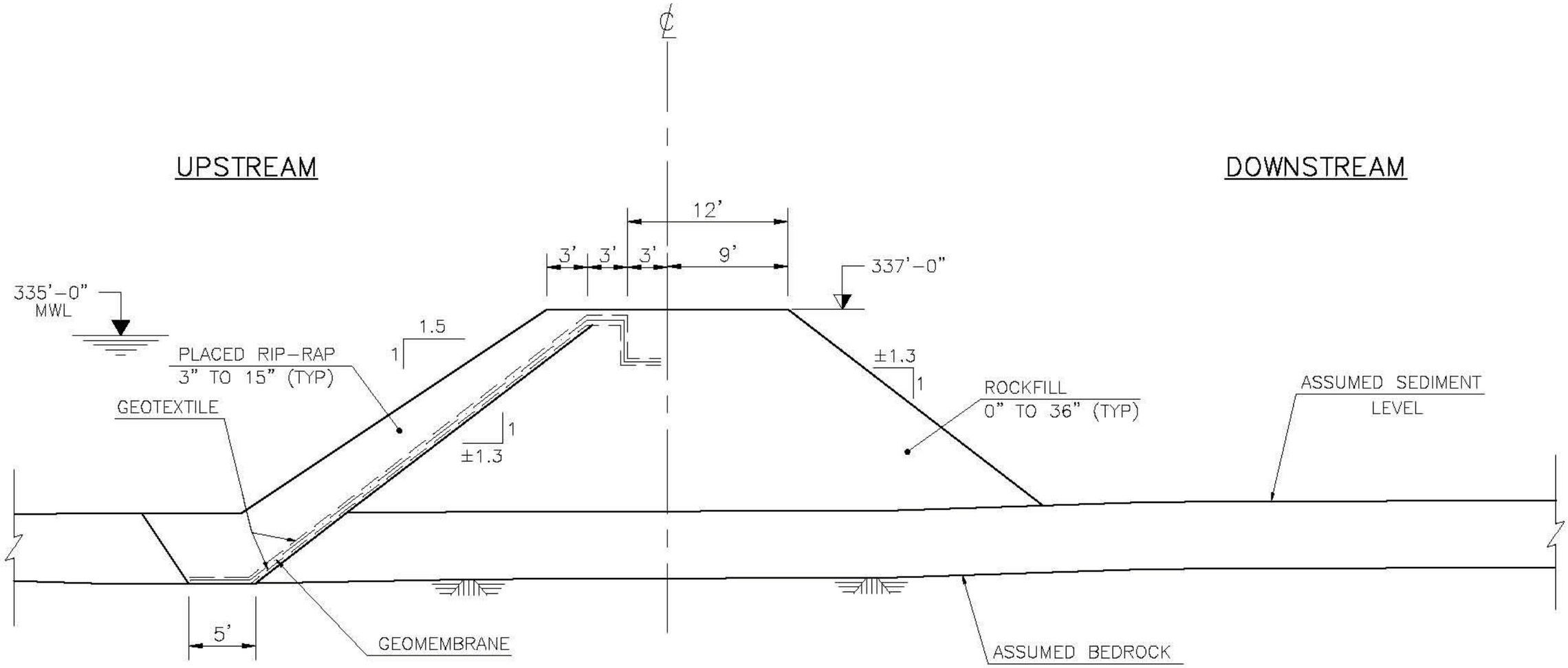

SECTION 1/--

Cross Section of the Proposed Coffer Dam	**Scale:**		**Job No.:**	**Figure No.:**
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	Date:	**Provided By:**	**Appd. By:**	
Client: **NB Power Generation Corporation**	May 18, 2011	NB Power	BLJ	

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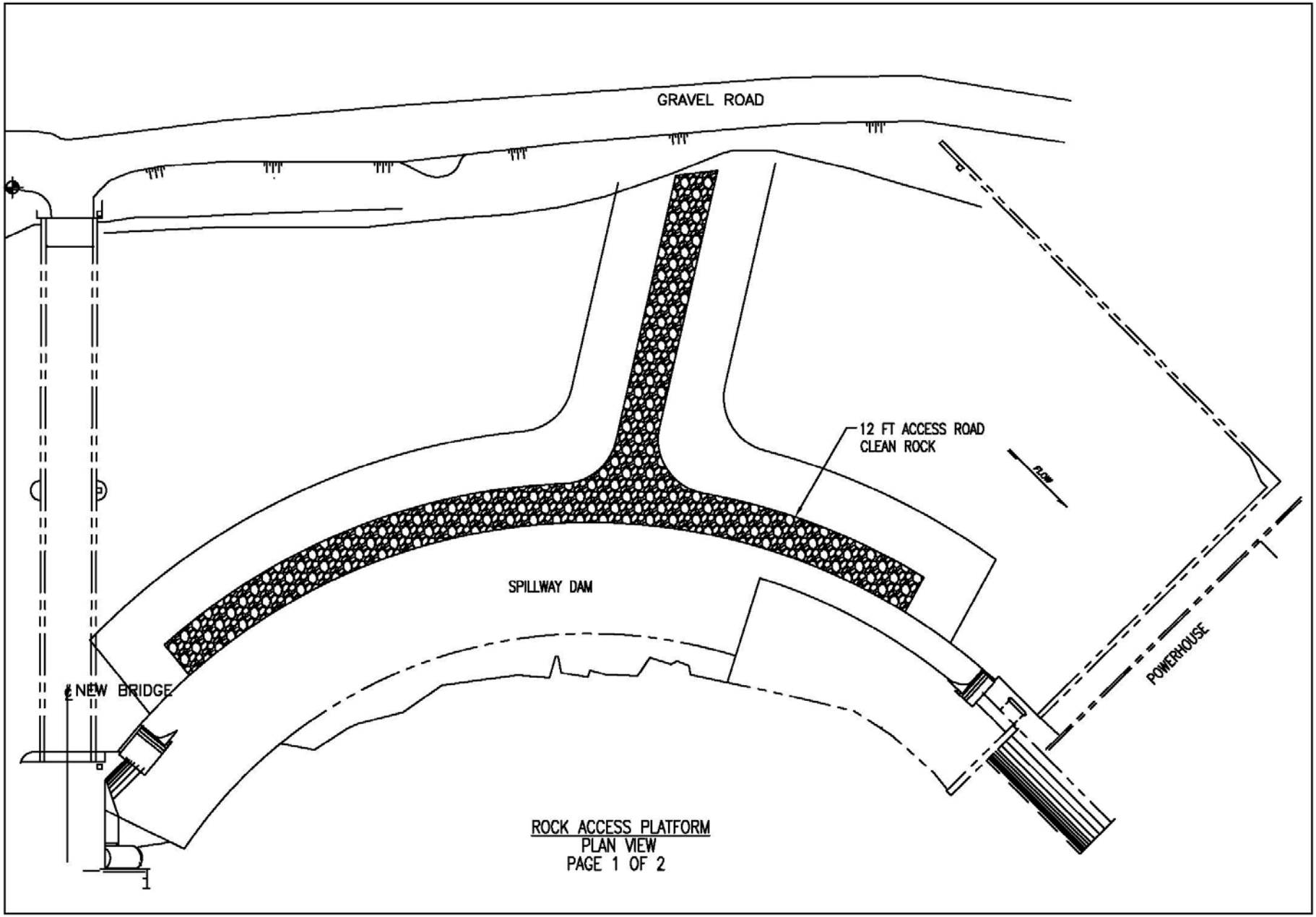

Plan View of the Access Road an Temporary Work Platform	**Scale:**		**Job No.:**	**Figure No.:**
	not to scale		121810326	**3**
	Date:	**Provided By:**	**Appd. By:**	
Client: NB Power Generation Corporation	May 18, 2011	NB Power	SW	

