

Ontario Power Generation

# **Proposed Stinson Generating Station Life Extension Project (Final Draft)**

**Aquatic Environment  
Technical Support Document**

January 2025

# Proposed Stinson Generating Station Life Extension Project

## Aquatic Environment Technical Support Document (Final Draft)

January 2025

**Prepared By:**

C. Portt and Associates with support from  
Arcadis Canada Inc.  
8133 Warden Ave. Unit 300  
Markham  
Ontario L6G 1B3  
Phone: 905 764 9380

**Prepared For:**

Ed Naval  
Ontario Power Generation Inc.  
800 Kipling Avenue  
Toronto, ON  
M8Z 5G4

**Our Ref:**

30109292-000-00007

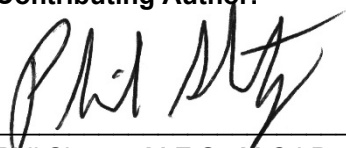
**Main Author:**



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George Coker  
Cam Portt  
C. Portt and Associates

**Contributing Author:**



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Phil Shantz, M.E.S., M.C.I.P., R.P.P.  
Environmental Value Proposition Leader  
Environmental Planning

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## APPENDICES

Appendix A: Initial Fish and Fish Habitat Investigations in Support of the Engineering Assessment of Development Options for the Stinson GS, Wanapitei River

Appendix B: 2022 Walleye Spawning and Habitat Investigations for the Stinson GS, Wanapitei River

Appendix C: 2023 Walleye Spawning and Habitat Investigations for the Stinson GS, Wanapitei River

## Executive Summary

An environmental assessment is not required for the Stinson Generating Station (GS) Life Extension Project. An environmental assessment is not required in Ontario for waterpower facilities when the re-developed facility has its capacity restricted to an increase of 25% or less than the existing one. The existing Stinson GS has a capacity of 5.4 megawatts (MW) while the planned facility will have a capacity of 6 MW. This increase can be accomplished through a negligible change in the flow through the turbines of 43.4 cubic meters per second (cms) to 43.5 cms.

While an environmental assessment is not required on the project an assessment of aquatic environment conditions, potential environmental impacts and proposed mitigation and monitoring measures are described in this Aquatic Environment Technical Support Document in order to: support discussions with government agencies on aquatic environment issues, Indigenous engagement, and provide direction to OPG, its Owner's Engineer and its constructor contractor on necessary aquatic environment considerations including construction stage mitigation and monitoring measures.

This Report describes the fieldwork undertaken including walleye spawning, fish habitat and fish community surveys. The results of these studies are presented and form part of the description of the local environment. This Report also contains detailed mitigation and monitoring measures to eliminate and lessen potential environmental effects on the aquatic environment. The mitigation and monitoring measures proposed are very similar in scope and detail to the measures proposed for the Coniston Generating Station Life Extension Project. With one constructor proposed for the two projects and with two closely located and similarly sized sites, it is recognized that common mitigation and monitoring measures are likely going to be easier to understand and implement.

Fewer environmental effects are expected with the revised version of this project than identified in Draft #1. The project has been revised eliminating the need for a downstream cofferdam, the use of explosives and any other in-water work.

This Report is a Final Draft.

# 1 Introduction

An environmental assessment is not required for the Stinson Project. An environmental assessment is not required in Ontario for waterpower facilities when the re-developed facility has its capacity restricted to an increase of 25% or less than the existing one. The existing Stinson GS has a capacity of 5.4 MW while the planned facility will have a capacity of 6 MW. This increase can be accomplished through a negligible change in the flow through the turbines of 43.4 cubic meters per second (cms) to 43.5 cms. While an environmental assessment is not required on the project an assessment of aquatic environment conditions, potential environmental impacts and proposed mitigation and monitoring measures are described in this Aquatic Environment Technical Support Document in order to:

- Support applications and discussions with DFO on construction and operation aspects of the Stinson GS Life Extension Project (SGSLEP).
- Support discussions with Indigenous Peoples on aquatic environment issues.
- Provide direction to OPG, its Owner's Engineer and its constructor contractor on necessary aquatic environment considerations including construction stage mitigation and monitoring measures.

In the absence of an environmental assessment process, this report is being prepared for OPG and therefore doesn't necessarily follow the format of standard environmental assessment reports. This Report is comprised of the following chapters.

- Chapter 1 – Introduction. This chapter describes the purposes, rationale and organization of this Report.
- Chapter 2 – Project Description. This chapter describes the project.
- Chapter 3 – Description of the Environment. This chapter describes and/or references where a description of the aquatic environment or components of the environment can be found.
- Chapter 4 – Environmental Effects, Mitigation and Monitoring. This chapter describes likely environmental effects and the proposed mitigation and monitoring measures.
- Chapter 5 – Summary and Conclusions.
- Chapter 6 – References.

## **2 Project Description**

### **2.1 Introduction**

OPG has spent the past few years planning the life extension of the Stinson Generating Station (GS). The original station was constructed in 1925 and therefore is close to 100 years old and is at the end of its service life (normally considered to be 90 years). OPG is planning on refurbishing the existing GS and installing two new turbine units.

OPG would note that OPG is also currently working on the life extension of the Coniston GS which is located downriver of Stinson GS.

### **2.2 Location of the Project**

Stinson GS is located within the boundary of the City of Greater Sudbury. The GS is located on the Wanapitei River approximately 25 kilometres east of the city centre of Sudbury and approximately 20 km downstream of the Wanapitei Lake control dam. The Wanapitei River is a tributary of the French River and has its headwaters north of Stinson with the first large waterbody being Wanapitei Lake. The Stinson GS is upstream of OPG's Coniston GS and downstream of Moose Rapids GS, which is privately owned (see Figure 2-1).



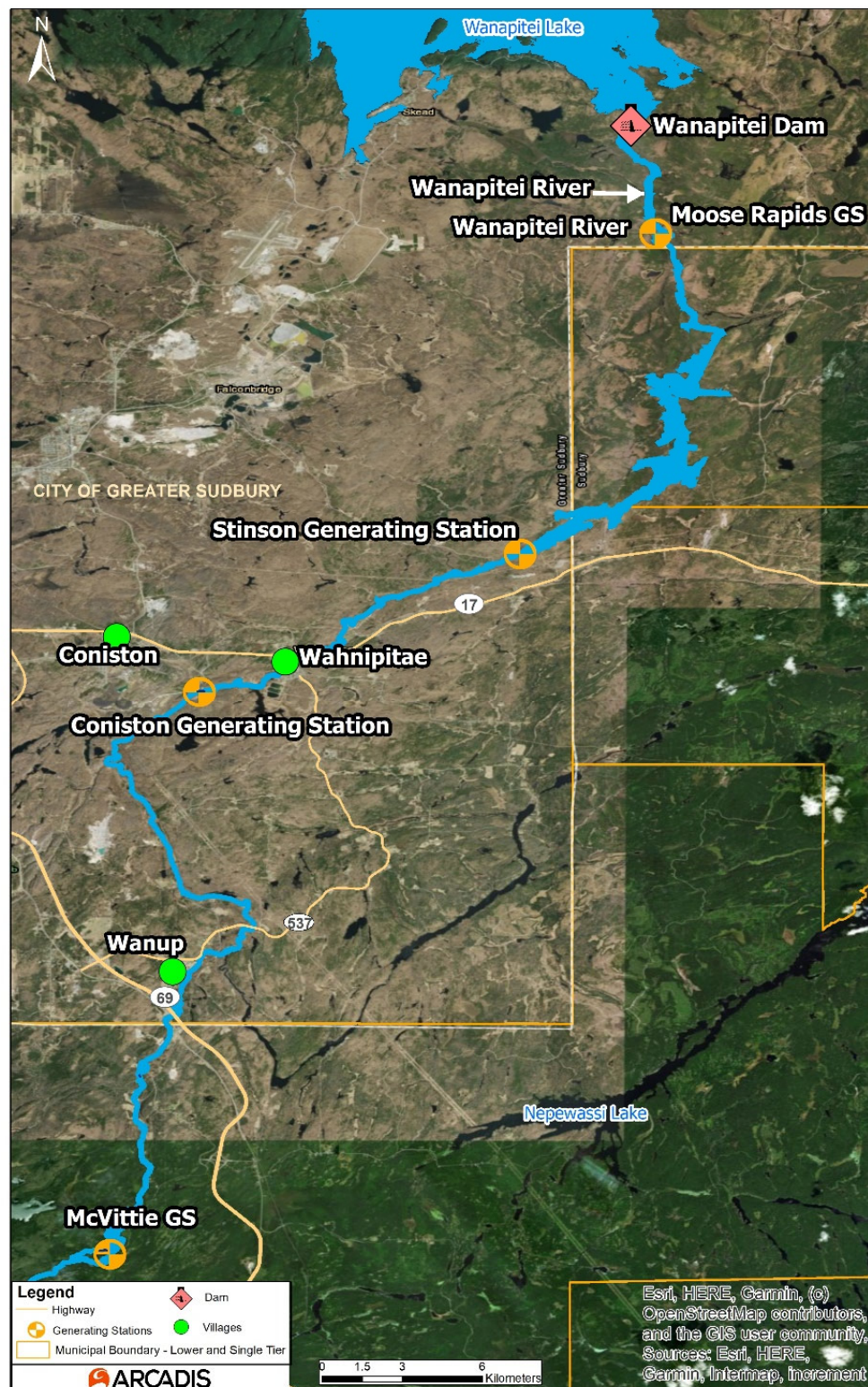


Figure 2-1 Location of the Stinson GS

## 2.3 Historical Development

The Stinson GS was built in 1925 by the Wanapitei Power Company, the same company that developed the McVittie and Coniston GSs. Stinson was the last of the three GSs to be built and was acquired by HEPCO (predecessor to Ontario Hydro) in 1929. A small colony of eighteen buildings was developed on the site to operate the facility. The colony buildings were removed in 1967 (Unterman McPhail, 2021).

## 2.4 Existing Station

The existing site consists of a main concrete gravity dam section, containing nine sluiceways and a retired (sealed) log chute, a concrete gravity section with four intake bays and trashracks leading to the intake canal. Water is conveyed through the intake canal to the headworks, and continues down through two rivetted steel plate penstocks, each 3.4 m in diameter and 21 m long, to the steel water chest of a turbine. Two steel headgates are controlled locally with electric hoists to isolate the penstocks but do not function as emergency gates. The station has two horizontal double Francis (camel back) generating units that operate at a gross head of 16.7 m, each capable of producing 2.7 MW resulting in the total plant capacity of 5.4 MW; however, the plant typically operates at no more than 5.2 MW. Over the years rehabilitations of elements have occurred. Some of the major rehabilitations are described below (KGS, 2021).

- Refaced the concrete on the majority of the piers and sluices and installed a concrete plug at the log chute on the main dam.
- Installed steel plating in various locations on downstream faces of the intake piers.
- Concrete lined and elevated the top of the north intake canal wall.
- Rehabilitated the top and downstream face of the headwork concrete.
- Recoated the penstock and rehabilitated the penstock saddles.
- Replaced the transmission lines and the substation.
- Replaced the power cables from the powerhouse to the substation.

Based on the existing condition of the facility it will technically reach its end of life in the next 5 years.

Figure 2-2 below is an aerial photograph of the site with key features labelled.





Figure 2-2 Site Overview

Figure 2-3 is a photograph looking upstream to the reservoir from the Stinson Dam.





*Figure 2-3 Stinson Reservoir (looking upstream from the main dam)*

Figure 2-4 shows the forebay to the Stinson powerhouse.



*Figure 2-4 Stinson Intake Canal*

Figure 2-5 shows the Stinson Main Dam.





*Figure 2-5 Stinson Main Dam*

Figure 2-6 and Figure 2-7 show the Spillway at no flow and partial flow.





Figure 2-6 Stinson Spillway: Leakage Flow Only



Figure 2-7 Stinson Spillway (likely 43.8 cms showing for the day)



Figure 2-8 shows the powerhouse and vehicular access.



Figure 2-8 Stinson Powerhouse

## 2.5 Operation

The Wanapitei River Water Management Plan (WRWMP) describes the operational requirements for the Stinson GS. The current operating regime at Stinson GS does not have any minimum flow requirements.

The Stinson GS forebay has two different operating range requirements. For the period May 1 to October 15 the range is 255.18 m to 255.42 m. For the balance of the year the range is: 254.66 m to 255.42 m. The narrower summer operating range is maintained for the benefit of residents and cottagers upstream of Stinson (OMNR *et al.*, 2011).

During the winter, efforts are made to keep the water level above 255.00 m from January 1st until an ice cap is formed (usually by January 15th). This practice is carried out to reduce the probability of frozen residential water lines above Stinson GS (OMNR, *et al.*, 2011).

OPG tries to operate its generators producing the greatest amount of hydroelectricity with the flows available. However, throughout the year, flows in the river may not be enough to operate the generators efficiently and the facility may “cycle” its operations within the WRWMP limits, resulting in the fluctuation of downstream flows over a relatively short period of time. OPG attempts to maintain a continuous flow throughout the day. However, at times, it may be necessary to shut down all turbines during low flows.

## 2.6 Alternatives Assessment

An alternatives assessment was undertaken by OPG including considerations for overhaul, refurbishment and redevelopment options, resulting in the selection of a refurbishment option by OPG.

## 2.7 Proposed Refurbishment

The preferred option is to refurbish the facility.

The refurbished GS will have the following characteristics:

- Effective Capacity of 6 MW (capacity of the current facility is 5.4);
  - Estimated Annual Energy Generation of approximately 26 GWh;
  - Number of Units – 2;
- Station Flow – 43.5 cms (existing is 43.4 cms);
  - Minimum Operating Flow – 2.18 m<sup>3</sup>/s;
  - Minimum Operating Flow per unit – 2.18 m<sup>3</sup>/s (existing is 6.6 cms to 9 cms);
  - Average Annual Flow – 30 m<sup>3</sup>/s; and
  - Average Head of 16.54 m (range of head from 15.0 m to 18.0 m).

### 2.7.1 General Layout – Site Plan

The proposed new site plan for the Stinson GS along with topographic and bathymetric elevations shown in Figure 2-9. The overall layout of the GS will remain largely unchanged from the existing situation. All of the major civil features of the GS will be retained in their current location including the dam, spillway, intake canal penstocks, powerhouse and tailrace. The powerhouse superstructure will be demolished and replaced. The powerhouse foundation will be re-used with some concrete repair work proposed. Two new turbine/generator units will be installed, and most of the powerhouse mechanical and electrical equipment replaced. With respect to the remaining civil works on site, the existing Main Dam and Sluiceway will be largely unaltered except for some minor work. The existing isolation gates will be refurbished (paint and new wheels), and a new hoist structure and motor will be installed. The existing Switchyard will have one new structure added to accommodate some update electrical equipment, but the overall size is not expected to change.

The existing access road, **Stinson Hydro Road** will still be used for access.



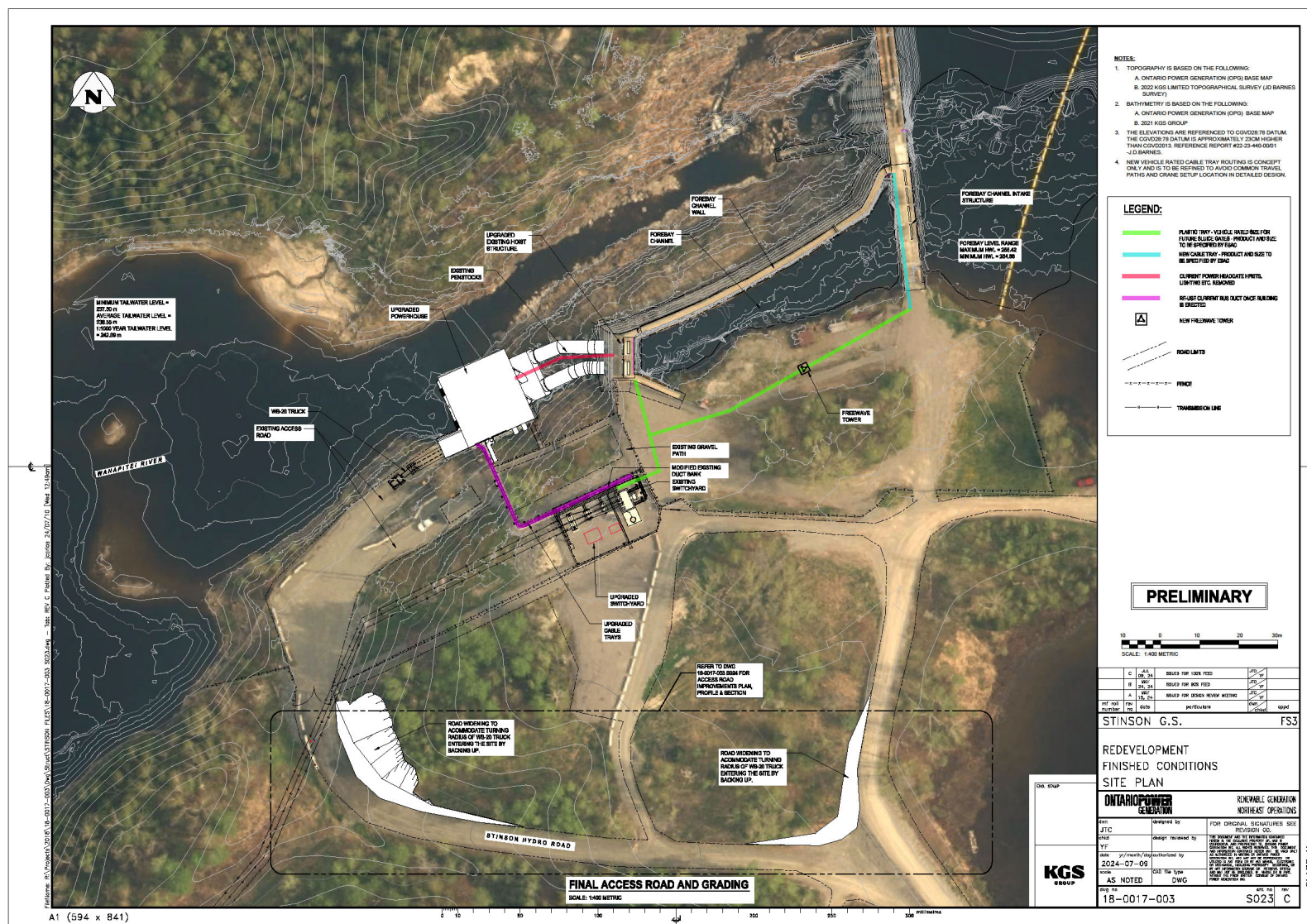


Figure 2-9 Proposed General Arrangement Site Plan for the Stinson GS



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Figure 2-10 shows the site plan during the construction period. In order to provide working space for the construction, two laydown areas are proposed south of the intake canal and shown on the Figure. The repair work for man-made intake canal channel walls and intake deck are shown. Figure 2-10 and Figure 2-11 shows the proposed road modifications. These proposed road modifications will allow for improved accessibility for trucks. All the proposed road modifications occur on OPG property.

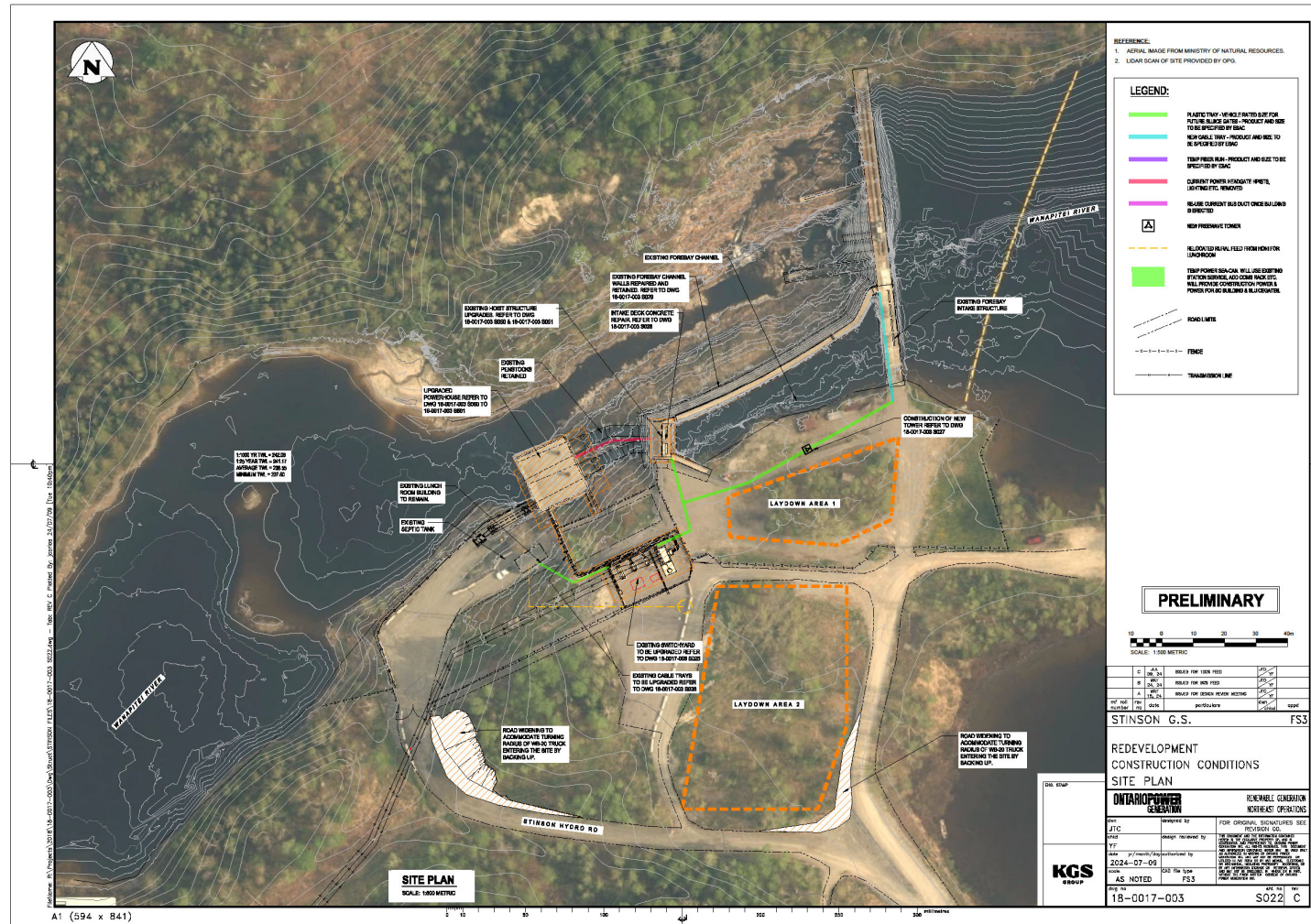


Figure 2-10 Proposed General Arrangement Site Plan for Construction for the Stinson GS



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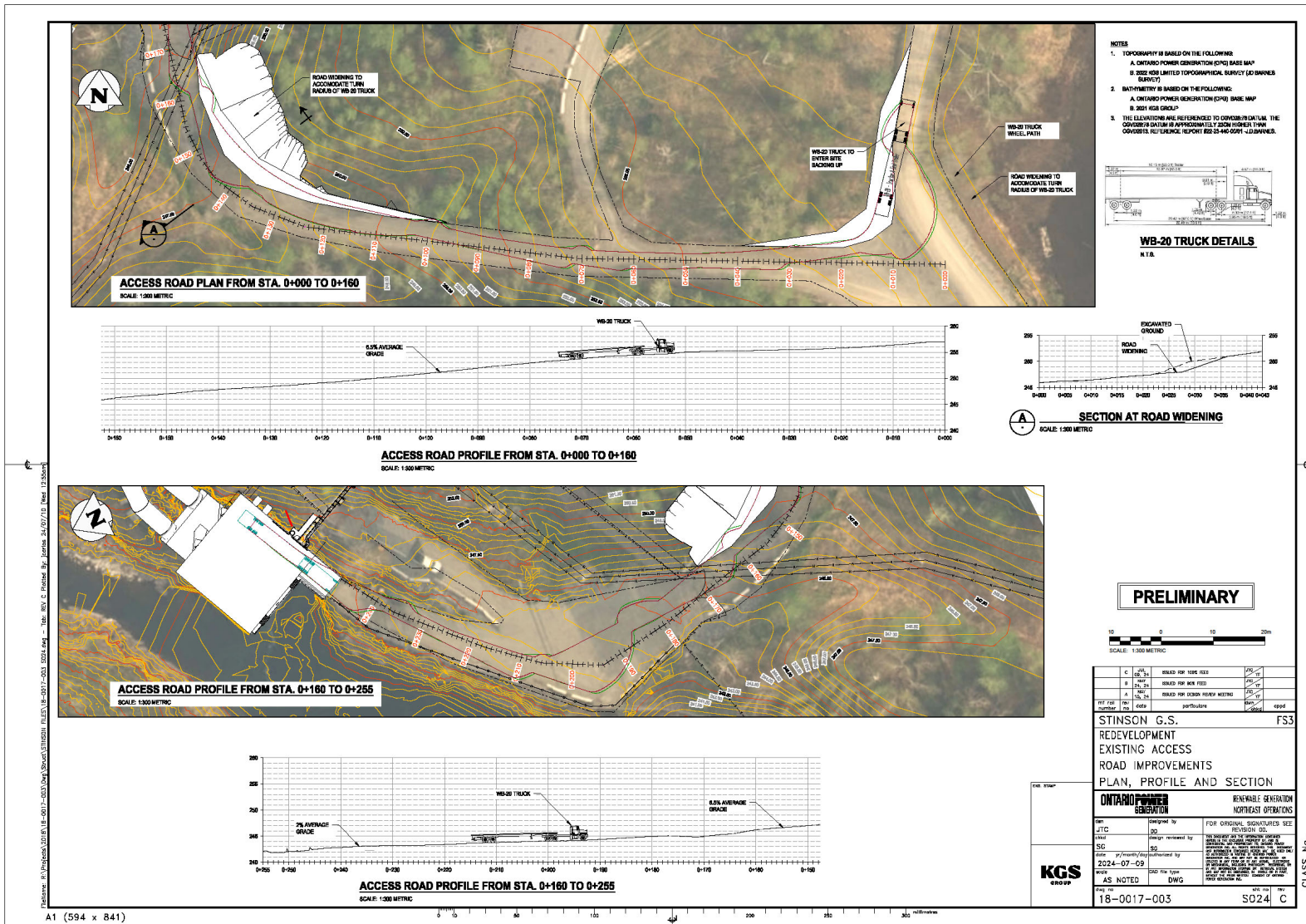


Figure 2-11 Road Improvements for the Stinson GS

## 2.7.2 Powerhouse

Figure 2-12 and Figure 2-13 show the proposed re-built Powerhouse General Arrangement Exterior and Interior Conditions in a 3D View. Both Figures show the penstocks connecting to the north face of the powerhouse and water passages and vehicular access occurring to the south. They represent no changes from the existing conditions.

The total area of the powerhouse will remain the same, as a prefabricated steel building will be added directly on the existing foundation. The height of the new powerhouse will be 3.92 M taller to accommodate the new taller units and a powerhouse crane.

As previously described, the powerhouse superstructure will be demolished and replaced, two new DIVE turbine/generator units will be installed, and most of the powerhouse mechanical and electrical equipment replaced. The powerhouse foundation will be re-used with some concrete repair work proposed.

DIVE Turbines are Fit for Purpose and greatly reduce civil work in comparison to Kaplan or SAXO type turbines. The general features of the DIVE turbines and their benefits for the project are as follows:

- Fit in current powerhouse footprint and can utilize the existing draft tubes.
- Civil work below the floor of the current powerhouse will be limited.
- No downstream cofferdam will be required.
- No permanent tailrace gates are required.
- Turbines are more fish friendly versus SAXO type turbines.

The DIVE-Turbine is an innovative turbine system for hydropower plants up to 4MW per turbine. DIVE Turbine Technology is optimally suited for low-head environments and has spread out over Europe quickly in recent years due to its cost-efficient design enabling partial loads due to double regulation. The units are designed maintenance-free and require only minimal service efforts enabling extremely high availability factor of 99.85% over 20 years. DIVE Turbines are a double regulated turbine and permanent magnet synchronous generator designed in one fully submersible unit.

DIVE Turbines are vertical-axis propeller turbines with electronic regulation. Based on the low RPM and simple propeller type runner, the mortality rate of fish passing downstream via the DIVE-Turbine is minimized in comparison to classical Kaplan turbines.

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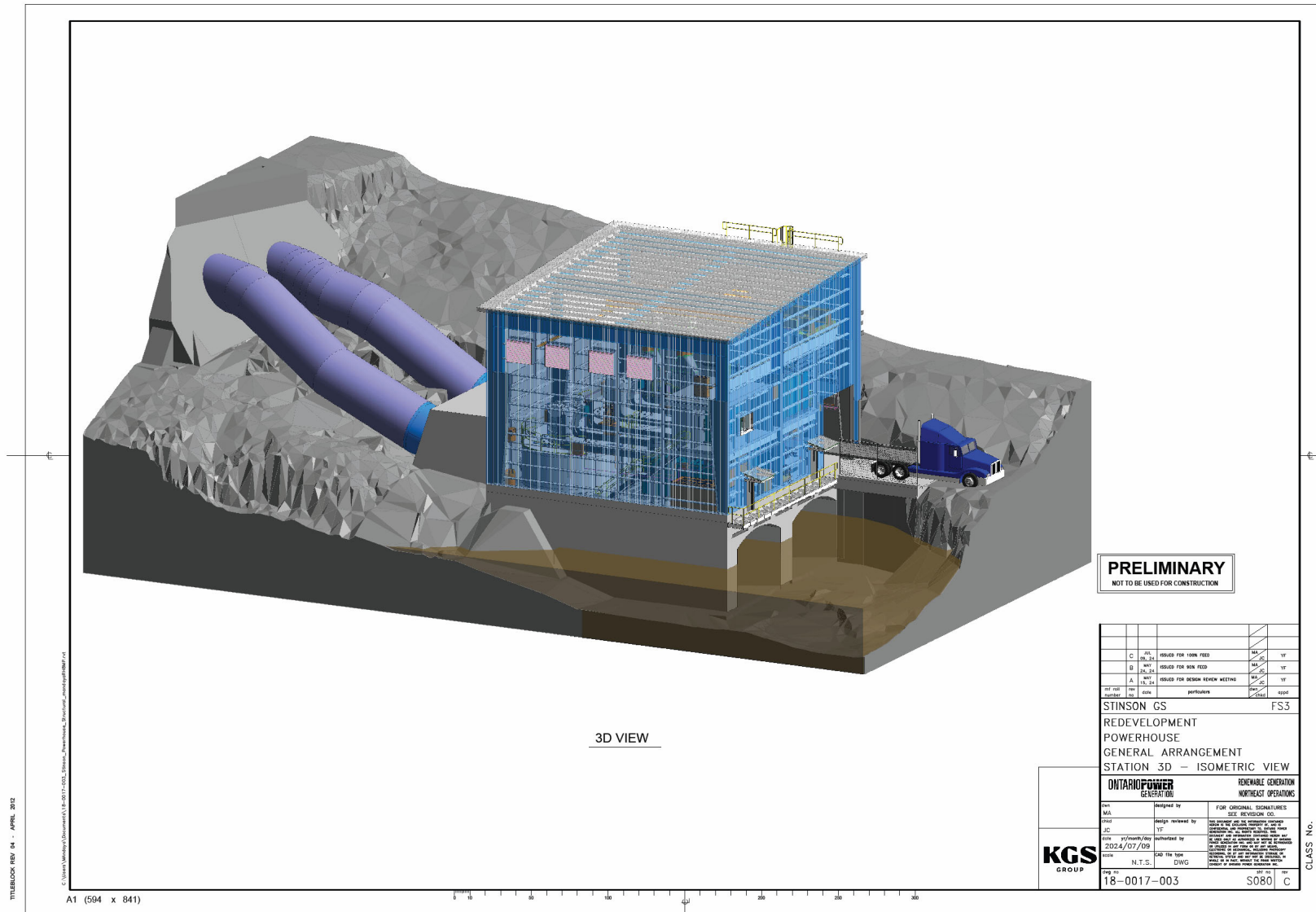