Stantec

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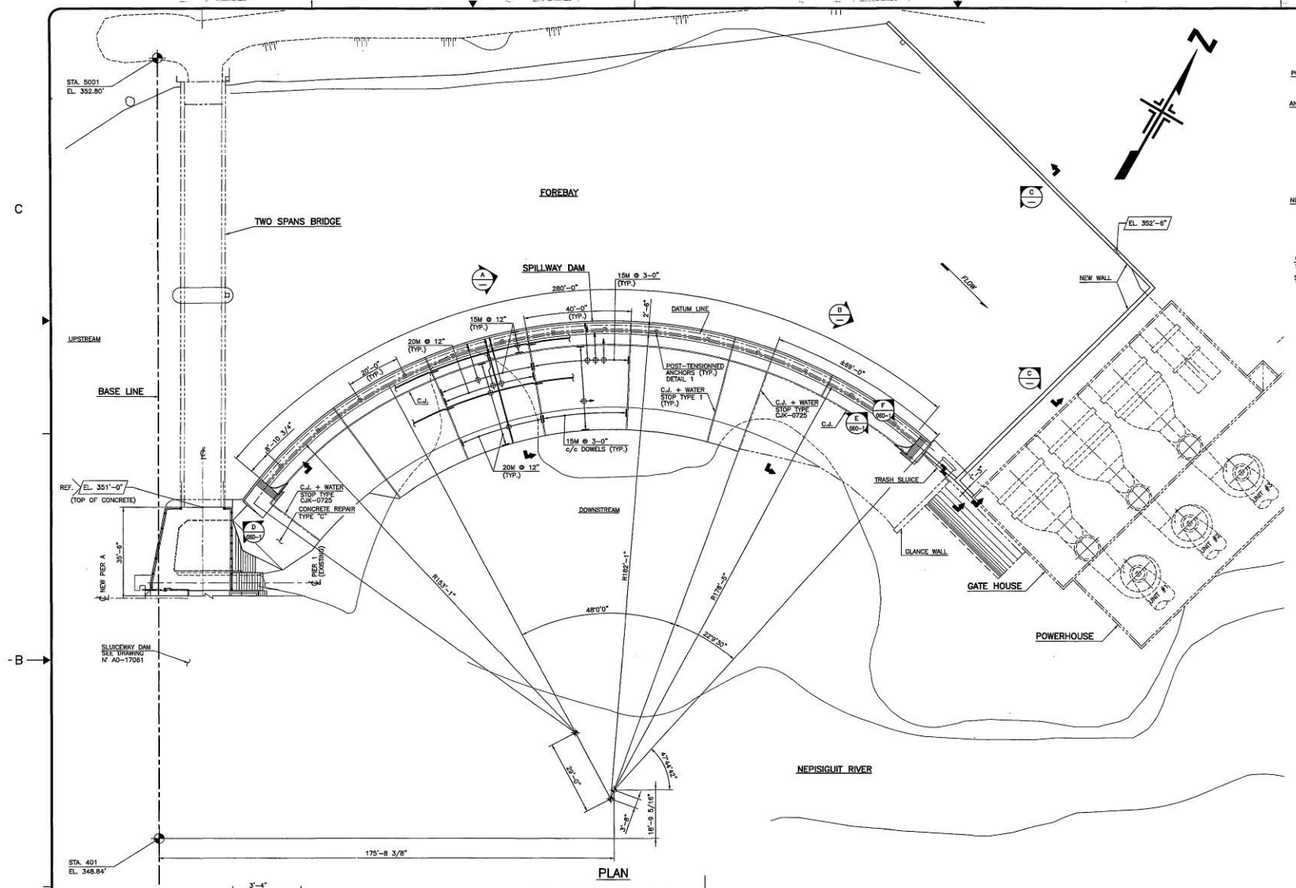
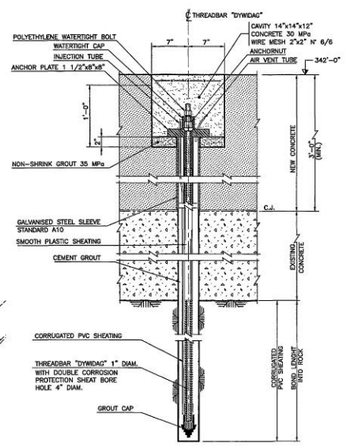
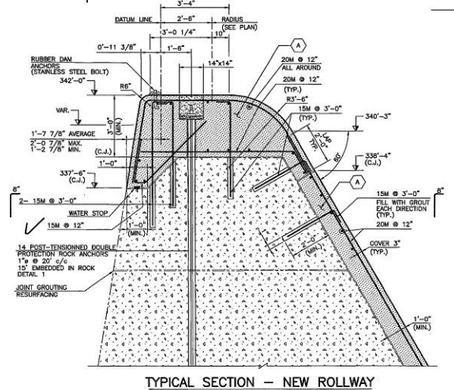
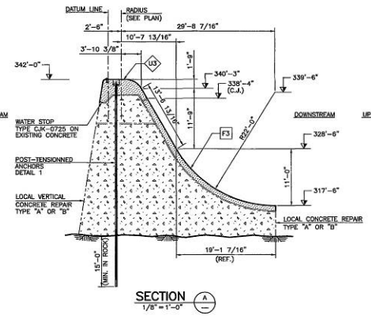


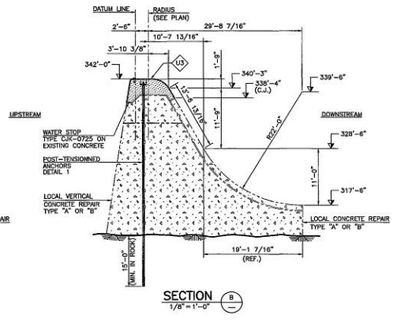


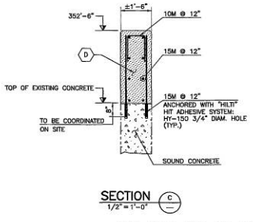
DYWIDAG POST–TENSION ANCHORS ROCK WITH DOUBLE CORROSION PROTECTION DETAIL (1) N.T.S.

N°	Notes or references
1	CONCRETE – CONCRETE MATERIALS AND METHODS OF CONCRETE CONSTRUCTION SHALL CONFORM TO THE REQUIREMENT OF CAN/CSA–A23.1. – ALL CONCRETE CORNER SHALL HAVE 1" x 1" CHAMFER (U.N.O.). – ALL CONCRETE WORK MUST BE TYPE A, UNLESS OTHERWISE SPECIFIED.
2	REINFORCING STEEL – REINFORCING STEEL SHALL CONFORM TO CAN/CSA–G30.18, GRADE 400R (U.N.O.), DEFORMED BARS. – LAP SLICES AND COVERS SHOULD CONFORM TO THE REQUIREMENTS OF CAN/CSA–A23.3. – ALL CONCRETE COVER FOR REINFORCING TO BE 3" PERPENDICULAR TO FACE OF CONCRETE (U.N.O.). – ALL REINFORCING BAR SPLICES AS FOLLOWING (U.N.O.): REINF. SPLICE 15M: 20 in. 20M: 27 in. 25M: 42 in. 30M: 51 in.
3	ACCESSORIES – LATEX ADHESIVE LIKE LATICRETE BY "STERNSON" OR EQUIVALENT APPROVED MUST BE APPLIED BETWEEN THE SURFACE OF EXISTING CONCRETE AND NEW CONCRETE BEFORE CONCRETING. – WATER STOP TYPE 1 (NEW CONCRETE CONSTRUCTION JOINTS): DURAJOINT, TYPE 5A, BY "STERNSON". – WATER STOP (NEW CONCRETE EXISTING CONCRETE JOINT): HYDROTITE CJK–0725 BONDED TO EXISTING CONCRETE WITH LEAK MASTER AND CONCRETE NAILS BY "MULTIMETHANES INC".
4	STRUCTURAL STEEL AND MISCELLANEOUS STEEL – ALL STEEL WORK SHALL CONFORM TO THE REQUIREMENTS OF CAN/CSA–S16.1. – ALL STEEL EXCEPT STEEL DECK SHALL BE GALVANIZED IN THE SHOP ACCORDING TO THE REQUIREMENTS OF CSA G–164 "HOT DIP, GALVANIZATION". THE APPLICATION RATE MUST BE AT LEAST 610 GRAMS PER SQUARE METER. – THE STEEL DECK SHALL CONFORM TO THE REQUIREMENTS OF CSA S–136.
5	AS REQUIRED, INSTALL DRAIN PIPES THRU NEW CONCRETE TO ALLOW FOR EXISTING CONCRETE JOINT DRAINAGE, LOCATION TO BE DETERMINED BY ENGINEER.
6	LOCATION OF POST–TENSION ANCHORS AND CONSTRUCTION JOINTS SHALL BE CONFIRMED ON SITE BY ENGINEER. BASE ON LOCATION OF EXISTING JOINTS, ANCHORS SHALL BE INSTALLED NO LESS THAN 5 FT. FROM EXISTING VERTICAL JOINTS.
7	CONTRACTOR SHALL SUBMIT A CONSTRUCTION PROCEDURE FOR SPILLWAY REPAIR TO CONSULTANT FOR APPROVAL. – IF ANCHOR HOLES ARE DRILLED PRIOR TO CONCRETING AND SLEEVES ARE INSTALLED, CONCRETE MUST HAVE A COMPRESSIVE STRENGTH OF 20 MPa BEFORE POST–TENSIONNING OF ANCHORS. – IF ANCHOR HOLES ARE DRILLED AFTER CONCRETING, CONCRETE MUST HAVE A COMPRESSIVE STRENGTH OF 24 MPa
8	CONTRACTOR SHALL MAKE OWN SURVEY OF EXISTING WORKS AND INFORM "NB POWER" OF ANY DISCREPENCIES ON WHAT IS SHOWN ON DRAWINGS.