Figure 2-12 Powerhouse General Arrangement Exterior 3D View



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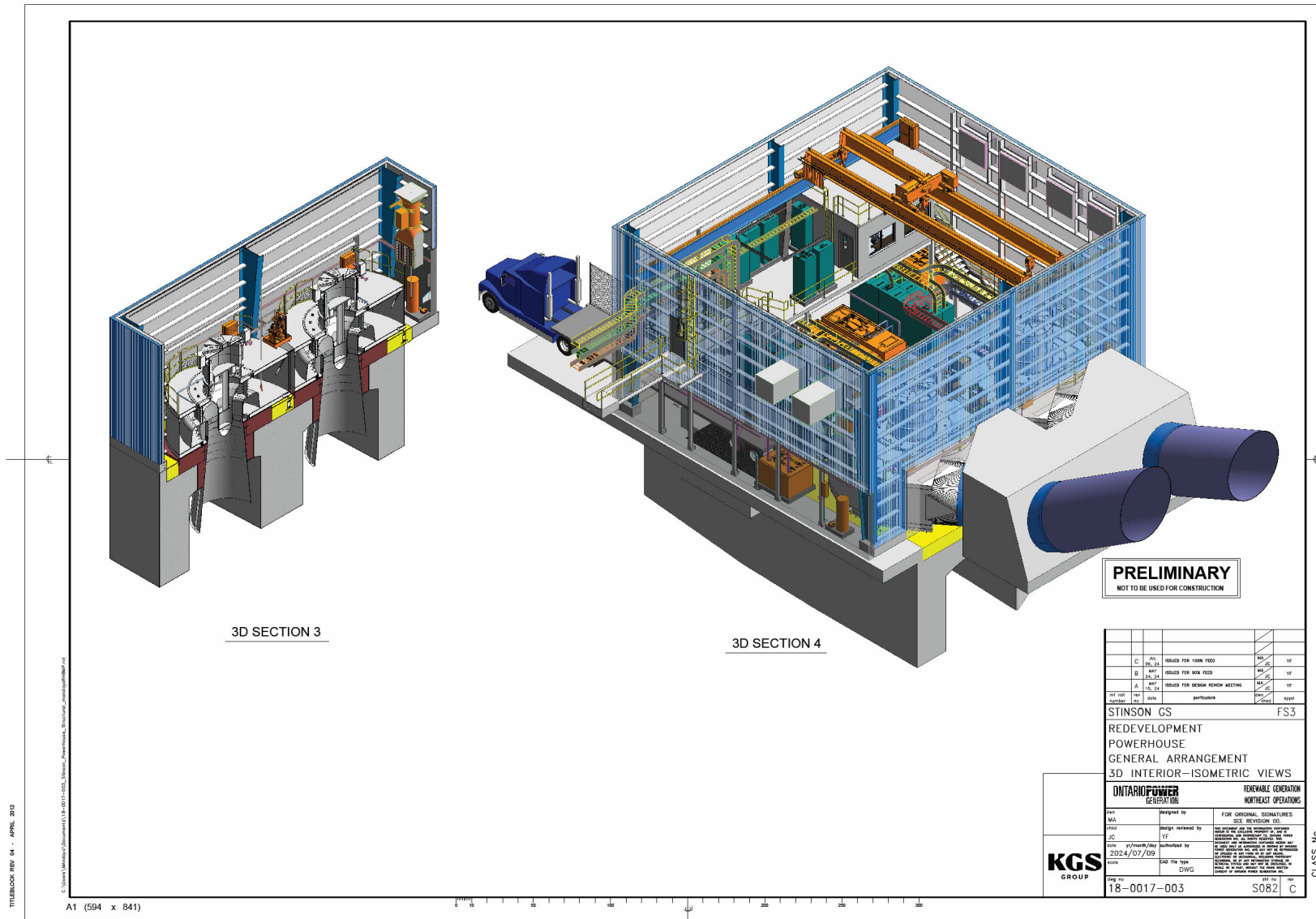


Figure 2-13 Powerhouse General Arrangement Interior 3D View

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Figure 2-14 shows the General Arrangement of the Powerhouse from the downstream side of the river. Clearly visible are the two water passages for the two units and an exterior walkway.

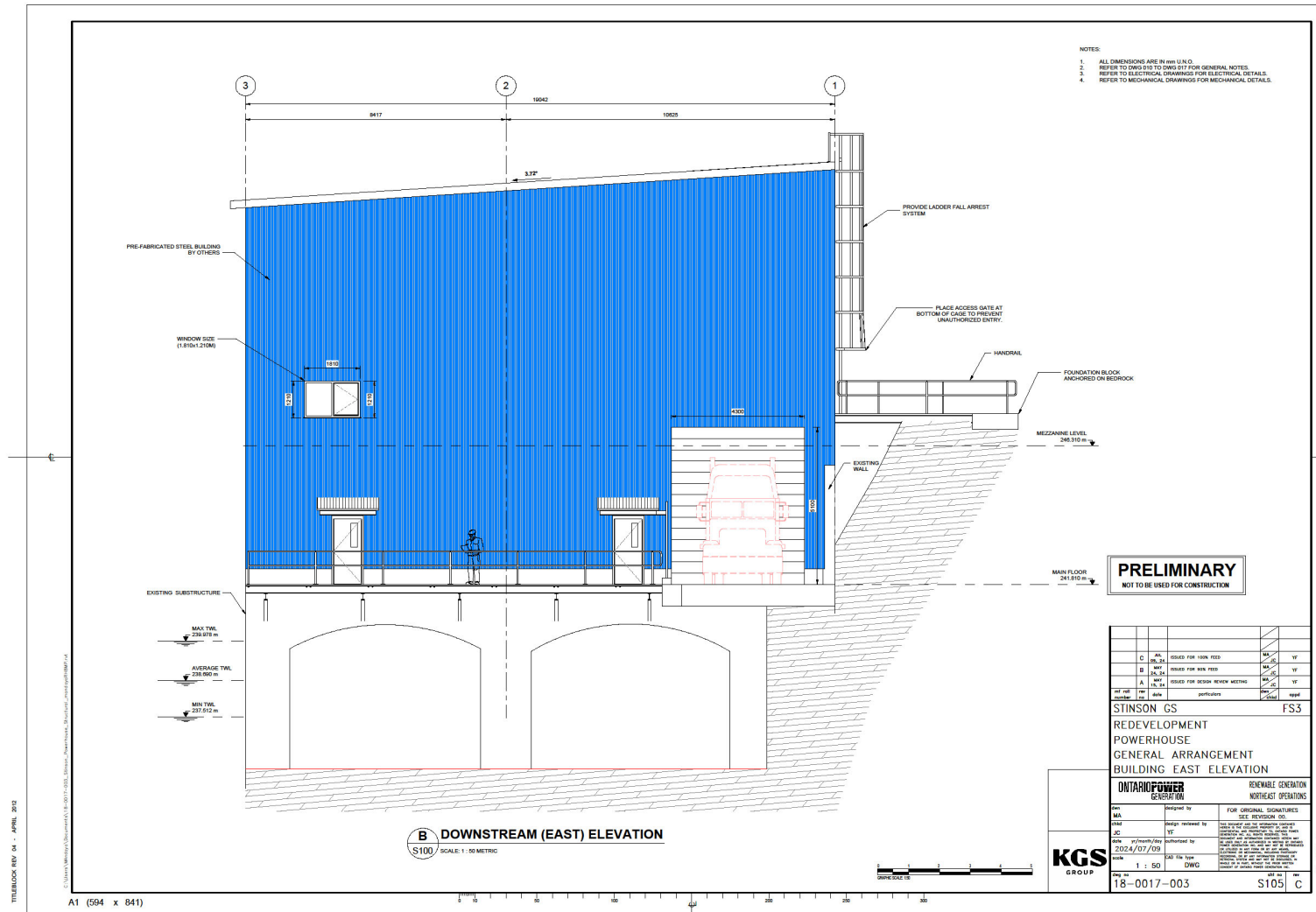


Figure 2-14 General Arrangement of the Powerhouse at the Main Level

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Figure 2-15 shows the General Arrangement of the Powerhouse along Units #1 and #2 and depicting the mechanical and electrical equipment. Figure 2-16 shows the General Arrangement of the Powerhouse Operating Floor as a top view. The Figure shows the layout on the main floor of the powerhouse including the two generator/turbine units. Figure 2-17 shows the General Arrangement of the Powerhouse including depiction of the Control Room.

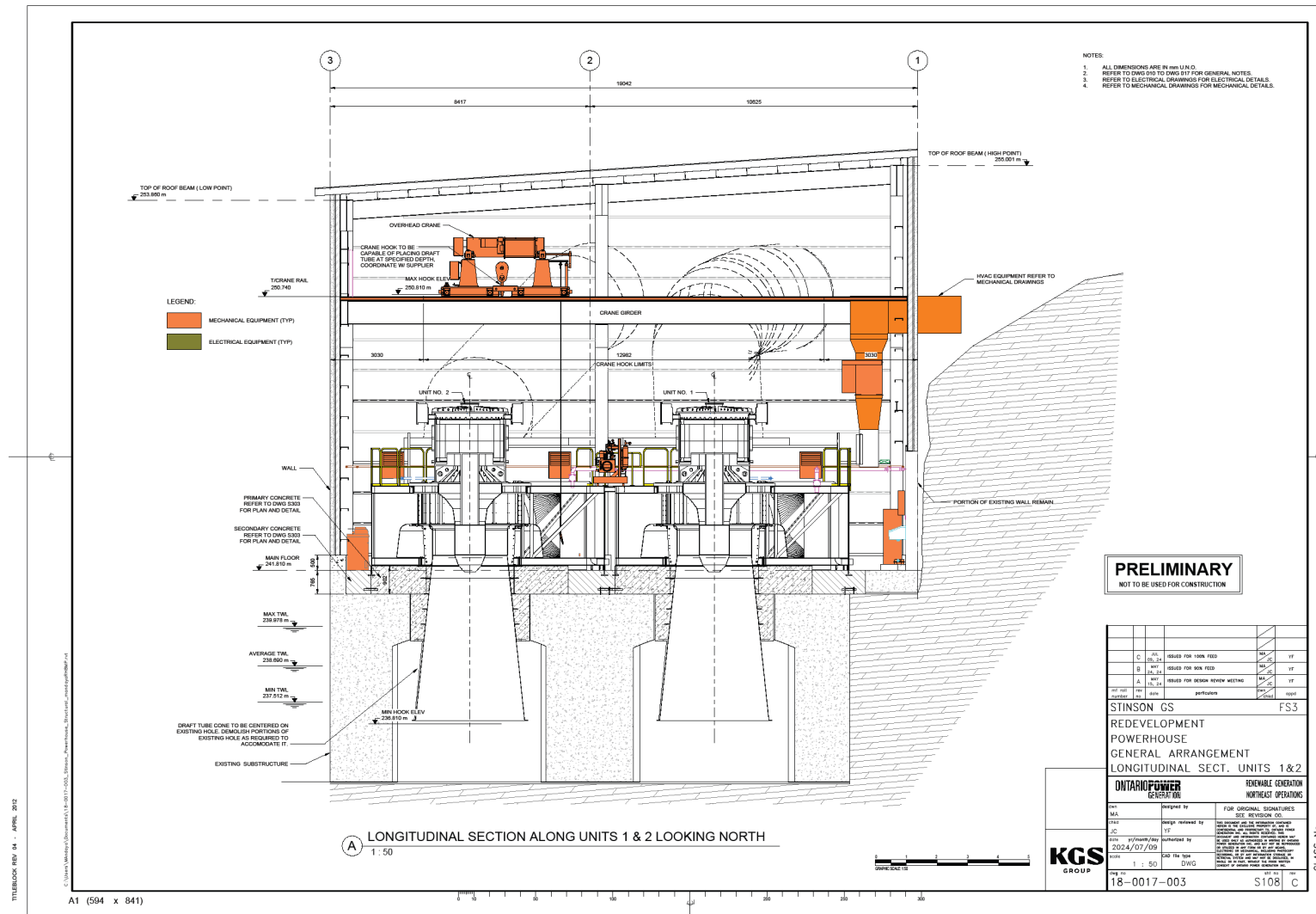


Figure 2-15 General Arrangement of the Powerhouse Along Units #1 and #2

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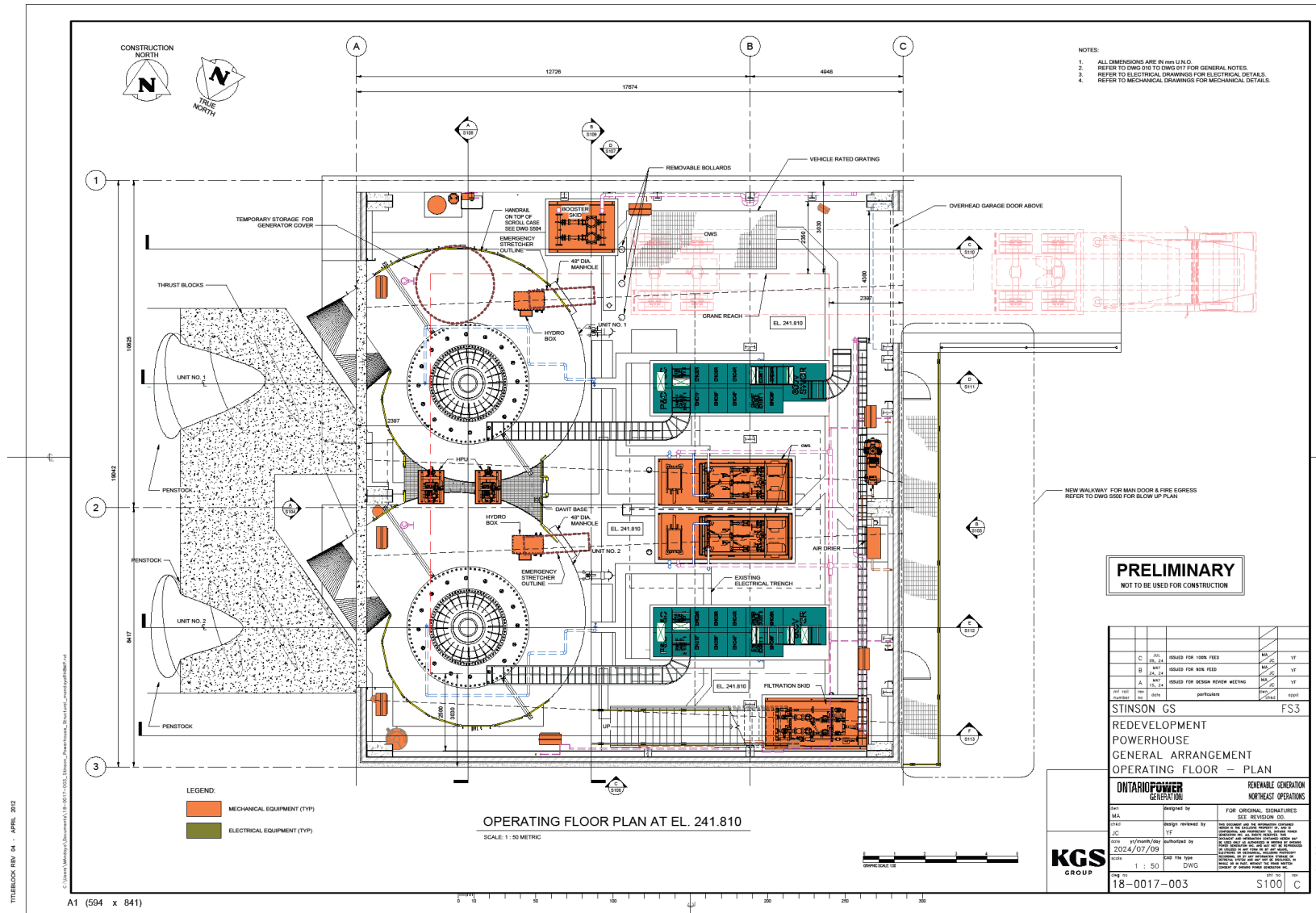


Figure 2-16 General Arrangement of the Powerhouse Operating Floor Plan

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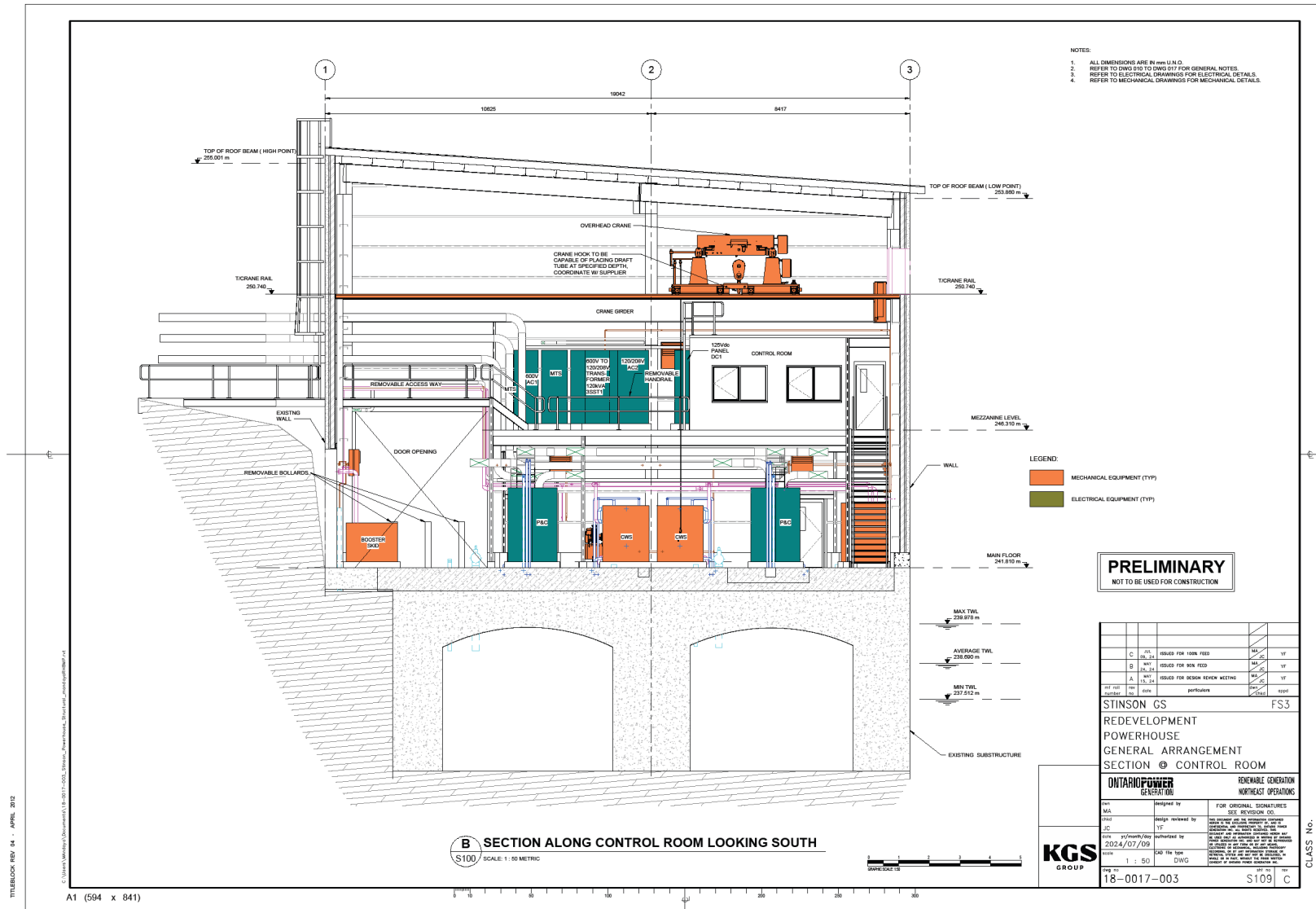


Figure 2-17 General Arrangement of the Powerhouse and Control Room



### 2.7.3 Construction Sequencing

The construction would proceed according to the following general stages as described below.

#### ***Stage #1 – Site Preparation***

The first stage of the work will involve preparing the site for construction.

Vegetation will be removed on all areas to be constructed on, including laydown areas. This clearing will be outside of the breeding bird and bat seasons (April 1 to October 1). Merchantable timber belongs to the Crown, although the amount of such material to be cleared on site is minimal. Should the MNRF be amendable, wood and plant resources will be offered to WFN or other local First Nations for their use.

Any access improvements (road and parking upgrades) required at the site will be undertaken.

Erosion and sediment controls (including turtle exclusion fencing) will be established on the site.

Construction facilities such as trailers will be established on site. Laydown areas will be set up, and trailers, equipment and materials organized into appropriate areas. Establishing laydown areas may mean placing temporary fill material on certain areas.

#### ***Stage #2 – Demolition***

The Intake Canal will be dewatered using the existing intake structure and stop logs. This will allow the removal of the two isolation gates for off-site restoration and removal of the hoist frame for replacement. The Intake Canal will be drained through the powerhouse and existing units. Pumps will be utilized to assist in dewatering if necessary.

The existing powerhouse will be demolished but its foundation kept intact. Following that, the existing equipment will be removed.

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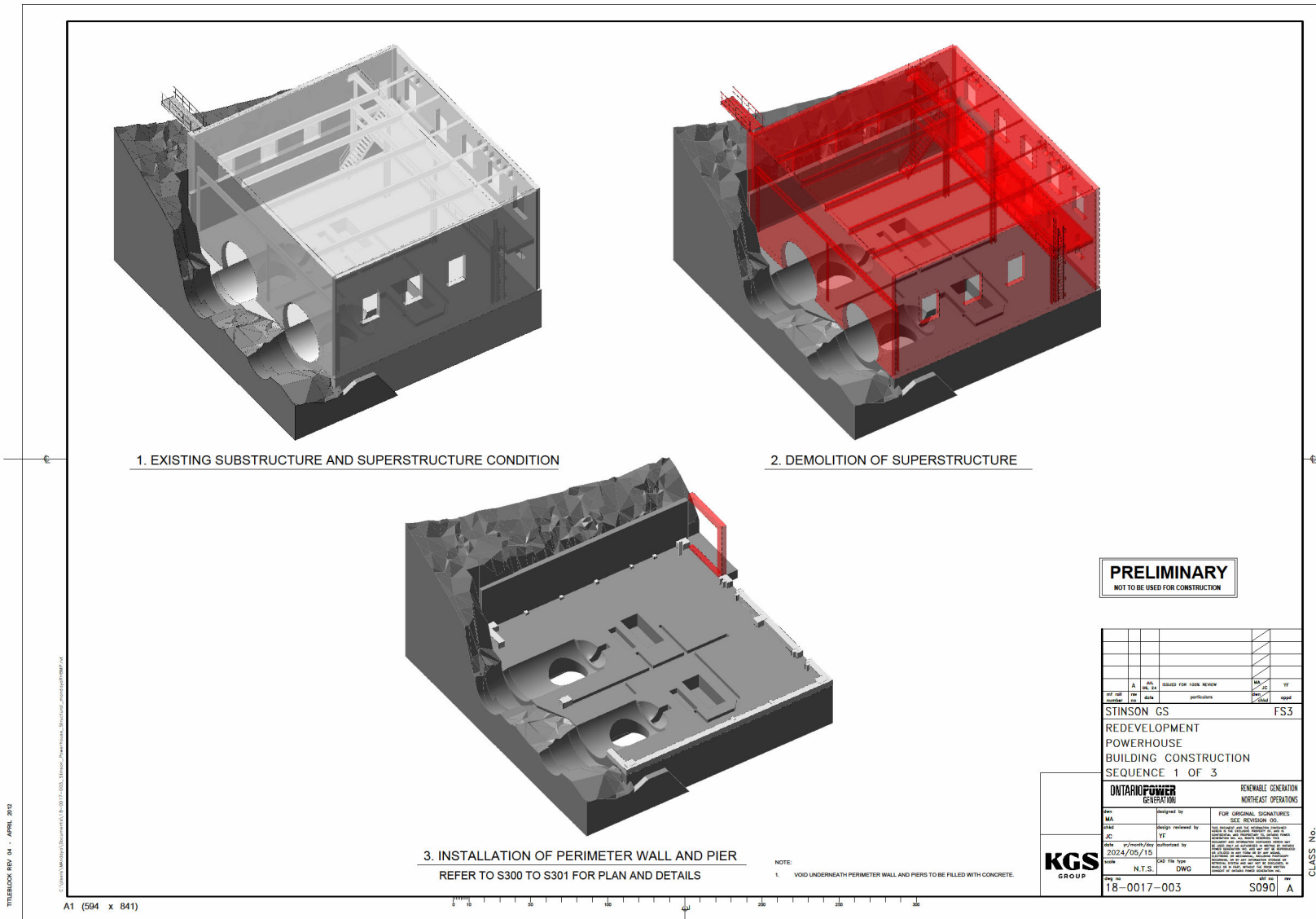


Figure 2-18 Powerhouse Re-Development Sequence 1 – Demolition

### **Stage #3 – Unit Removal and Draft Tube Install**

Once the powerhouse superstructure has been removed, the two existing camel back units will be removed as well as all electrical and mechanical systems. The concrete floor will be excavated to the extent required to install new support beams and reinforcement for the new DIVE units. Figure 2-19 shows the extent of the planned concrete floor removal.

Once the excavations are completed, new prefabricated steel draft tube cones will be lowered into position and embedded in concrete along with embedments for the scroll cases.

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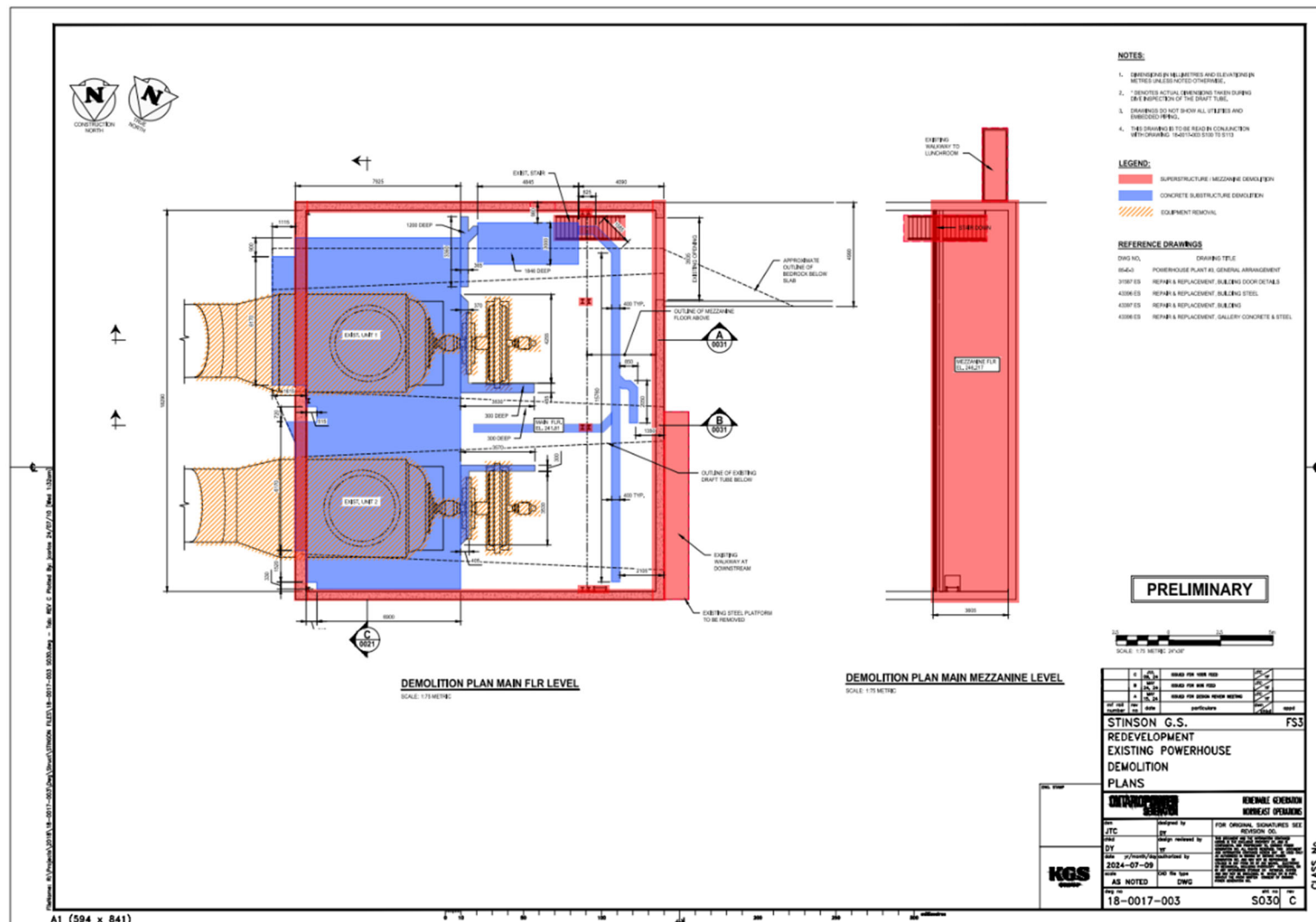


Figure 2-19 Powerhouse Re-Development Floor Removal

#### **Stage #4 – Powerhouse and Equipment Installation**

A prefabricated steel building will be erected on the existing foundation. After the superstructure is erected, a new 40-ton powerhouse crane will be installed to aid in the installation of the DIVE turbine units. The DIVE units will be installed in three segments, the scroll case, the turbine and the generator. Other plant electrical and mechanical equipment will be installed in parallel.

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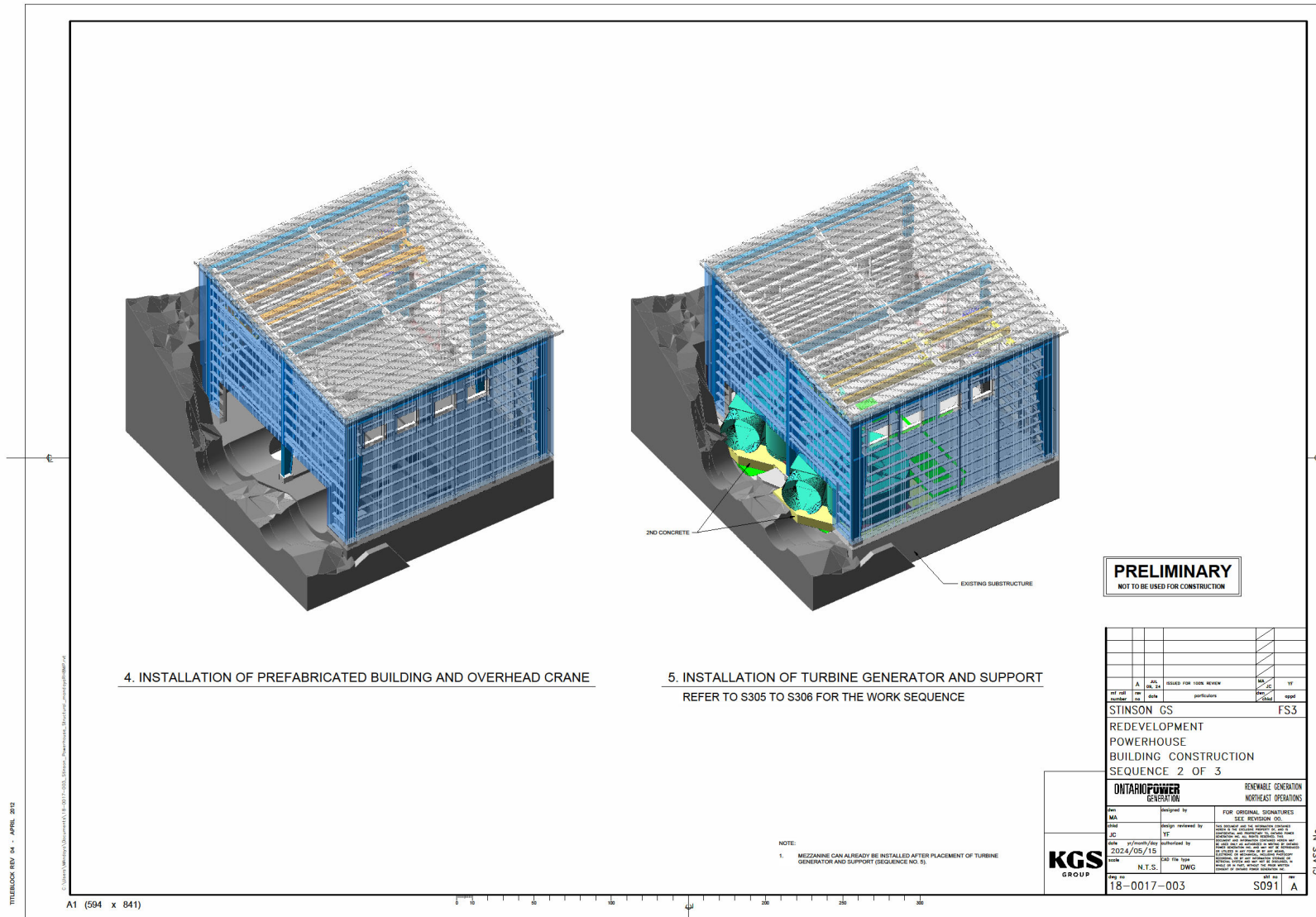
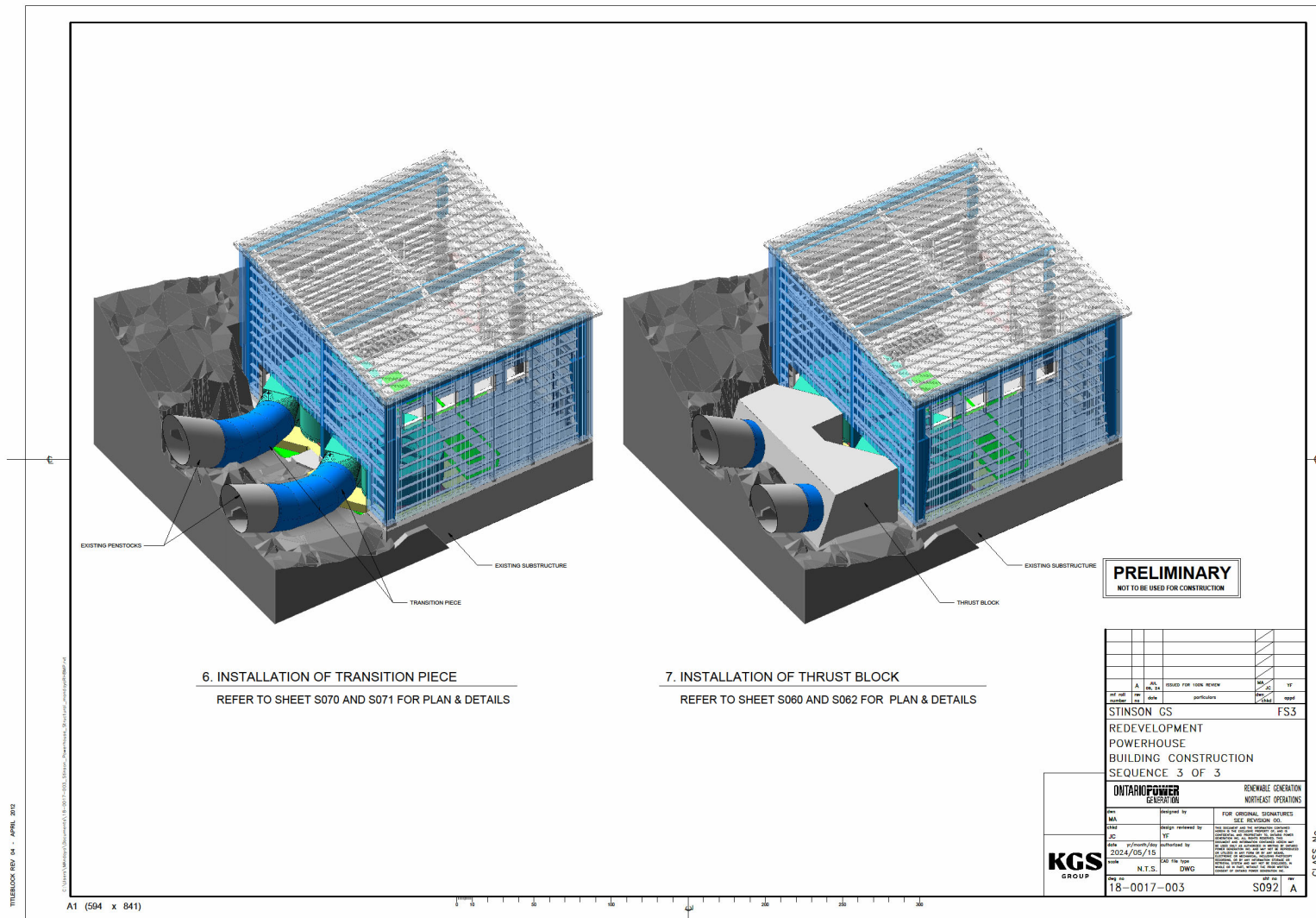