LEGEND

(A) TYPE OF CONCRETE

TYPE OF FINISH

N°	Date	Issues and/or revisions	Designed	Rémmed
2	09–09–19	REVISED AND ISSUED FOR CONSTRUCTION – PHASE 2		
1	08–04–19	REVISED AND ISSUED FOR CONSTRUCTION – PHASE 2		
0	99–02–19	ISSUED FOR TENDER		

REVIEWED
REVIEWED AS NOTED
NOT ACCEPTED–RESUBMIT
NOT REVIEWED
INFORMATION ONLY
REFER TO LETTER
DATE 2019-09-23 FOR COMMENTS
BY
REVIEW OF THIS DOCUMENT BY NB POWER DOES NOT RELIEVE THE CONTRACTOR RESPONSABILITY FOR ANY ERRORS OR OMISSIONS.

Énergie NB Power
Production Generation

RSW INC
1010, rue de la Gauchetière ouest, Bureau 500
Montréal (Québec) Canada H3B 0A1
téléphone: (514) 397–0585
télécopieur: (514) 397–0585
courriel: rsw@rswinc.com
consultants en ingénierie • engineering consultants

Project: NEPISIGUIT FALLS GENERATING STATION
SPILLWAY REHABILITATION

Title: SPILLWAY CONCRETE REPAIR WORKS PLAN AND DETAILS

Drawn	C. RACETTE	Checked	R. QUENNEVILLE
Designed	P. CÔTÉ	Checked	A. BERGERON
Approved	C. CHARTRAND	Approved	C. CHARTRAND
Scale factor 1/16"=1'	Scale		Project n°
Dimensions in FEET	0 15 30		P1583
Drawing n°		Drawing n°	Rev.
RSW		AO–17060 Customer	2

D040-29460-7000-009-DP-E-02

AO 1189 x 841

ORIGINAL

Spillway Concrete Repair Works Plan and Details	**Scale:** not to scale	**Job No.:** 121810326	**Drawing No.:** **4**
	Date: May 18, 2011	**Provided By:** NB Power	**Appd. By:** SW
Client: NB Power Generation Corporation			

Stantec

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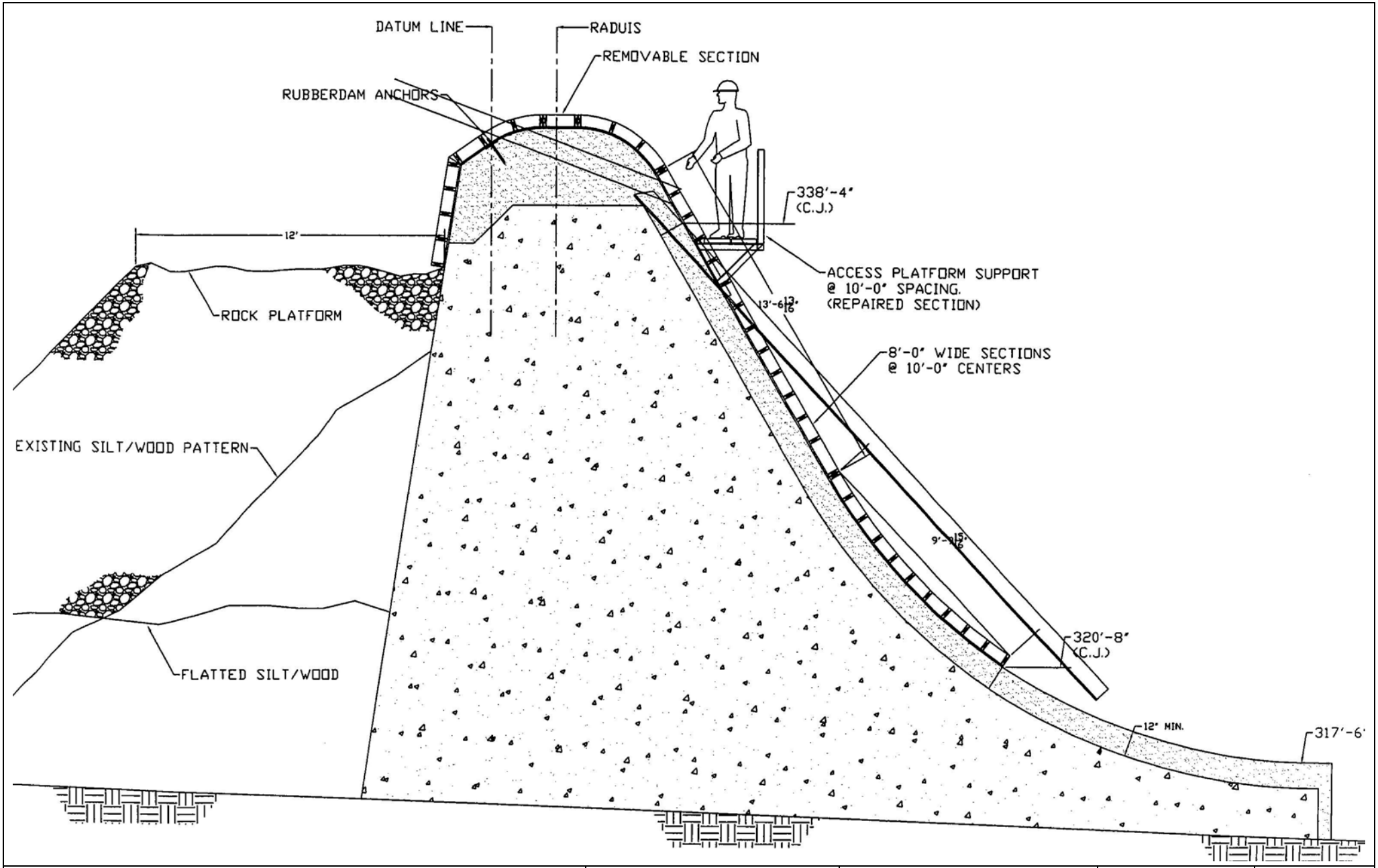

Cross Section of the Spillway Concrete Repairs	Scale:	Job No.:	Figure No.:
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	Date:	Provided By:	Appd. By:
Client: NB Power Generation Corporation	May 18, 2011	NB Power	SW