Figure 2-20 Powerhouse Construction – Installation of Prefabricated Building, Overhead Crane and Turbine Generator and Support

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*Figure 2-21 Powerhouse Construction – Installation of Transition Piece and Thrust Block*



### **Stage #5 – Commissioning**

When all the equipment is installed and verified it will be released to commissioning gradually. A series of verifications will be completed prior to permitting the intake canal to be watered once again. Once the water is restored to the flow passages the units will be placed back into service following a sequence of testing. The testing will occur in compliance with the WRWMP.

### **Stage #6 – Site Remediation**

Stage #6 will involve final clean-up of the site including removal of all temporary construction features and equipment.

Areas planned for re-vegetation will be either re-planted or seeded once the areas have been stabilized, temporary materials such as fill are removed, and overburden/topsoil is replaced.

## **2.8 Construction**

The Project will be executed using a Design-Build Strategy with early contractor engagement. Both the Coniston and Stinson GSs will be completed together as one project. Per this strategy, OPG has secured the services of a professional engineering firm to complete the detailed design. In parallel, the Construction Contractor is engaged providing early constructability input and preparing the final construction cost and schedule estimates for the preferred option for Stinson GS.

There will be office and construction crew trailers onsite, but there will not be any construction accommodations onsite with all construction staff accommodated offsite in nearby communities.

The existing onsite roads may require some limited upgrading and widening to facilitate construction and improve access to the site for semi-trailers.

As previously indicated in this Report the project has been revised to eliminate the need for: a downstream cofferdam, other in-water work, and the use of explosives. To facilitate both demolition and construction the following construction activities and infrastructure will be used:

- A floating dock will be installed in the tailrace of the current powerhouse to facilitate demolition and construction.
- A platform or platforms will be constructed connected to and around the existing powerhouse to facilitate demolition and construction. All the platforms will include a plastic liner that is intended to be impermeable barrier so debris cannot enter the water. Furthermore, a filter cloth will be placed over the liner to protect the integrity of the liner and act as a sponge to retain any liquid material (e.g., prevent rain from mixing with dirt on the platform).
- Sediment fencing and/or other erosion and sediment controls will be utilized on land to prevent materials from entering the river. An in-water turbidity curtain may be employed in the river if further mitigation is warranted.



A Hazardous Materials Management Plan, Waste Management Plan and a Spills Emergency Preparedness and Response Plan will be developed for the Stinson Life Extension Project as part of a broader site-specific Environmental Management Plan for the construction period.

Commissioning of the new units will not differ much from normal operation. However, there will be more start-up and shut-down sequences for the units and emergency stops for testing of the equipment. All commissioning will be done in compliance with the WMP. Wet testing will be planned to avoid the Walleye spawning period. And follow the WMP rules.

During the commissioning, the units would be cleaned of deleterious material prior to starting the unit. They may potentially be washed/mopped out. Any water from this would be minor, amounting to a few 5-gallon pails. This water would be disposed of through the septic system as normal wash water would at the station as it is currently configured. This water will go into a wastewater tank and be hauled off site by a certified septic company.

Incidental spills of oil, gas, diesel and other liquids to the environment could occur during construction. Fuelling and lubrication of construction equipment should be carried out in a manner that minimizes the possibility of releases to the environment. Measures for containment and cleanup of contaminant releases will be followed to minimize contamination of the natural environment, followed by approved landfill or other disposal. In addition, sanitary and other wastes will be generated during construction. Interim sanitary waste collection and availability of treatment facilities will be arranged for the duration of the construction period. All construction waste, washwater and wastewater will be disposed of or managed in accordance with regulatory requirements.

## **2.9 Decommissioning**

Decommissioning involves the permanent removal of the hydroelectric facilities, with the resultant loss of the site as a renewable source of electricity generation. Once the Stinson GS-Life Extension Project has reached the end of its service life in 90 years (approximately 90 years from now) or more, additional redevelopment, rather than decommissioning, would be an option that should be considered again to further extend the life of this plant.

### 3 Description of the Aquatic Environment

#### 3.1 Wanapitei River – Water Management

Figure 3-1 below shows the Wanapitei Watershed Planning Area and more specifically Lake Wanapitei and the Wanapitei River. As per the WMP, the headwaters of the Wanapitei River consist of a network of streams and lakes located in northeastern Ontario, north of the City of Greater Sudbury. The river has a general southward direction and is 167 km long. It drains into the French River. Its drainage area covers over 3,341 square kilometres. OPG owns the control dam at the outlet of Lake Wanapitei, and three generating stations at Stinson, Coniston and McVittie. A fourth hydroelectric generating facility located at Moose Rapids, just south of the outlet of Lake Wanapitei, is owned by Canadian Hydro Developers (now Trans-Alta).

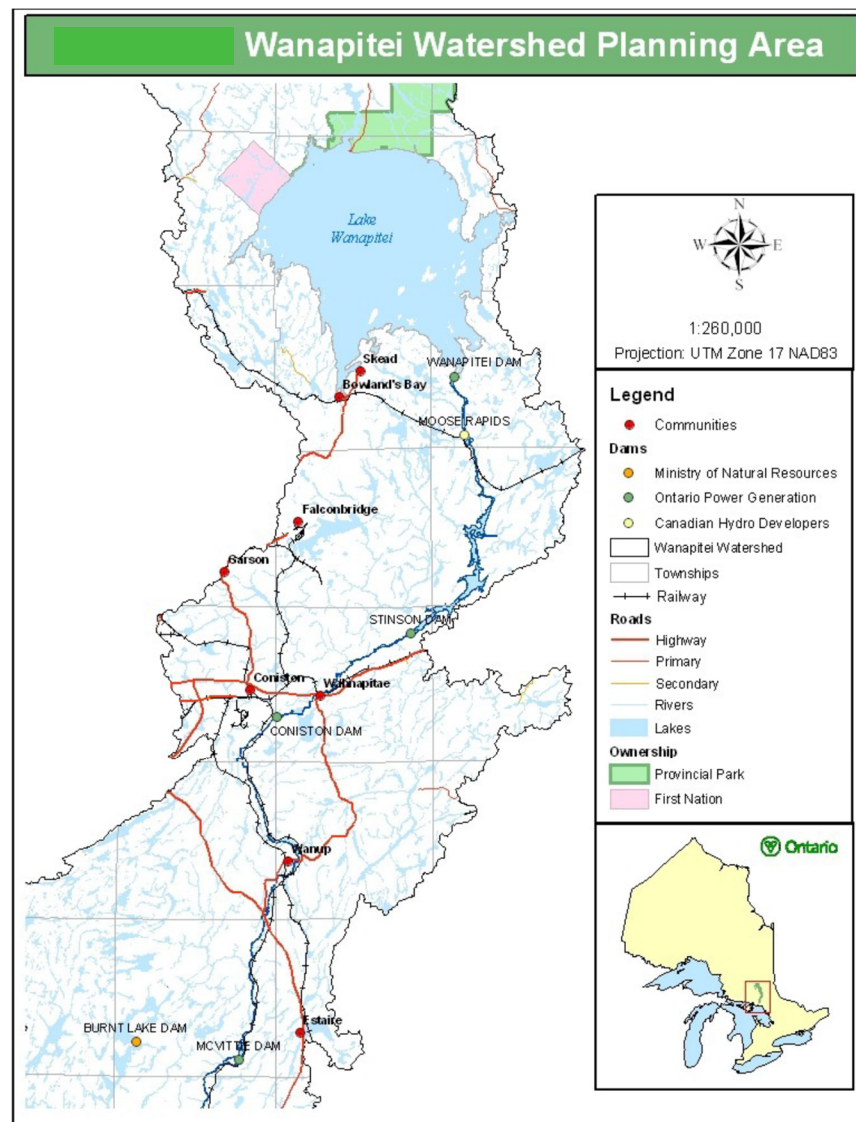


Figure 3-1 Wanapitei River

As per page 2 of the WRWMP (2011), the river is operated to optimize flood mitigation, recreation and aquatic needs as the highest priorities within the watershed. Power generation occurs as a secondary benefit. As part of the development of WMP, operating limits were established for each control and power generation facility in the watershed.

As discussed in Section 2.5, Stinson also has legally required water ranges upon which it manages through the reach of the Wanapitei River above the facility.

Total daily flow records for the Wanapitei River at Stinson GS were provided by OPG for the period 1999-2019. OPG also provided the spill flow and turbine flow records for the generating station for use in this study. Flows on the Wanapitei River are generally controlled by the operation of the Wanapitei Lake Dam, which regulates water levels on Wanapitei Lake. The operation goal for the dam is to maintain proper balance between power production and impacts of flooding downstream and the effects of upstream high-water levels on lake residents. In general, the dam is opened gradually over the winter to lower the lake level in anticipation of the spring thaw. At the onset of the freshet, flow through the dam is reduced to let the local freshet pass through the river system and allow the Lake to start filling. Monthly average and maximum flows are shown on Figure 3-2 and are reflective of the Wanapitei Dam operating strategy described above. During the winter months, flows are fairly steady as the dam is opened to draw the lake level down. The average flow for April drops notably compared to winter flows, as the dam is closed to prepare for the freshet. Largest flows occur in May and June as freshet flows pass through the system. The lowest flows occur in the late summer and early fall as water is held in Lake Wanapitei for recreational purposes (KGS, 2021).

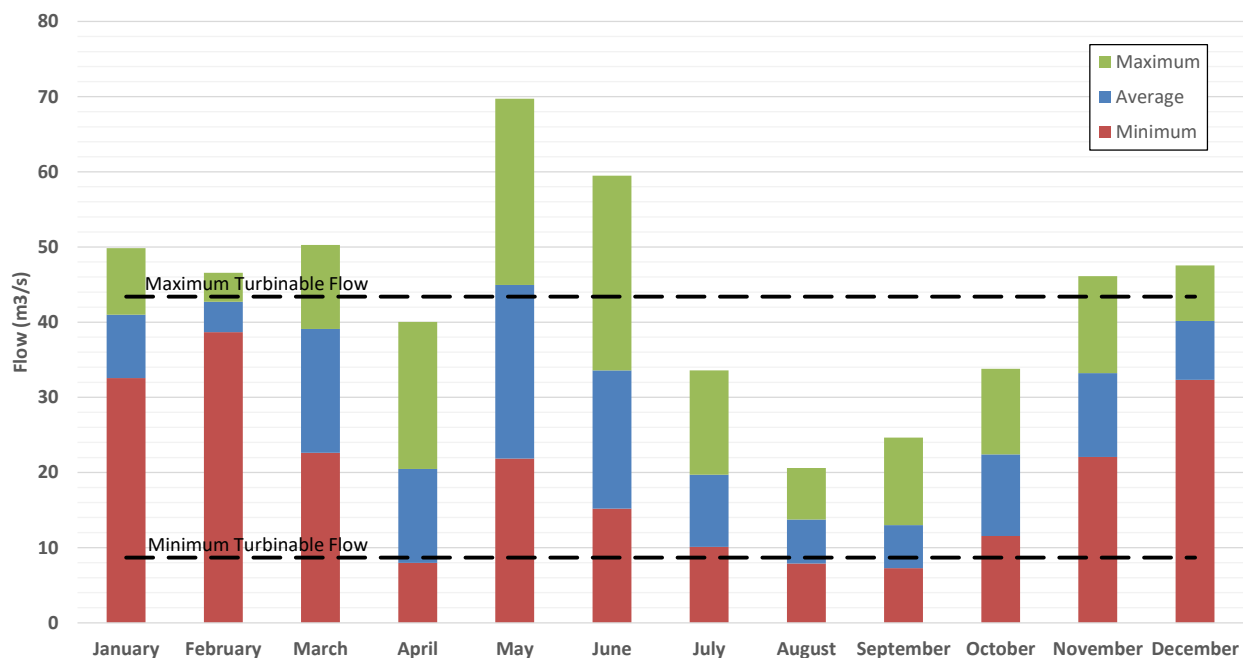


Figure 3-2 Average, Maximum, and Minimum Monthly Flows at Stinson GS

A flow duration curve for Wanapitei River flows between 1999 and 2019 is shown on Figure 3-3. Approximately 75% of the recorded flows are below the current maximum plant capacity of approximately 43.4 m<sup>3</sup>/s.