Stantec

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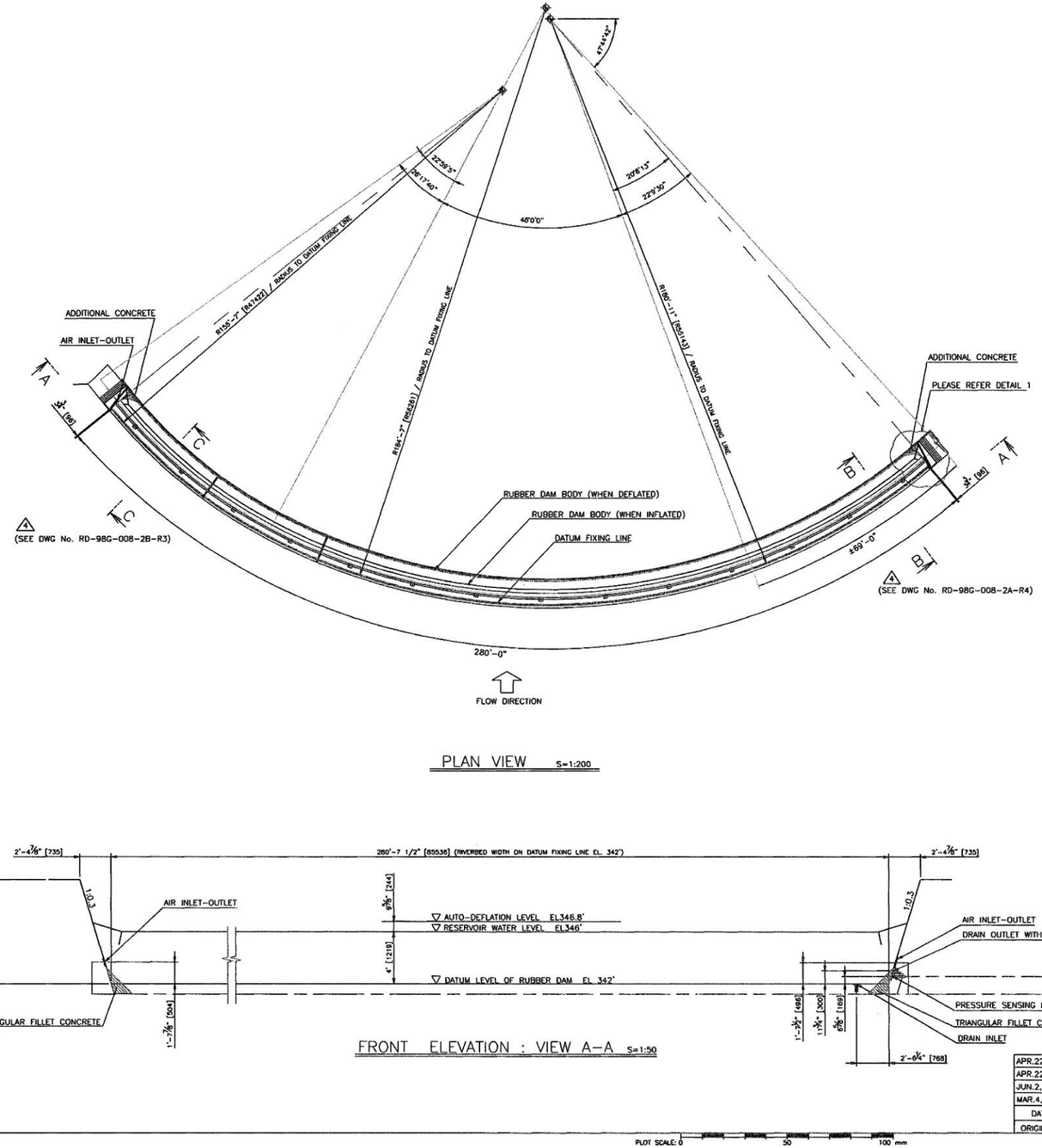
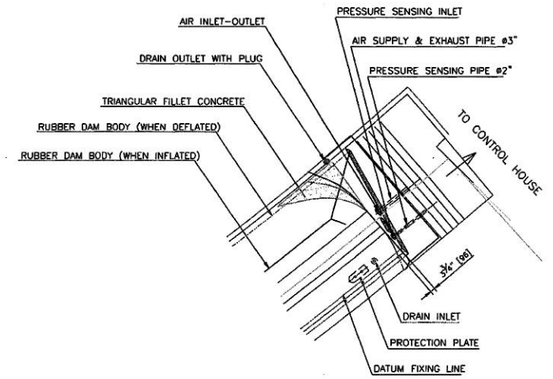


NOTE :

1. AIR PIPE RUNS TO BE KEPT HORIZONTALLY OR UP-SLOPED TOWARDS CONTROL HOUSE.
2. PRESSURE PIPE RUNS TO BE KEPT HORIZONTALLY OR UP-SLOPED TOWARDS CONTROL HOUSE.
3. DO NOT LEAVE ANY LOW POINT IN BETWEEN PIPELINE UP TO CONTROL HOUSE TO PREVENT THE PIPELINE FROM BLOCKAGE BY CONDENSATION.
4. SCOPE OF SUPPLY : BRIDGESTONE SUPPLY THE SPECIAL FLANGES INCLUDING AIR INLET-OUTLET FLANGE, PRESSURE SENSING INLET, DRAIN INLET, DRAIN OUTLET WITH PLUG AND WATER INTAKE SCREEN TOGETHER WITH 300mm LONG STUB PIPE.
5. OTHER INTERCONNECTION PIPES TO BE SUPPLIED BY OTHERS.
6. PIPE LAYOUT ARE FOR REFERENCE ONLY.
7. DIMENSIONS IN BRACKET [ ] ARE FOR REFERENCE ONLY.
8. ALL UNITS SHOWN IN FT-IN, (mm) FORMAT.
9. THE ACCURACY & INSTALLATION WORKMANSHIP OF ALL PIPINGS SHALL BE RESPONSIBILITY OF THE CONTRACTOR. THIS INCLUDES ENSURING MEASURES TAKEN TO PREVENT PIPING SETTLEMENT RESULTING FROM CONSTRUCTION WORKS & PIPING PROTECTION FROM NEARBY STRUCTURES.
10. ACTUAL RD LENGTH SHALL BE DECIDED AFTER THE SURVEY ON THE EXISTING SPILLWAY.
11. THE RUBBER DAM SHALL BE IN DEFLATED CONDITION WHENEVER AMBIENT TEMPERATURE REACHES BELOW -30 DEGREES CELCIUS.



DETAIL 1 S=1:50

APR.22,2008	4	LABEL	SRI	CHARHWEE CHARHWEE
APR.22,2008	3	FOUNDATION RADIUS, DIMENSIONS	SRI	CHARHWEE CHARHWEE
JUN.2, 2005	2	PIPE ROUTE & OTHERS	SRI	CHARHWEE TT WANG
MAR.4, 2005	1	DAM LENGTH AND OTHERS	SRI	TT WANG CHARHWEE
DATE	No.	REMARKS	APPROVED	CHECKED REVISED
ORIGINAL	No.			

0400-294100-7002-005-DD-E-01

FOR BATHURST (SPAN #1)

SUBJECT RUBBER DAM PLAN VIEW & FRONT ELEVATION

DATE	FEB 9, 1998	SCALE	AS SHOWN
APPROVED		CHECKED	DESIGNED
Y.ENAMI		A.FOONG	SW.LEONG

DWG No. RD-98G-008-1-R4

BRIDGESTONE CORPORATION

ORIGINAL

Plan View and Front Elevations of the Rubber Dam	**Scale:** not to scale	**Job No.:** 121810326	**Drawing No.:** 6
	Date: May 18, 2011	**Provided By:** NB Power	**Appd. By:** SW
Client: NB Power Generation Corporation			

Stantec

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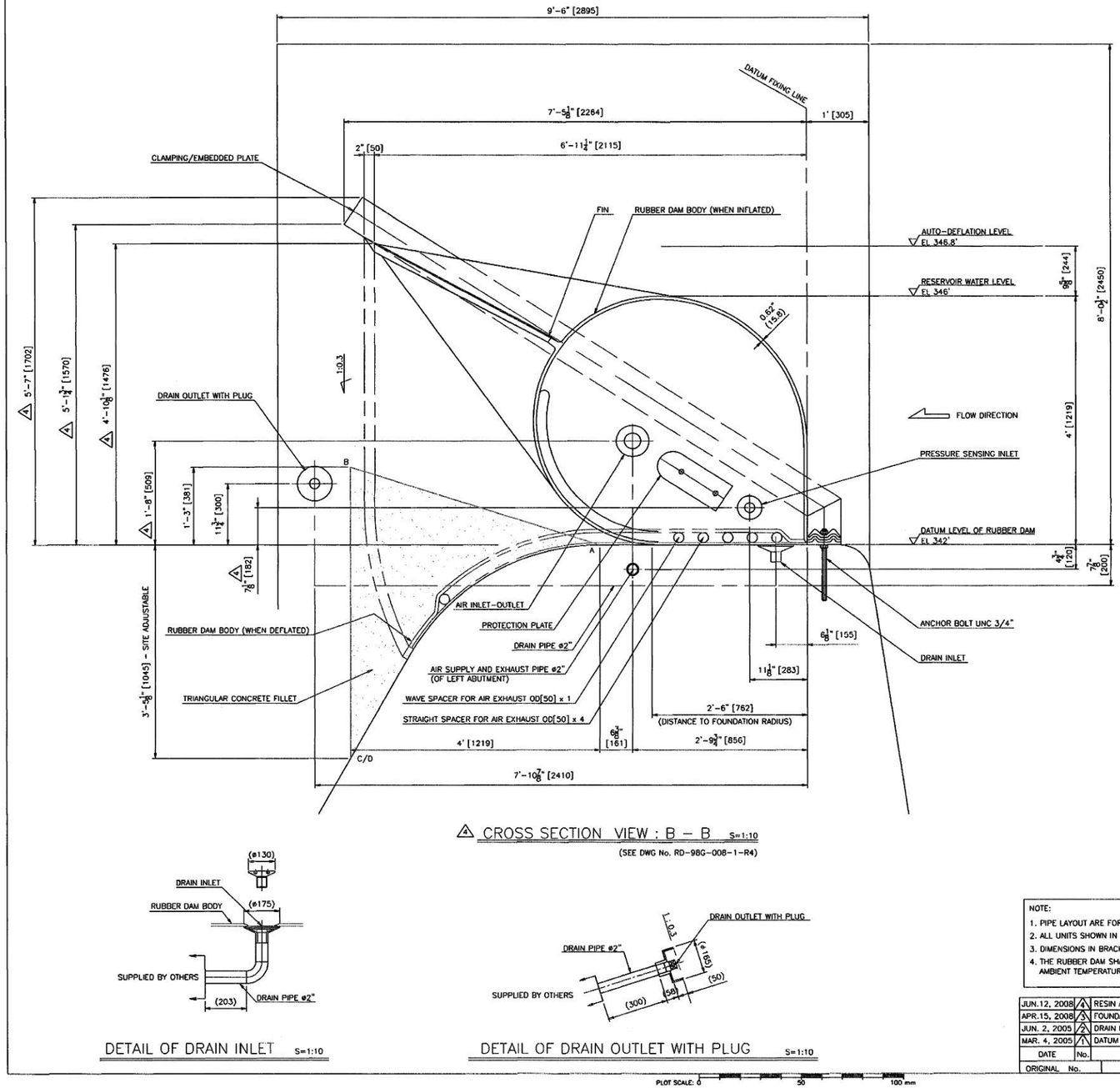


⚠ CROSS SECTION VIEW : B – B S=1:10

(SEE DWG No. RD-98G-008-1-R4)

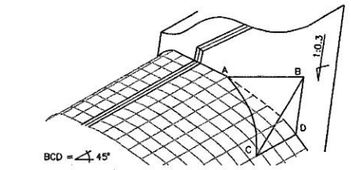
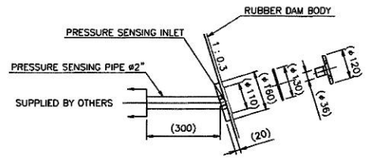
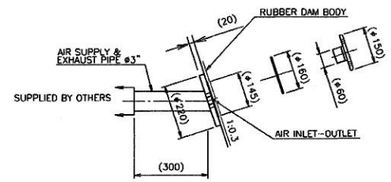


ILLUSTRATION OF TRIANGULAR FILLET CONCRETE S=NONE



DETAIL OF PRESSURE SENSING INLET S=1:10



DETAIL OF AIR INLET-OUTLET S=1:10

DETAIL OF DRAIN INLET S=1:10

DETAIL OF DRAIN OUTLET WITH PLUG S=1:10

PLOT SCALE: 0 50 100 mm

NOTE:
1. PIPE LAYOUT ARE FOR REFERENCE ONLY.
2. ALL UNITS SHOWN IN FT-IN, (mm) FORMAT.
3. DIMENSIONS IN BRACKET [ ] ARE FOR REFERENCE ONLY.
4. THE RUBBER DAM SHALL BE IN DEFLATED CONDITION WHENEVER AMBIENT TEMPERATURE REACHES BELOW -30 DEGREES CELCIUS.

DATE	No.	REMARKS	APPROVED	CHECKED	REVISED
JUN.12, 2008	4	RESIN ANCHOR & DIMENSIONS	SRI	CHARHWEE	CHARHWEE
APR.15, 2008	3	FOUNDATION & DIMENSIONS	SRI	CHARHWEE	CHARHWEE
JUN. 2, 2005	2	DRAIN INLET & OTHERS	SRI	CHARHWEE	TT WANG
MAR. 4, 2005	1	DATUM FIXING LINE AND OTHERS	SRI	TT WANG	CHARHWEE
ORIGINAL	No.				

8890-29400-7002-0001-RD-E-01

FOR: BATHURST (SPAN #1)

SUBJECT: RUBBER DAM CROSS SECTION – 1/2

DATE	FEB 9, 1998	SCALE	AS SHOWN
APPROVED		CHECKED	DESIGNED
Y. ENAMI		A. FOONG	SW. LEONG

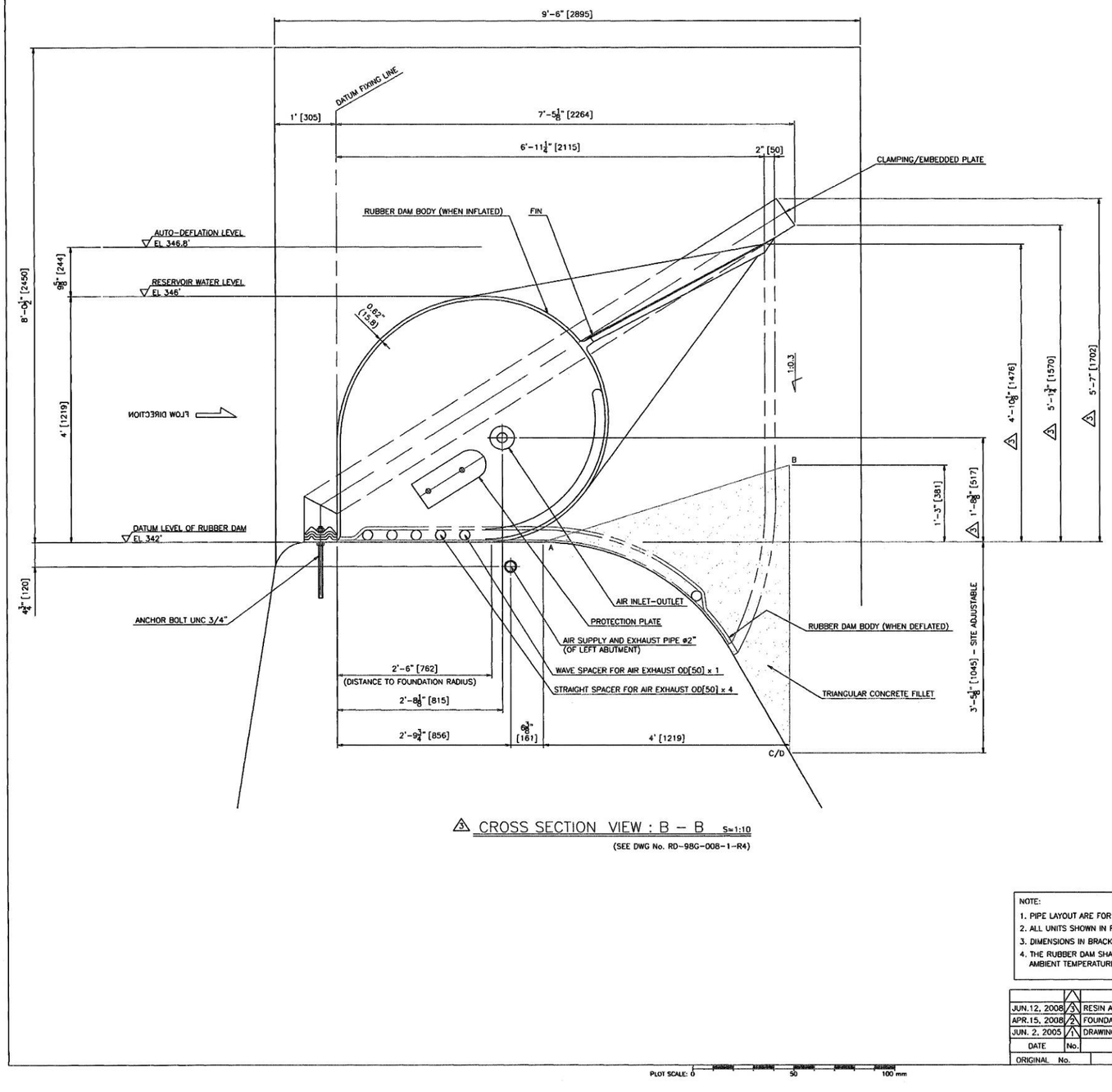
DWG No. RD-98G-008-2A-R4

BRIDGESTONE CORPORATION

ORIGINAL

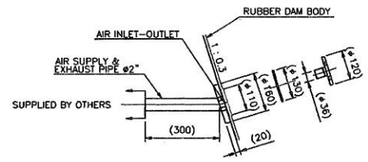
Cross Section of the Rubber Dam 1 of 2	**Scale:** not to scale	**Job No.:** 121810326	**Drawing No.:** **7a**
	Date: May 18, 2011	**Provided By:** NB Power	**Appd. By:** SW
Client: NB Power Generation Corporation			