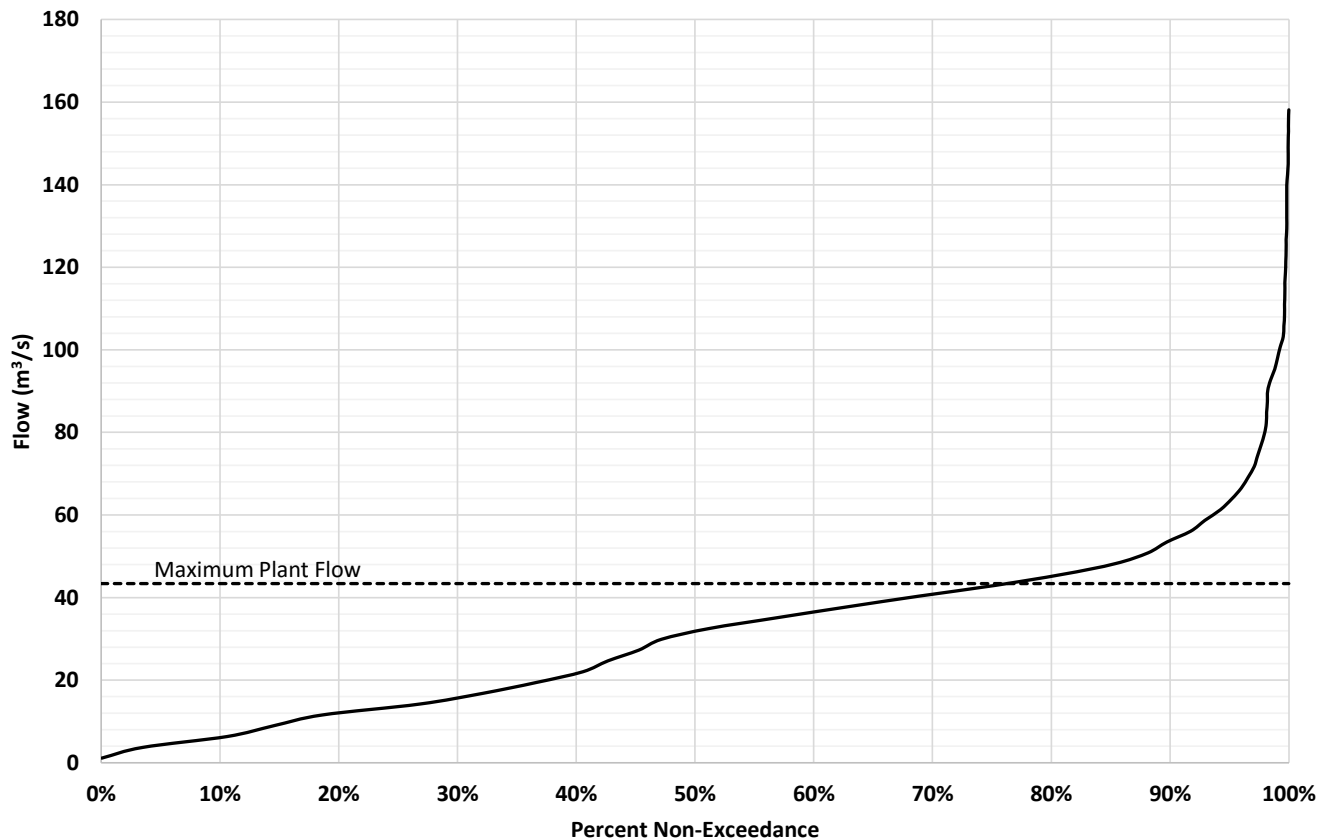


Figure 3-3 Wanapitei River Flow Duration Curve

The operating range of the forebay is governed by the Wanapitei River Water Management Plan and is illustrated on Figure 3-4. This Plan mandates that summer water levels (between May 15<sup>th</sup> and October 15<sup>th</sup>) be maintained between the operating band of 255.18 m and 255.42 m (0.24 m range). This is mainly for the benefit of cottagers residing above Stinson GS and summer recreational users of the river. During the winter, the width of the operational band increases to a minimum of 254.66 m and a maximum of 255.42 m (0.76 m range). During this time efforts are made to keep the water level above 255.00 m from January 1<sup>st</sup> until an ice cap is formed (usually by January 15<sup>th</sup>). This practice is carried out to reduce the probability of frozen residential water lines above Stinson GS.

Headwater levels on the Wanapitei River above Stinson GS are measured and recorded by OPG on a daily basis using a pressure transducer gauge (ID# 02DB053).

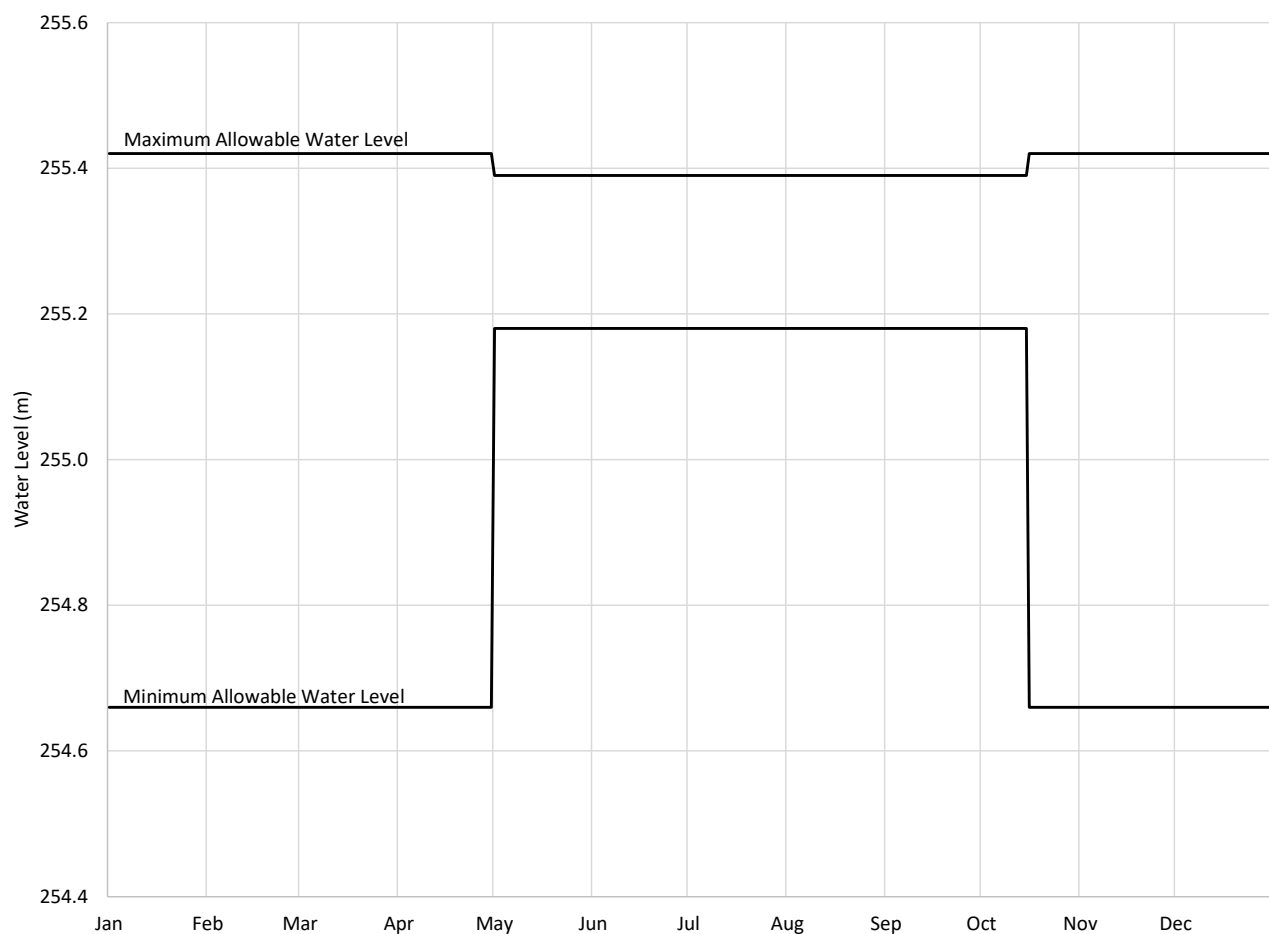


Figure 3-4 Stinson GS Headwater Level Operating Range

As already indicated, there are no proposed changes to water management operations with the proposed refurbished facility.

## 3.2 Fisheries Community and Fisheries Investigations at Stinson

C. Portt and Associates was retained by Ontario Power Generation Inc. (OPG) to conduct initial fish and fish habitat investigations in support of the assessment of options for development opportunities at this site approximately, 20 km east of Sudbury, Ontario. The report documenting those investigations appears as Appendix A to this Report.

A diverse community of fishes exists in the Wanapitei River and its tributaries, downstream of Lake Wanapitei, with 23 species of fish and a stocked hybrid (Splake) previously reported to be present (see Table 3-1). During the 2020 field investigations two additional species, Longnose Dace and Pumpkinseed, were captured. None of the fish species within this section of the Wanapitei River are considered at-risk in Ontario (<https://www.ontario.ca/page/species-risk-ontario#section-3>, checked February 24, 2023) or federally (<https://www.dfo-mpo.gc.ca/species-especes/sara-lep/identify-eng.html?province=Ontario>, checked February 24, 2023). Chinook Salmon do not occur at the Stinson GS; this species only occurs in the Wanapitei River as the

result of a spawning run from Lake Huron via the French River, and they are blocked from moving farther upstream at the McVittie GS. Emerald Shiner is a resident of lakes and is unlikely to be found at the Stinson GS. Stocking of Splake, Brook Trout, and Rainbow Trout have occurred in the watershed both upstream and downstream of the Stinson GS (OMNRF 2020), and therefore it cannot be ruled-out that an occasional individual of these species may be found nearby the facility. Walleye are present in the river, and spring spawning is known to occur downstream of McVittie, Coniston, and Moose Rapids generating stations (OMNR *et al.*, 2011, C. Portt and Associates 2017). During 2022 Walleye spawning observations, Walleye were observed at the downstream end of the Timmins Chute, approximately 750 meters downstream from the Stinson GS. No Walleye were observed in the immediate vicinity of the Stinson GS during the 2022 spawning survey.

Table 3-1 Fish Species that Occur in the Wanapitei River and its Tributaries, Downstream of Lake Wanapitei (MNR *et al.*, 2011; C. Portt and Associates)

Common Name (Scientific name)
Chinook Salmon ( <i>Oncorhynchus tshawytscha</i> )
Rainbow Trout ( <i>Oncorhynchus mykiss</i> )
Brook Trout ( <i>Salvelinus fontinalis</i> )
Splake ( <i>Salvelinus fontinalis</i> x <i>S. namaycush</i> )
Central Mudminnow ( <i>Umbra limi</i> )
Northern Pike ( <i>Esox Lucius</i> )
White Sucker ( <i>Catostomus commersonii</i> )
Shorthead Redhorse ( <i>Moxostoma macrolepidotum</i> )
Emerald Shiner ( <i>Notropis atherinoides</i> )
Longnose Dace ( <i>Rhinichthys cataractae</i> ) <sup>1</sup>
Blacknose Shiner ( <i>Notropis heterolepis</i> )
Golden Shiner ( <i>Notemigonus crysoleucas</i> )
Bluntnose Minnow ( <i>Pimephales notatus</i> )
Mimic Shiner ( <i>Notropis volucellus</i> )
Brown Bullhead ( <i>Ameiurus nebulosus</i> )
Channel Catfish ( <i>Ictalurus punctatus</i> )
Burbot ( <i>Lota lota</i> )
Trout-perch ( <i>Percopsis omiscomaycus</i> )
Smallmouth Bass ( <i>Micropterus dolomieu</i> )
Rock Bass ( <i>Ambloplites rupestris</i> )
Pumpkinseed ( <i>Lepomis gibbosus</i> ) <sup>1</sup>
Walleye ( <i>Sander vitreus</i> )
Yellow Perch ( <i>Perca flavescens</i> )
Iowa Darter ( <i>Etheostoma exile</i> )
Logperch ( <i>Percina caprodes</i> )
Johnny Darter ( <i>Etheostoma nigrum</i> )

<sup>1</sup> Not reported in MNR *et al.* (2011) but captured by C. Portt and Associates in 2015.



### 3.2.1.1 Electrofishing

Electrofishing was conducted on July 14, 2020, within the spillway and in four areas downstream of the powerhouse. Details of the electrofishing can be found in Appendix A.

### 3.2.1.2 Fish Habitat Assessment

A description of the fish habitat assessment methods and results at Stinson is in Appendix A.

### 3.2.1.3 Walleye Spawning

Walleye spawning was investigated at Stinson on April 30 and May 1, and again on May 9, 2022. The maximum water temperature was 6.3°C on April 30, 6.5°C on May 1, and 8.5°C on May 9, which are within the typical range for Walleye spawning. The spill channel, tailrace, and areas downstream of the tailrace, including below a rock chute located 750 m downstream of the GS, known as the Timmins Chute, were searched on those three nights for Walleye using a powerful spotlight. Small numbers of Walleye were observed (two on April 30; three on May 1; four on May 9) below the Timmins Chute. No Walleye were observed in the spill channel, the tailrace, or immediately downstream of the tailrace of the Stinson GS. At the flows observed in 2022, it is thought that the Timmins Chute (Figure 3-5) was a barrier to upstream movement by Walleye, given its length, its relatively straight shape, and the water velocity, which was estimated to be 34 m/s in mid-channel. The 11.23 km- section of the Wanapitei River between the Stinson GS and the Coniston GS likely does not support a large Walleye population. Walleye spawning was assessed again in 2023 but flows in the Wanapitei River were more than twice as high as in 2022, severely constraining the area that could be effectively examined for spawning fish. As in 2022, Walleye were not observed in the vicinity of the Stinson GS in 2023. No Walleye were observed in 2023 at Timmins Chute either. It is suspected that the Timmins Chute, where water velocity was estimated to be 4 m/s during this field investigation, prevents Walleye from moving upstream to the Stinson GS. Furthermore, the Walleye population is likely not large, due to the habitat characteristics and limited habitat area in this isolated section of river between the Stinson and Coniston GS. The Reports on Walleye spawning can be found in Appendix B and C.

## 3.3 Fish Passage on the Wanapitei River

This section has been prepared to address questions about fish passage on the Wanapitei River.

Between the outlet of Wanapitei Lake and the French River, the Wanapitei River descends approximately 90 meters, from 267.2 m ASL to 177 m ASL. The path the river takes is dictated by the topography of the underlying or protruding bedrock, and the river is punctuated by falls, chutes, and rapids, created by bedrock outcrops which impede or prevent upstream fish movement. Consequently, from a fish population perspective, the river consists of a series of isolated or semi-isolated reaches.

Alexander Murray, who surveyed the Wanapitei River in 1856, described the reach from the French River upstream to Wanapitei Lake as follows.

*The navigation of the Wahnapiatae up to Wahnapiataeping Lake is attended with considerable difficulty, being frequently interrupted by falls and long violent rapids, the current of the whole stream at the same time being very strong, especially above the White-fish River route. A current becomes perceptible upon entering the*

*eastern mouth of the stream, immediately after leaving the French River bay, and at one place, a little over half-a-mile up the channel, there is a rapid, giving a fall of about a foot and a-half. Above the bifurcation of the river, there are fourteen falls, and one jam of drift-wood, where portages are necessary, both ascending and descending, and there are several rapid besides, which require to be portaged when ascending the river, although they can mostly be run when proceeding downward.*

#### 3.3.1.1 Stinson Dam and Upstream of the Stinson Dam

There is a complete barrier to upstream fish migration at the Stinson GS. The Stinson Dam is built across a bedrock chute. It is not known if there was a complete barrier to upstream fish migration here prior to the dam construction in the early 1920s but, based on its width and slope **Error! Reference source not found.** the chute was probably at least a seasonal barrier to upstream fish migration. Murray (1857) indicates that there were two falls at this site, one 2.1 meters (7 feet) high and another 2.4 meters (8 feet) high.

Today, the next complete barrier to upstream fish passage is at the Moose Rapids GS, approximately 16 km upstream from the Stinson GS. Murray (1856) indicated that there was a fall of 1.8 m (6 feet) and a rapid approximately 6.5 km upstream from the Stinson site; both of these features are now backwatered by the Stinson Dam. Approximately 4.6 km upstream from the Moose Rapids GS, the control dam at the outlet of Lake Wanapitei is also a barrier to upstream fish migration.

#### 3.3.1.2 From the Stinson Dam to Coniston Dam

There is a bedrock chute (Timmins Chute) (Figure 4-5) approximately 0.8 km downstream from the Stinson GS which is likely a barrier to upstream fish passage under high flows and may be a significant impediment under other flows.



*Figure 3-5 Upstream Portion of Timmins Chute, Viewed from the Snowmobile/Pedestrian Bridge. May 9, 2022.*

### 3.3.1.3 From the Coniston Dam downstream to the French River

Upstream fish passage is not possible at the Coniston GS and downstream passage can only occur through the GS or via the spillway when river flow exceeds the plant capacity. Based on the height and shape of the bedrock outcrop at the base of the dam at Coniston (Figure 3-6 below), it is likely that a complete barrier to upstream fish movement was present prior to dam construction. Murray (1857) indicated that the falls and rapids there resulted in an elevation change of 18.3 m over 0.42 km. (60 feet over 0.26 mile).





*Figure 3-6 Bedrock Outcrop at the Base of the Coniston Dam. Person near left margin provides scale. August 5, 2020.*

The McVittie GS, which is 27.5 km downstream from the Coniston GS, is also a complete barrier to upstream fish migration. It is likely that a complete barrier to upstream migration was also present at McVittie prior to the construction of the dam and generating station, based on the visible bedrock (Figure 3-7). There are three locations between the Coniston GS and the McVittie GS where, at a minimum, seasonal barriers to upstream migration are thought to occur. A steep bedrock chute is located approximately 17 km downstream of the Coniston GS, just upstream of Highway 400 at the south end of the village of Wanup, (Figure 3-8). Second Falls is approximately 20.1 km downstream from the Coniston GS (Figure 3-9) and aerial imagery shows a third bedrock outcrop located approximately 1.3 km upstream from the McVittie GS.





*Figure 3-7 Bedrock Outcrop at the Base of the McVittie GS Dam. August 22, 2002.*



*Figure 3-8 Steep Bedrock Chute on the Wanapitei River, 17 km Downstream from the Coniston GS. May 3, 2016.*





*Figure 3-9 Second Falls, Approximately 20.1 km Downstream from the Coniston G.S. May 3, 2016.*

There are four more locations between the McVittie GS and the French River that are thought to be at least partial barriers to upstream fish migration. A bedrock chute approximately 4 meters wide, 3.25 km downstream from the McVittie GS (Figure 3-10) was examined during field investigations supporting the environmental assessment for the McVittie GS and considered to be a barrier to upstream migration by most fish species under most flow conditions. (C. Portt and Associates, 2004). The river crosses bedrock outcrops approximately 19 km downstream (just downstream from the Highway 637 bridge) and 26 km downstream from the McVittie GS, which may be barriers under some flow conditions. Sturgeon Chutes, located approximately 38 km downstream from the McVittie GS and 5 km upstream from the confluence of the Wanapitei and the French Rivers, may also be a barrier to upstream migration by some species under some flow conditions.





*Figure 3-10 Rock Chute Approximately 3.25 km Downstream from the McVittie Generating Station. October 15, 2002.*

### **3.4 Benthic Invertebrates and Water Quality**

The proposed refurbishment will not result in any new inundation and there are no proposed changes to the WRWMP compliance requirements with respect to water levels, therefore, the Project does not trigger requirements of the OWA Best Management Practices (BMP) for Small Hydropower and Methyl Mercury or the OWA BMP Surface Water Quality and Fish Sampling Programs guideline document. Therefore, no proposed fish tissue sampling is proposed, and water quality monitoring isn't required as per these Guides. No changes to the benthic invertebrate community are anticipated as a result of the proposed refurbishment.

## 4 Environmental Effects, Mitigation and Monitoring

### 4.1 Consideration of Providing Fish Passage

#### 4.1.1 Upstream Fish Passage

Fisheries and Oceans Canada requested that OPG consider providing upstream fish passage at both Coniston GS and Stinson GS. The intent of providing fish passage is to allow fish to optimize their use of the environment by moving between habitats as their optimal habitats change seasonally or for different life stages. Lake Trout moving to the colder hypolimnion of lakes, where they spend the summer, is an example of seasonal movement. Migration of Sea Lamprey (*Petromyzon marinus*) into Great Lakes tributaries to spawn, and the development of ammocoetes in those tributaries, is an example of movement to meet the differing habitat requirements of different life stages.

Providing upstream fish passage at previously impassable natural barriers (e.g., Coniston) is usually not recommended because this could alter the existing fish communities (Silva *et al*, 2017). Within the Wanapitei River, this is probably not a major concern, as the fish communities are similar upstream and downstream from the Coniston GS and the Stinson GS. Another benefit of barriers to upstream migration is prevention of the spread of introduced species. Again, this may not be a major issue in this reach of the Wanapitei River. There is a complete barrier to upstream migration at McVittie which prevents introduced species present in Lake Huron (e.g. Sea Lamprey, Pacific salmon, *Oncorhynchus* spp.) from moving upstream.

The presence of barriers to upstream fish migration is not unusual in rivers on the Canadian Shield and the fish community in the Wanapitei River is not unusual for those rivers. The fish species present occur in both rivers and lakes and can complete their life cycle in either; although, where the adults reside in lakes, some of the species (e.g., Walleye, White Sucker) typically migrate into streams to spawn if suitable streams are available.

If habitat for all life stages of a species is present within the reaches between barriers, then creating the opportunity for upstream movement between those reaches is unlikely to result in a significant increase in fish productivity. Habitat that appears suitable for Walleye and White Sucker spawning is present immediately downstream from the Stinson Generating Station, but no Walleye were observed there during a spawning survey conducted in the spring of 2022. Walleye were observed during the 2022 Walleye spawning survey at the base of Timmins Chute, approximately 650 m downstream from the Stinson GS. Timmins Chute may be a barrier to upstream migration during high flows and the area at its base may be the principal, or perhaps the only, Walleye spawning location in the reach of the river between the Coniston GS and Stinson GS.

The headponds of the Coniston GS and Stinson GS provide nursery and adult foraging and overwintering habitat (and more habitat than was present prior to dam construction). Given the variety of habitats present between the generating stations (Coniston, Stinson, and Moose Rapids) and the similarity of the habitats in each of the reaches, there is probably little potential increase in fish productivity that would be gained by providing for upstream fish movement at Stinson GS.

### 4.1.2 Downstream Fish Passage

Prior to dam and generating station construction, downstream fish passage would have occurred via the natural river channel. With the dam and generating station in place, downstream fish passage can occur via the spill channel (i.e., the river channel) or passage through the generating station.

The effect of the dam and GS construction on the number of fish moving downstream is unknown. The upstream impoundment created by the dam has a considerably larger cross-sectional area, and therefore a considerably lower average velocity, than the natural river channel would have had. If the proportion of the fish present that move downstream past the Coniston site is positively correlated with mean current velocity, that proportion would be lower with the dam and GS in place.

To evaluate the change in downstream fish movement in absolute terms (i.e., total number of fish), it would be necessary to know the change in the number of fish present in the reach upstream that resulted from the construction of the dam and GS, as flooding upstream from the dam has created fish habitat. The habitat upstream from the dam is deeper and probably provides more overwintering habitat than when the river was in its natural state. The increase in total habitat and overwintering habitat created by the dam have not been determined, nor has the effect of the reduced mean velocity on fish retention, but it is reasonable to conclude that more fish are present in the upstream reach and a smaller proportion of those fish are carried downstream under the present conditions than prior to dam and GS construction.

As stated above, under the present conditions, fish can pass downstream via the spill channel or through the generating station. Fish could be killed moving downstream via either route. There are few data on fish mortality as a result of passage over small, natural falls, but dead or injured fish are not typically seen below barriers such as existed at Stinson prior to the generating station being constructed. Dead or injured fish however, are also not typically seen downstream from small hydroelectric facilities such as the Stinson GS, nor are concentrations of scavengers or predators that would feed on dead or injured fish.

Injury or death of fish passing through turbines can occur due to blade strike, pressure changes, sheer forces, turbulence, and cavitation (Čada, 2001; Coutant and Whitney, 2000). The rates of mortality and injury to fish that pass through hydroelectric turbines is the subject of considerable scientific research but determining these rates is not simple and they are affected by the facility characteristics (e.g., dam height) including turbine characteristics (e.g., turbine design and velocity) as well as fish species, size and life stage (Radinger *et al*, 2021; Algera *et al*, 2020).

The existing GS utilizes Francis turbines. The previous iteration of the project proposed to use Kaplan or SAXO type turbines. The proposed iteration of the project is based on using DIVE turbines. In general, information suggests that SAXO turbines cause less harm to fish than Francis turbines and that DIVE turbines should be better still. This together with the topic of fish productivity is discussed further below.

It is generally accepted that passage through Kaplan turbines cause less harm to fish than passage through Francis turbines (Algera, 2020; Twardek *et al.*, 2022). Pracheil *et al.* (2016) determined that average mortality of *Perca* sp. was 5% in Kaplan turbines compared to 31% in Francis turbines and that average mortality of *Sander* sp. was 14% in Kaplan turbines compared to 39% in Francis turbines. For both genera, however, confidence limits were wide. A meta-analysis by Algera *et al.* (2020) concluded that Kaplan turbines have an average mortality risk ratio (increase



in risk of mortality relative to controls not passing through the turbine) of 144% compared to 522% for Francis turbines.

The effect of turbine injury and mortality on fish productivity is difficult to assess (Aglera *et al.*, 2020). Aglera *et al.* (2020) state, “In terms of the consequences of entrainment to fish productivity in the upstream reservoir, all entrained fish are no longer contributing regardless of the outcome of their passage success (i.e., survival or mortality) if no upstream passage is possible.” In other words, mortality due to passage through a turbine (or over a falls) has no impact on productivity upstream from a GS (or a falls) if upstream migration is not possible. The impact can only be on productivity downstream. If fish move downstream past a barrier to upstream movement and survive, they add biomass to the downstream reach and, if the downstream reach contains suitable habitat adequate food resources, they will contribute to the productivity in the downstream reach via the same mechanisms as they would in the upstream reach (growth, reproduction). If fish die as a result of their downstream passage, either immediately or later due to injury, they transfer packets of energy to the downstream reach that will be utilized by organisms within that reach at some trophic level. This contrasts with fish that are removed from the aquatic system (e.g., for human consumption) whose energy is removed from the system.

Information provided to date is that, based on their design, the DIVE turbines should result in less fish mortality than either Francis or SAXO type turbines, but to the best of our knowledge this has not been quantified.

#### 4.1.3 Overall Impact Regarding Fish Passage

As a dam and a GS are already in place, the proposed refurbishment will represent no change in terms of overall fish passage.

## 4.2 Effects Assessment and Mitigation Measures

The available environmental baseline and site-specific information provided the basis for an assessment of potential effects of the proposed Stinson Generating Station Life Extension Project on the aquatic environment.

The selection and application of general fisheries avoidance and mitigation measures to avoid or mitigate potential effects of proposed construction and operation are based on the following nine principles:

1. Avoid permanent destruction or harmful alteration of fish habitat, where practicable, through siting of facilities and project design.
2. Where unavoidable, minimize the permanent destruction or harmful alteration of fish habitat to the extent practicable through siting of facilities and project design.
3. Avoid temporary harmful alteration of fish habitat to the extent practicable during construction.
4. Where unavoidable, minimize temporary destruction or harmful alteration of fish habitat to the extent practicable by implementing appropriate mitigation measures.
5. Minimize the area and duration of habitat disturbance.
6. Appropriate timing of construction activities, whenever practicable, to avoid sensitive time periods and limit the length of time of potential effects.



7. Avoid causing death of fish, where practicable, during construction.
8. Where unavoidable, minimize the death of fish during construction by implementing appropriate mitigation measures.
9. Minimize the death of fish during operations, to the extent practicable, through project design and by implementing appropriate avoidance and mitigation measures.

The potential effects of the project will be limited to temporary construction effects (e.g., due to vegetation clearing, exposed soil, dewatering of the Intake Canal, excavation, noise,). Permanent changes to physical habitat (e.g., changes in wetted area, substrate, water velocity) are not proposed. The only operational effects may be a reduction (improvement) in fish mortality for fish that get entrained due to the DIVE turbine design.

Recommended avoidance and mitigation measures to avoid or minimize the potential harmful effects on the aquatic environment considered best industry practices described in various sources such as: OWA Standing Guidance for Temporary Dewatering and Repair of Hydroelectric Facilities and Water Control Structures in Ontario (2024, relevant Fisheries and Oceans Canada (DFO) Standards and Codes of Practices (e.g., Routine Maintenance Dredging and End-of-Pipe Fish Protection Screens for Small Water Intakes in Freshwater), and Ontario Provincial Standard Specifications as well as government agency and other organization consultation. Assessment of the DFO pressures, avoidance and mitigation measures was also considered in the development of mitigation, monitoring and project design measures. (<https://www.dfo-mpo.gc.ca/pnw-ppe/measures-mesures-eng.html>).

## 4.3 Potential Effects and Associated Mitigation During Construction

### 4.3.1 Death of Fish

The potential for death of fish during construction is very low as no blasting, in-water works nor cofferdams are proposed. Death of fish could occur during the de-watering of the Intake Canal.

As indicated in section 2.7.4 the Intake Canal will be dewatered using the existing intake structure and stop logs. This will allow the removal of the two isolation gates for off-site restoration and removal of the hoist frame for replacement. The Intake Canal will be drained through the powerhouse and existing units. Pumps will be utilized to assist in final dewatering if necessary. It is expected that most fish present in the Intake Canal will move downstream through the penstocks and GS as the intake canal is drained. A fish relocation plan will be developed and implemented by the constructor to capture and relocate fish that remain within the Intake Canal during final dewatering, being relocated to the upstream side of the canal. This work will require a Licence to Collect Fish for Scientific Purposes issued under the *Fish and Wildlife Conservation Act*, which is obtained from MNRF. If pumps are to be used, intake screens adhering to the DFO code of practice will be used to prevent the impingement or entrainment of fish during dewatering (<https://www.dfo-mpo.gc.ca/pnw-ppe/codes/screen-ecran-eng.html>). No mussels were observed in the project vicinity during field investigations, however, mussels within the dewatered areas will be relocated during the fish relocation program if they are present.

### 4.3.2 Changes to Wetted Habitat

No permanent changes to the area or nature of existing wetted habitat will occur as a result of the project. During construction, the man-made Intake Canal will be de-watered and not available to fish.

The existing GS has a maximum capacity of 43.4 m<sup>3</sup>/s. During construction there will be a significant increase in the volume of water and the proportion of the time that water is discharged through the spillway. This in turn will result in more habitat being available in the spillway, especially when flows are lower than the GS capacity. Based on average daily flow data, flow was less than 43.4 m<sup>3</sup>/s 75 percent of the time during the period between 1999 and 2019 (Figure 3-3). It should be noted that the upper spillway is steep and when discharge is high the high-water velocities there limit fish use.

Overall, the net effect on fish productivity during construction, which is estimated to slightly over one years, is expected to be a minor positive one.

### **4.3.3 Changes to Riparian Vegetation**

Little alteration of riparian vegetation is anticipated. Most of the construction area is occupied by existing infrastructure. Figure 2-9 indicates that the two areas most likely to be cleared for use as laydown areas are set back from the shoreline.

### **4.3.4 Changes to Fish Passage**

For a discussion on fish passage see section 4.1. There will be no change to upstream fish passage during construction.

Under present conditions fish can be conveyed downstream through the GS or via the spillway, depending on where water is being discharged. During construction there will be no flow through the GS and downstream fish passage can only occur via the spillway.

### **4.3.5 Changes to Surface Hydrology**

During construction water will not be flowing through the intake canal and existing GS and therefore more water will be passing through the spillway. The construction of the project is not expected to have any other effect on surface hydrology. As previously noted, the increased volume of flow through the spillway will result in a temporary increase in the area of available habitat, and increases in depth and velocity, with the magnitude of the changes dependent upon flow.

### **4.3.6 Changes to Groundwater Hydrology**

Based on the available groundwater data, static groundwater levels are expected to be approximately 1.1 to 1.3 meters below the ground surface at the proposed retaining wall area of the powerhouse. Groundwater levels will fluctuate depending on the season and following precipitation events, hence the actual groundwater level at the time of construction could vary from that what was reported in the geotechnical report. KGS has advised that the contractor develop a plan for managing the groundwater during construction (KGS, 2023). No changes to groundwater hydrology are expected with the project as the powerhouse is already in existence.

### 4.3.7 Changes to Water Quality

During construction, water quality in the Wanapitei River may be affected by suspended sediment generated by land-based construction activities (e.g., soil erosion, dewatering, stormwater runoff) or incidental spills and/or waste material dispersion.

Stinson is in an Intake Protection Zone, specifically IPZ3 Vulnerability Scoring 8. This designation is associated with Greater Sudbury's *Greater Sudbury Source Protection Area Source Protection Plan (Source Protection Plan)*. The Zoning By-Law does restrict certain uses from the IPZ3 zone but none of these are applicable to Stinson. Stinson GS is rated a score of 8 because it lies upriver of the Wanapitei Water Treatment Plant which is located off Highway 17 directly across from Coniston Hydro Road.

While a number of policies are applicable to the IPZ3 Zone, none of them seem applicable to OPG and the Stinson GS. This could be confirmed with a discussion with Conservation Sudbury.

OPG will consult with the City of Greater Sudbury on any municipal issues of concern (preliminary consultation has already occurred).

Overall, with the implementation of the mitigation measures described in this document, the effects of the construction of the proposed Project on water quality are expected to be localized, temporary and negligible.

#### 4.3.7.1 Erosion and Sediment Control

There is a risk to the Wanapitei River by sediment loadings due to accelerated soil erosion during construction. Till and gully erosion caused by channelized overland flow can be a major source of soil erosion. Sheet erosion can also be a source of sediment.