Stantec



③ CROSS SECTION VIEW : B – B S=1:10

(SEE DWG No. RD-98G-008-1-R4)



DETAIL OF AIR INLET-OUTLET S=1:10

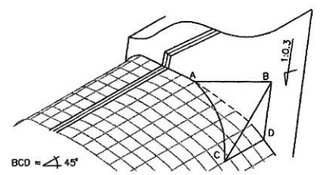


ILLUSTRATION OF TRIANGULAR FILLET CONCRETE S=NONE

NOTE:
1. PIPE LAYOUT ARE FOR REFERENCE ONLY.
2. ALL UNITS SHOWN IN FT-IN. (mm) FORMAT.
3. DIMENSIONS IN BRACKET [ ] ARE FOR REFERENCE ONLY.
4. THE RUBBER DAM SHALL BE IN DEFLATED CONDITION WHENEVER AMBIENT TEMPERATURE REACHES BELOW -30 DEGREES CELCIUS.

JUN.12, 2008	3	RESIN ANCHOR & DIMENSIONS	SRI	CHARHWEE	CHARHWEE
APR.15, 2008	2	FOUNDATION & DIMENSIONS	SRI	CHARHWEE	CHARHWEE
JUN. 2, 2005	1	DRAWING NUMBERING	SRI	CHARHWEE	TT WANG
DATE	No.	REMARKS	APPROVED	CHECKED	REVISED
ORIGINAL	No.				

0890-294400-7002-002 - DB-E-01

FOR: BATHURST (SPAN #1)

SUBJECT: RUBBER DAM CROSS SECTION – 2/2

DATE	MAR. 4, 2005	SCALE	AS SHOWN
APPROVED		CHECKED	DESIGNED
SRI		TT WANG	CHARHWEE
DWG No.	RD-98G-008-2B-R3		

BRIDGESTONE CORPORATION

ORIGINAL

PLOT SCALE: 0 50 100 mm

Cross Section of the Rubber Dam **Drawing 2 of 2**	**Scale:** not to scale	**Job No.:** 121810326	**Drawing No.:** **7b**
	Date: May 18, 2011	**Provided By:** NB Power	**Appd. By:** SW
Client: **NB Power Generation Corporation**			

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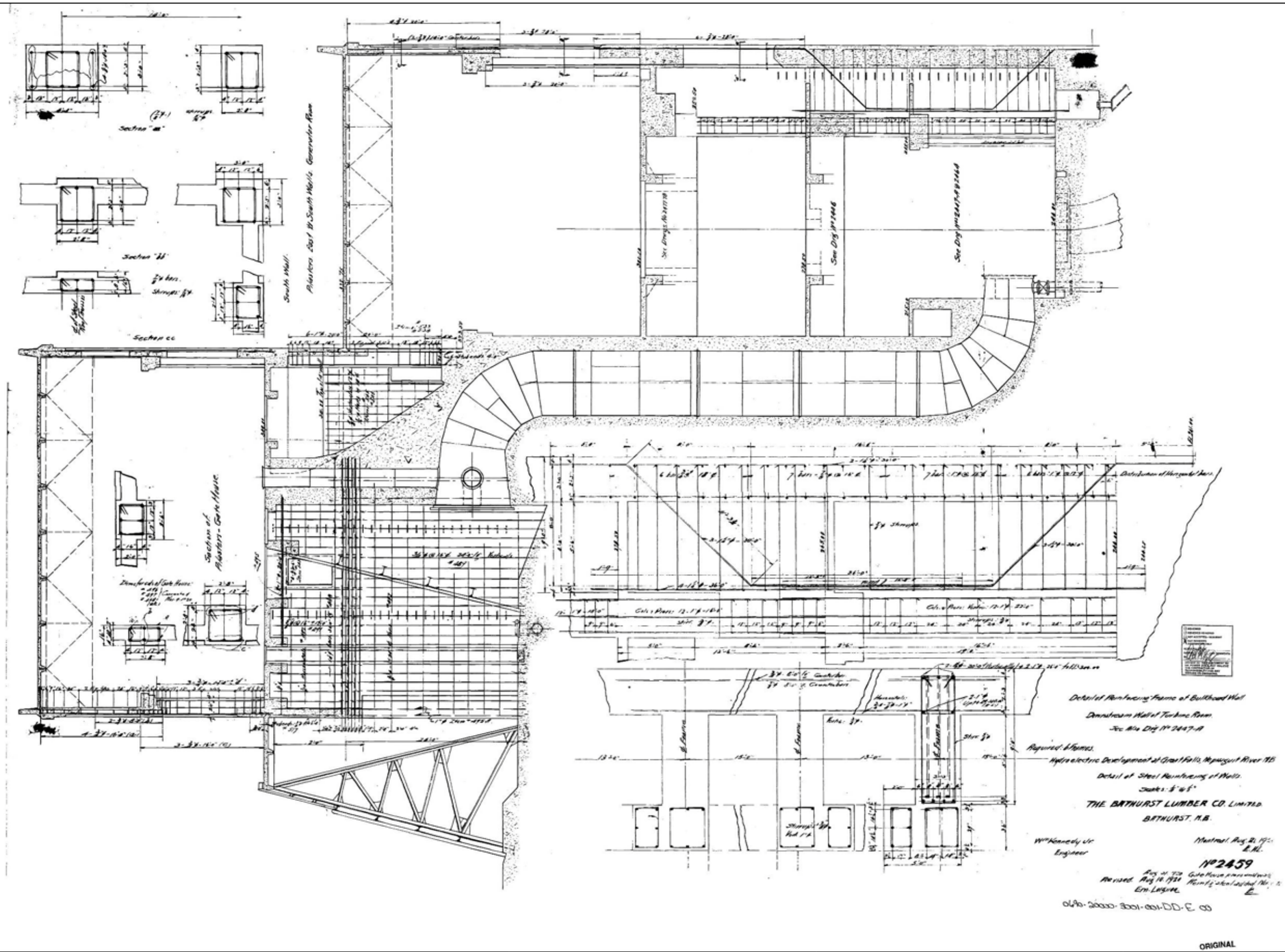

Schematic of Nepisiguit Falls Generating Station	**Scale:**		**Job No.:**	**Drawing No.:**
	n/a		121810326	**8**
	Date:	**Provided By:**	**Appd. By:**	
Client: **NB Power Generation Corporation**	May 18, 2011	NB Power	SW	

Stantec

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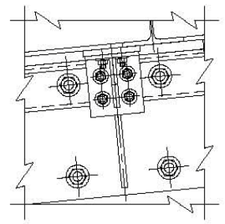
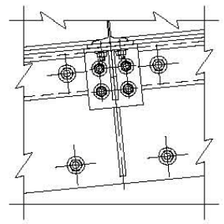
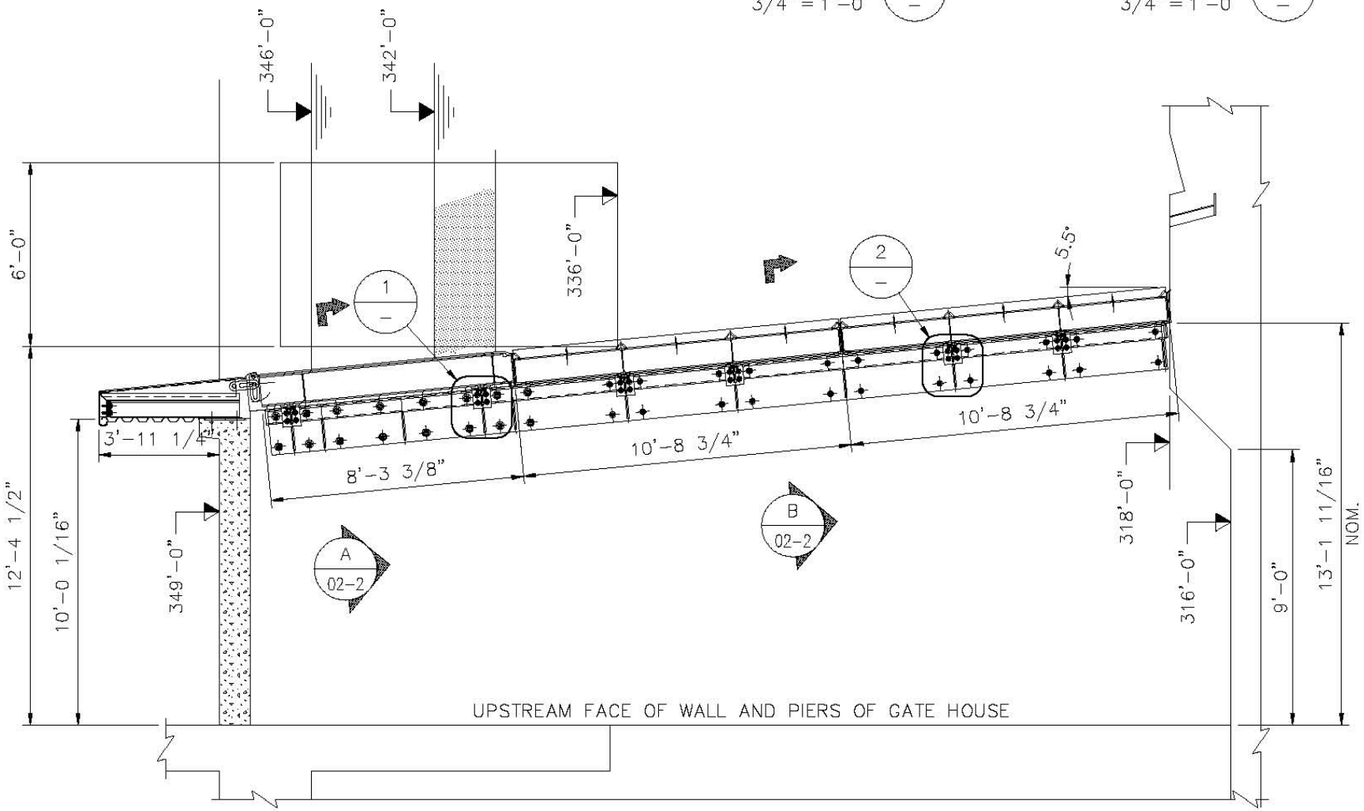


DETAIL 1
3/4" = 1'-0



DETAIL 2
3/4" = 1'-0



SIDE VIEW
1/4" = 1'-0"

DRAFT

Énergie NB Power
Production Generation

AECOM
1010, DE LA GAUCHETIÈRE OUEST SUITE 1400, MONTRÉAL (QUÉBEC) CANADA H3B 0A1
TEL. : 514 287-8500 TÉLÉC. : 514 287-8500 www.aecom.com

Project: NEPISIGUIT GENERATING STATION

Title: INTAKE REHABILITATION
GENERAL ARRANGEMENT
SIDE VIEW AND SECTIONS

Drawn	A. LAVCHEV	Checked	
Designed	M. DESLOGES	Checked	
Approved		Approved	

Scale factor: Dimensions in ft
Scale 1/4"=1'
P48_0901

Client	Sector	Project	Drawing no	Sheet	Mod. Rev.
	48	0901	LZ02	1 of 2	0

B 11" x 17"

Plan View of Trash Rack and Intake Replacement	**Scale:** n/a	**Job No.:** 121810326	**Drawing No.:** **9a**
	Date: June 6, 2011	**Provided By:** NB Power	**Appd. By:** SW
Client: NB Power Generation Corporation			

Stantec

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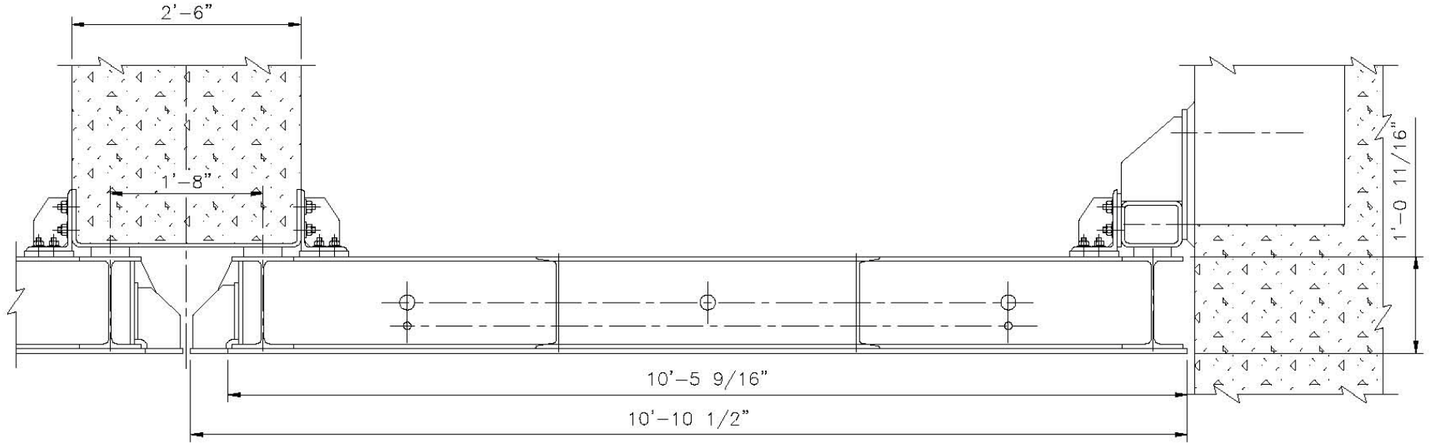
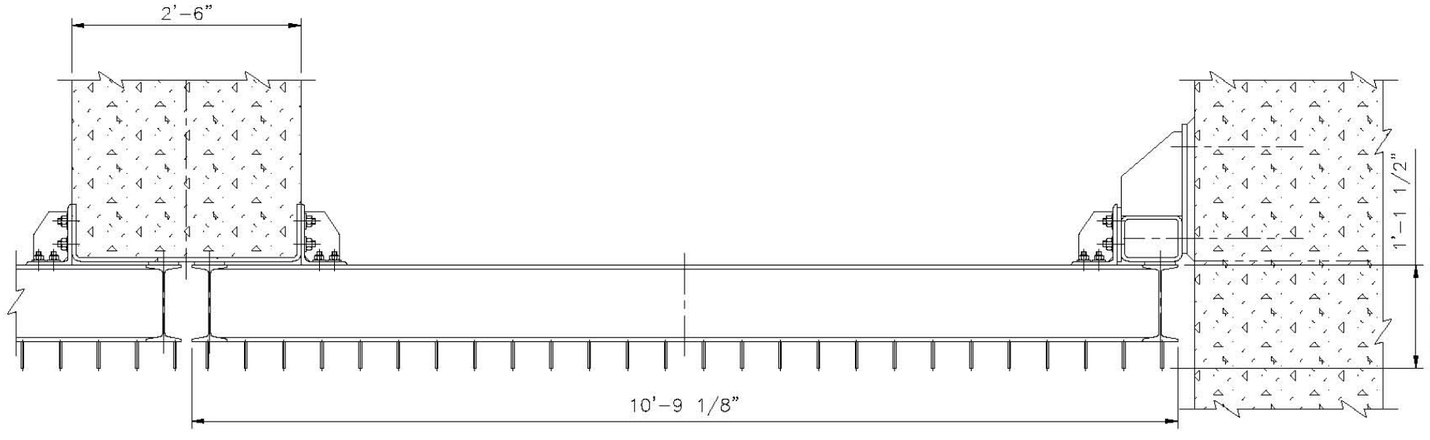


SECTION A / 02-1
3/4" = 1'-0"
ICE SHEILD

DRAFT



SECTION B / 02-1
3/4" = 1'-0"
TRASH RACKS

Énergie NB Power
Production Generation

AECOM
1010, DE LA GAUCHETIERE OUEST SUITE 1400, MONTREAL (QUEBEC) CANADA H3B 0A1
TEL. : 514 287-8500 TELEC. : 514 287-8500 www.aecom.com

Project: NEPISIGUIT GENERATIONG STATION

Title: INTAKE REHABILITATION
GENERAL ARRANGEMENT
SIDE VIEW AND SECTIONS

Drawn	A. LAVCHEV	Checked	
Designed	M. DESLOGES	Checked	
Approved		Approved	
Scale factor	Scale 3/4"=1'		P48_0901
Dimensions in ft			

Client	Sector	Project	Drawing no	Sheet	Mod. Rev.
	48	0901	LZ02	2 of 2	0

B 11" x 17"

Cross Section of Trash Rack and Intake Placement	**Scale:** n/a	**Job No.:** 121810326	**Drawing No.:** **9b**
	Date: June 6, 2011	**Provided By:** NB Power	**Appd. By:** SW
Client: NB Power Generation Corporation			

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Appendix D

NB Power's Watercourse and Wetland Alteration Permit

New Nouveau Brunswick

PERMIT FOR WATERCOURSE AND WETLAND ALTERATION
ALT 31667'10 Original

(Regulations 90-80 under the Clean Water Act Chapter C-6.1, Act of New Brunswick 1989)

PERMITTEE NB Power **ADDRESS** 515 King St.
Fredericton , NB E3B 1E7

(506)458-6655

LOCATIONS

Easting	Northing	Datum	Zn	Easting	Northing	Datum	Zn
see description below...							

Affected Watercourse/Tributary: Various

Affected Regions: ENV - 4, 5, 6, 1 **DFO -** FUNDY, GULF **DNR -** 1, 3, 4

1:50,000 Maps - Various **County -** Various **Parish -** Various

PERMIT VALID FOR THIS PERIOD FROM 2010/12/15 (yyyy/mm/dd) TO 2011/12/31 (yyyy/mm/dd)

Description of Watercourse/Wetland Alteration(s):

This project consists of the following: (1) placing rip-rap along the areas of the headpond/reservoir of NB Power Generation's 6 hydro generating facilities wherever necessary to repair erosion to private property that borders these waterbodies, due to ice and wave action; (2) carrying out annual maintenance on the Keswick Island causeways; (3) cutting and/or disposing of dead, undermined, blown down and nonviable trees that have the potential of falling into or being washed into a headpond/reservoir by floodwaters; (4) removing deadheads, driftwood and floating debris from these headponds/reservoirs and depositing it at designated land based sites for disposal and; (5) making necessary infrastructure repairs to these 6 hydro generating facilities and the dams on the outlet of 4 lakes used as storage reservoirs and their appurtenant control/monitoring equipment, in order to maintain system reliability.

The Permittee may undertake only those Watercourse/Wetland Alteration(s) described above hereby approved by the Minister. Refer to Conditions of Approval stated on the attached Document "A". Responsibility for any action arising from any watercourse/wetland alteration must be borne by the Permittee and no liability shall be incurred by the Minister or the Department. This permit does not exempt or exclude the Permittee from the provisions of any Act of the Legislature of New Brunswick or of Canada to serve as legal defense to any action commenced by landowners who are adversely affected by the alteration.

Number of conditions attached to this permit: 23

Date of Issuance: 2010/12/15 (yyyy/mm/dd)

Minister of Environment

NB Power
515 King St.
Fredericton , NB E3B 1E7

DOCUMENT "A" Attached to ALT 31667'10 Original
CONDITIONS OF APPROVAL

(Regulations 90-80 under the Clean Water Act Chapter C-6.1, Act of New Brunswick 1989)

(1) that any debris and excavated material be removed from the watercourse/wetland and adjacent areas and disposed of, or placed in a manner where it cannot be returned to the watercourse/wetland;

(2) that all necessary precautions be taken to prevent discharge or loss of any harmful material or substance into the watercourse/wetland; including but not limited to creosote, hydrocarbons, biocides, fresh cement, lime, paint or concrete;

(3) that exposed material resulting from cut and fill operations be stabilized against erosion immediately upon completion of the project to reduce siltation of the watercourse/wetland, unless stated otherwise in these "Conditions of Approval";

(4) that machinery and pollutants be located or stored in areas not in danger of floodwaters;

(5) that the permittee ensure that a copy of this permit (including the conditions of approval) is kept at the alteration site for the duration of the project, and such copy shall be produced by the permittee upon the request of an inspector designated to act on behalf of the Minister of Environment, or an employee of the federal Department of Fisheries and Oceans Canada;

(6) that an annual report of the work which has been carried out each year and a summary of the work planned for the following year shall be submitted to the New Brunswick Department of the Environment anually;

(7) that all in-water work shall be carried out between June 1st and September 30th only;

(8) that no temporary access roads shall be constructed or temporary culverts shall be installed to facilitate the activities covered by this permit without prior approval from the New Brunswick Department of the Environment;

(9) that driftwood shall not be buried in an area over which surface runoff will drain unchecked, into a watercourse and all exposed erodible backfill must be levelled off, smooth graded and either hydroseeded or seeded by conventional means and blanketed with hay/straw mulch immediately following completion of the burial of the material at each site;

(10) that rip-rap and armour stone shall be clean, durable, non-ore-bearing, non-toxic rock obtained from a non-watercourse source;

(11) that the armour stone/rip-rap shall not be dumped or pushed over the bank but either lowered in place with a machine capable of controlling the dropping of the rock or placed from the base of the bank by equipment stationed on a barge;

(12) that all repairs/upgrades to the infrastructure and appurtenant control/monitoring equipment of these hydro generating facilities and the dams on the outlet of the lakes used as storage reservoirs, shall be carried out in isolation of the water being impounded by or discharged through the control structure;

(13) that turbid water from dewatering operations be routed through a settling pond or over existing vegetation sufficient in distance from the waterbody to ensure that the level of suspended solids in the water column does not increase more than 25 milligrams per litre above background levels;

(14) that any fish trapped when isolating a work area from the remainder of the submerged footprint of the waterbody, shall be immediately captured alive and relocated out of harms way;

(15) that sediment control works be installed at the onset of work at a facility, added wherever necessary to control sedimentation, and maintained such that it performs it's intended function throughout the project;

(16) that the applicant take necessary steps to ensure that his/her actions, and/or those of his/her agent, do not result in noticeable suspened solids in a waterbody as a result of the activities covered by this permit;

(17) that none of the danger trees, driftwood, deadheads and floating woody debris shall be buried at the sites where the material is removed from the headponds and all the chips stockpiled during chipping operations shall be removed from these sites prior to the chipper leaving a site;

(18) that the equipment operating adjacent to and/or reaching into a waterbody must be mechanically sound, not leaking fuel or hydraulic fluid and shall be pressure washed free of petroleum products and dirt;

(19) that all materials and equipment used to carryout these undertakings shall be stored and operated/parked in a manner that minimizes the chances of any deleterious substances (e.g. petroleum products, silt, etc.) entering a waterbody;

(20) that all spoil material generated during these undertakings shall be trucked off-site and disposed of at an approved disposal facility;

(21) that each day that work has been performed, temporary siltation prevention measures shall be in place when the permittee's or their agent's personnel leave a jobsite where erodible soil is exposed, whenever siltation control works have failed or are not functioning properly, no further work shall take place until the problem is corrected;

(22) that prior approval be obtained from the New Brunswick Department of the Environment before the water level in a storage reservoir or headpond is lowered below the normal operating range for the June 1st through September 30th, low risk, construction period;

(23) that prior approval be obtained from the New Brunswick Department of the Environment before undertaking any repairs to a water level control structure that require a reduction in the downstream maintenance flow, below the current minimum discharge that has been agreed to by Fisheries and Oceans Canada or voluntarily adopted;