Erosion and sediment control will be an integral component of the construction planning process. All personnel involved with the proposed works will be briefed on erosion and sediment control including engineers, contractors, inspectors and environmental staff. A site-specific Sediment and Erosion Control Plan and Stormwater Management Plan is to be prepared by the DBC. The site-specific Erosion and Sediment Control Plan will be part of a broader site-specific Environmental Management Plan required for the construction period of the project. Sediment and erosion control measures should be implemented prior to work and maintained during the work phase, to prevent entry of sediment into the water. This should include sediment removal from areas within the cofferdams and within work areas such as the powerhouse foundation area, draft pit and tailrace excavation. Judicious selection of the discharge location and water pressure during dewatering will minimize potential effects of in-water construction activities on water quality in the Wanapitei River. The plan should also include the use of silt curtains or cofferdams, if appropriate, during any in-water work to prevent deleterious substances from entering fish habitat.

Management of dredged material and control of runoff will be addressed by the site-specific Sediment and Erosion Control Plan and Stormwater Management Plan to be prepared by the DBC.

As indicated, in Section 5.1.3, the perimeter of natural shoreline is limited in the area of proposed construction, however, during construction the removal of any natural shoreline vegetation should be minimized, and consideration made to armor potentially erodible shoreline proximate to the proposed GS.

In general, the following guidelines will be applied in the development of the Erosion and Sediment Control Plan:

- fitting of proposed works to the terrain (i.e., using the natural topography of the land in the placement and organization of the construction site);
- timing of grading and construction activities to minimize soil exposure;
- retention of existing vegetation where feasible;
- restriction of the use of heavy construction equipment to within the approved work areas to minimize soil disturbance and vegetation destruction;
- storage of stripped soil at upland locations with a minimum of 5 m from the edge of the River and above the high water mark;
- implementation of erosion control measures, e.g., rip-rap berms underlain by filter geotextile, straw bales used as filters, silt fencing along the shoreline and/or mulching for interim stabilization;
- diversion of runoff away from exposed areas;
- minimization of the length and steepness of slopes subject to erosion;
- maintenance of low runoff velocities;
- design of drainage works, such as ditches and outfalls, to handle concentrated runoff;
- retention of sediment on site;
- routine inspection and maintenance of erosion and sediment control measures; and
- re-vegetation of disturbed areas by seeding and/or planting following construction as soon as seasonal conditions permit.

More detailed direction with respect to erosion and sediment control can be obtained by looking at Ontario Provincial Standard Specification 805, Construction Specification for Temporary Erosion and Sediment Control Measures.

The use of settling ponds (which are not anticipated) will require Environmental Compliance Approvals under the OWRA. The DBC will be responsible for the final design of the settling ponds, if required, including locations of such works, treatment options, volumes, discharges to the environment, proposed monitoring plans and effluent criteria for parameters of concern (e.g., pH, TSS, turbidity, hydrocarbons, total ammonia).

With the implementation of the site-specific Erosion and Sediment Control Plans, the potential effects of soil erosion and turbidity generation will be minimized or obviated.



#### 4.3.7.2 Management and Control of Hazardous Materials, Construction Wastes, and Incidental Spills

Management and control of hazardous materials, construction wastes, groundwater and incidental spills is described in detail in the Terrestrial Environment TSD and takes into account best industry practices listed at the beginning of section 4.2.

In summary, all materials and equipment used for the purpose of site preparation and proposed Project completion should be operated and stored in a manner that prevents any deleterious substance (e.g., petroleum products, debris, etc.) from entering the water or spilling onto land. Incidental spills of oil, gas, diesel fuel and other liquids to the environment could occur during construction. Fuelling and lubrication of construction equipment should be carried out in a manner that minimizes the possibility of releases to the environment. All hazardous materials should be clearly marked and stored safely on site to avoid accidental release.

Measures for containment and cleanup of contaminant releases should be followed to minimize contamination of the natural environment, e.g., placement of fuel tanks and generators on an appropriate form of containment where possible, monitoring and other measures documented in the Environmental Management Plan. At all times where spills are a risk, appropriate materials for cleanup and approved disposal locations should be available. Spills or other discharges should be reported to the MECP as required by provincial legislation. Interim sanitary waste collection and availability of treatment facilities should be arranged for the duration of the construction period. All construction waste, washwater and wastewater should be disposed of in accordance with regulatory requirements.

During powerhouse construction, there is a potential for accidental loss of cement during surface application. Any dripped cement should be recovered from the river bottom for suitable disposal. All trash and other solid debris should also be collected for appropriate disposal.

A Hazardous Materials Management Plan, Waste Management Plan and a Spills Emergency Preparedness and Response Plan will be developed as part of the site-specific Environmental Management Plan. The implementation of these pollution prevention plans will obviate or minimize the environmental effects of accidental releases to the natural environment that have the potential to affect surface water and groundwater quality in the proposed Project area.

### 4.4 Potential Post-construction and Operational Effects and Associated Mitigation, Enhancement and Monitoring Measures

#### 4.4.1 Wanapitei River Water Management

OPG does not propose to alter the existing water management compliance requirements associated with this facility. The Stinson GS will continue to be operated in full accordance with WRWMP required levels and flows.

As already indicated, the original GS had a capacity of 4.75 megawatts (MW) with a plant discharge flow of 43.4 m<sup>3</sup>/s. The proposed GS will have a capacity of 6.0 MW based on a plant discharge flow of 43.5 m<sup>3</sup>/s.

#### **4.4.2 Surface Water Hydrology**

As stated in the preceding section, the total GS capacity after redevelopment (43.5 m<sup>3</sup>/sec) will be nearly identical to the original capacity (43.4 m<sup>3</sup>/sec). Consequently, no major changes in the relative amounts of water passing through the station and the spillway are expected to occur.

#### **4.4.3 Groundwater Hydrology**

No effects on groundwater hydrology or quality are anticipated as a result of the redevelopment of the GS; therefore, no mitigation is required.

#### **4.4.4 Surface Water Quality**

The re-development of the Coniston Generating Station is not expected to have any negative effects on water quality. Water will go through the powerhouse and be returned to the river in approximately the same locations and volumes as prior to development. The proposed project does not result in any new inundation which might impair water quality.

All of OPG's powerhouses have an oil-water separator in place that separates oily substances and prevents them from entering the river. All of OPG's GSs contain spill equipment and personnel trained in its use should regular operations activities result in spills.

#### **4.4.5 Sediment Erosion and Transport**

The final site grading and elevations will be designed to minimize erosion and manage stormwater.

Once the site is fully re-developed and any unstable areas stabilized, the erosion and sediment control measures will be removed from the site except for any permanent ditches, berms or other features that are recommended to prevent any sediment from entering the river and erosion from occurring.

As the proposed project will be operating according to the requirements of the existing WRWMP, OPG does not anticipate any changes to localized erosion patterns on the river.

#### **4.4.6 Changes to Aquatic Habitat**

##### **4.4.6.1 Downstream from the powerhouse**

No existing habitat will be eliminated, or significantly altered, downstream from the powerhouse. Post-development, flow from the tailrace will enter the river channel at the same location as prior to redevelopment and the maximum flow through the GS will be essentially unchanged, so no changes to depths or water velocities are expected.

#### 4.4.6.2 Upstream from the powerhouse

The existing intake canal will be isolated through the installation of stoplogs within the existing inlet structure. The canal downstream of the inlet will be dewatered by OPG and maintained until all works are complete and the site is ready for commissioning.

As indicated previously, no upstream fish passage is possible at the Stinson GS and this will not change as a result of the refurbishment.

#### 4.4.7 Downstream Fish Passage, Impingement and Entrainment

Under existing conditions, fish can be conveyed downstream through the GS or via the spillway, depending on where water is being discharged. This will continue to be the case post-development. There will be no change to the conditions experienced by fish passing downstream through the spillway because of redevelopment. The intake velocities to the powerhouse will not change.

#### 4.4.8 Fish Mortality Due to Passage Through the GS

The rates of mortality and injury to fish that pass through hydroelectric turbines is the subject of considerable scientific research, however, determining these rates is not simple and they are affected by the facility characteristics (e.g., dam height) and turbine characteristics (e.g., turbine design and velocity) as well as fish species, size and life stage (Radinger *et al.*, 2021; Algera *et al.*, 2020). There are no mortality or injury data for the Stinson GS. To the best of our knowledge, dead or injured fish have not been reported downstream from the Stinson GS, nor are concentrations of scavengers or predators (e.g., gulls, terns) that feed on dead or injured fish, which suggests that the number of fish injured or killed is not large.

There will be no changes to intake velocities from the existing situation.

The DIVE turbines are considered an improvement over the existing Francis turbines. However, this improvement would be difficult to quantify and assess.

## 4.5 Summary of Mitigation, Enhancement and Monitoring Measures

Table 4-1 summarizes potential construction and operation effects, the recommended mitigation/remedial measures to minimize or obviate these effects and the net effects of the proposed project.

Table 4-1 Potential Construction and Operation Effects

Effect/Activity	Recommended Mitigation/Remedial Measures	Net Effect
<b>Construction</b>		
Death of fish	<ul style="list-style-type: none"> <li>Capture and relocate fish from areas that are dewatered.</li> </ul>	Negligible Effect
Loss of riparian habitat	<ul style="list-style-type: none"> <li>Avoid disturbance or riparian areas where possible.</li> <li>Minimize the area of riparian disturbance to what is necessary.</li> </ul>	Negligible Effect
Change in water quality		
Soil erosion	<ul style="list-style-type: none"> <li>Adherence to Erosion and Sediment Control Plan.</li> <li>Final site grading and elevations designed to minimize erosion and manage stormwater.</li> <li>Following construction, revegetate disturbed areas that are no longer required to suit the surrounding environment.</li> </ul>	Negligible Effect
Incidental spills	<ul style="list-style-type: none"> <li>Adherence to Spills Emergency Preparedness and Response Plan.</li> </ul>	Negligible Effect
Hazardous materials/waste	<ul style="list-style-type: none"> <li>Adherence to Hazardous Materials Management Plan and Waste Management Plan.</li> <li>Waste disposal in accordance with regulatory requirements.</li> </ul>	Negligible Effect
Dewatering	<ul style="list-style-type: none"> <li>If required, treat dewatering effluent to prevent sediment from entering the watercourse.</li> </ul>	Negligible Effect
Isolation and dewatering of the man-made Intake Canal	<ul style="list-style-type: none"> <li>Capture and relocation fish (and mussels if present) trapped in the area that will be dewatered.</li> </ul>	Eliminates or minimizes fish mortality due to dewatering
Sportfish populations	<ul style="list-style-type: none"> <li>As a condition of employment, prohibition of sportfishing by construction workers while working.</li> </ul>	No Effect
<b>Operation</b>		
Incidental spills	<ul style="list-style-type: none"> <li>Adherence to OPG's Environmental Management System.</li> </ul>	Negligible Effect
Water management operations	<ul style="list-style-type: none"> <li>None recommended: no changes predicted.</li> </ul>	Negligible Effect
Sediment erosion and transport	<ul style="list-style-type: none"> <li>Protect banks where there is erosion potential with suitably sized substrate.</li> </ul>	Negligible Effect
Loss/gain of fish habitat	<ul style="list-style-type: none"> <li>No change to fish habitat.</li> </ul>	Negligible Effect
Fish entrainment and survival	<ul style="list-style-type: none"> <li>No change to entrainment. Mortality expected to be lower.</li> </ul>	Reduction in mortality predicted.



## 5 Summary and Conclusions

An environmental assessment is not required for the Stinson Generating Station (GS) Life Extension Project. An environmental assessment is not required in Ontario for waterpower facilities when the re-developed facility has its capacity restricted to an increase of 25% or less than the existing one. While an environmental assessment is not required on the project an assessment of aquatic environment conditions, potential environmental impacts and proposed mitigation and monitoring measures are described in this Aquatic Environment Technical Support Document in order to: support discussions with any other government agencies on aquatic environment issues; and provide direction to OPG, its Owner's Engineer and its constructor contractor on necessary terrestrial environment considerations including construction stage mitigation and monitoring measures.

This Report describes the fieldwork undertaken including walleye spawning, fish habitat and fish community surveys. The results of these studies are presented and form part of the description of the local environment. This Report also contains detailed mitigation and monitoring measures to eliminate and lessen potential environmental effects on the aquatic environment. The mitigation and monitoring measures proposed are very similar in scope and detail to the measures proposed for the Coniston Generating Station Life Extension Project. With one constructor proposed for the two projects and with two closely located and similarly sized sites, it is recognized that common mitigation and monitoring measures are likely going to be easier to understand and implement.

## 6 References

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## 7 Acronyms and Abbreviations

AAFN	Atikameksheng Anishnawbek First Nation
ARD	Acid Rock Drainage
Arcadis	Arcadis Canada Inc.
BMP	Best Management Practices
Beacon	Beacon Environmental
OWA Class EA	Class Environmental Assessment for Waterpower Projects
CFSA	<i>Crown Forest Sustainability Act</i>
CGSLEP	Coniston Generating Station Life Extension Project
CHDR	Cultural Heritage Documentation Report
CHER	Cultural Heritage Evaluation Report
DB	Design Build
DBC	Design-Build Contractor
DFO	Department of Fisheries and Oceans
DFN	Dokis First Nation
e.g.	For example (exempli gratia)
EA	Environmental Assessment
ECA	Environmental Compliance Approvals
EPA	<i>Environmental Protection Act</i>
ESA	<i>Endangered Species Act</i>
et al.	And others (et alia)
etc.	And so on (et cetera)
FRL	Forest Resource Licence
FWCA	<i>Fish and Wildlife Conservation Act</i>
GS	Generating Station
HADD	Habitat alteration, disruption or destruction
HIA	Heritage Impact Assessment
HIFN	Henvey Inlet First Nation
Hydro One	Hydro One Networks Inc.
i.e.	That is (id est)

INAC	Indigenous and Northern Affairs Canada
KGS Group	Kontzamanis, Graumaun, Smith, MacMillan Inc.
KM	Kilometre
LIO	Land Information Ontario
<i>LRIA</i>	<i>Lakes and Rivers Improvement Act</i>
M5	Extractive Industrial
MECP	Ontario Ministry of Environment, Conservation and Parks
MHSTCI	Ministry of Heritage, Sport, Tourism and Culture Industries
MNR	Ontario Ministry of Natural Resources and Forestry
NFN	Nipissing First Nation
NHIC	Natural Heritage Information Centre
<i>NWA</i>	<i>Navigable Waters Act</i>
<i>NWPA</i>	<i>Navigable Waters Protection Act</i>
O. Reg.	Ontario Regulation
OBBA	Ontario Breeding Bird Atlas
OGS	Ontario Geological Survey
<i>OHA</i>	<i>Ontario Heritage Act</i>
OMNR	Ontario Ministry of Natural Resources
OMNRF	Ontario Ministry of Natural Resources and Forestry
OPG	Ontario Power Generation Inc.
ORAA	Ontario Reptile and Amphibian Atlas
OWA	Ontario Waterpower Association
<i>OWRA</i>	<i>Ontario Water Resources Act</i>
pers. comm.	Personal communication
PTTW	Permit to Take Water
RFR	Request for Review
RU	Rural
S&Gs	Standards & Guidelines for Conservation of Provincial Heritage Properties
S5	Secure – common, widespread and abundant in the Province
SAR	Species at risk
<i>SARA</i>	<i>Species at Risk Act</i>



Proposed Stinson Generating Station Life Extension Project  
Aquatic Environment Technical Support Document (Final Draft)

SCHV	Statement of Cultural Heritage Value
SCP	Strategic Conservation Plan
SGSLEP	Stinson Generating Station Life Extension Project
SLS	Seasonal Limited Service
WFN	Wahnapitae First Nation
WMP	Water Management Plan
WR	Wanapitei River
WRA	<i>Ontario Water Resources Act</i>
WRFN	Whitefish River First Nation
WRWMP	Wanapitei River Water Management Plan

# Appendix A

**Initial Fish and Fish Habitat Investigations in Support of the  
Engineering Assessment of Development Options for the  
Stinson GS, Wanapitei River**

# **INITIAL FISH AND FISH HABITAT INVESTIGATIONS IN SUPPORT OF THE ASSESSMENT OF DEVELOPMENT OPTIONS FOR THE STINSON GS, WANAPITEI RIVER**

**2021**



Submitted to:

Ontario Power Generation Inc.  
700 University Avenue  
Toronto, Ontario, M5G 1X6

February 2021

C. PORTT and ASSOCIATES  
56 Waterloo Avenue  
Guelph, Ontario, N1H 3H5  
[cportt@sentex.net](mailto:cportt@sentex.net)

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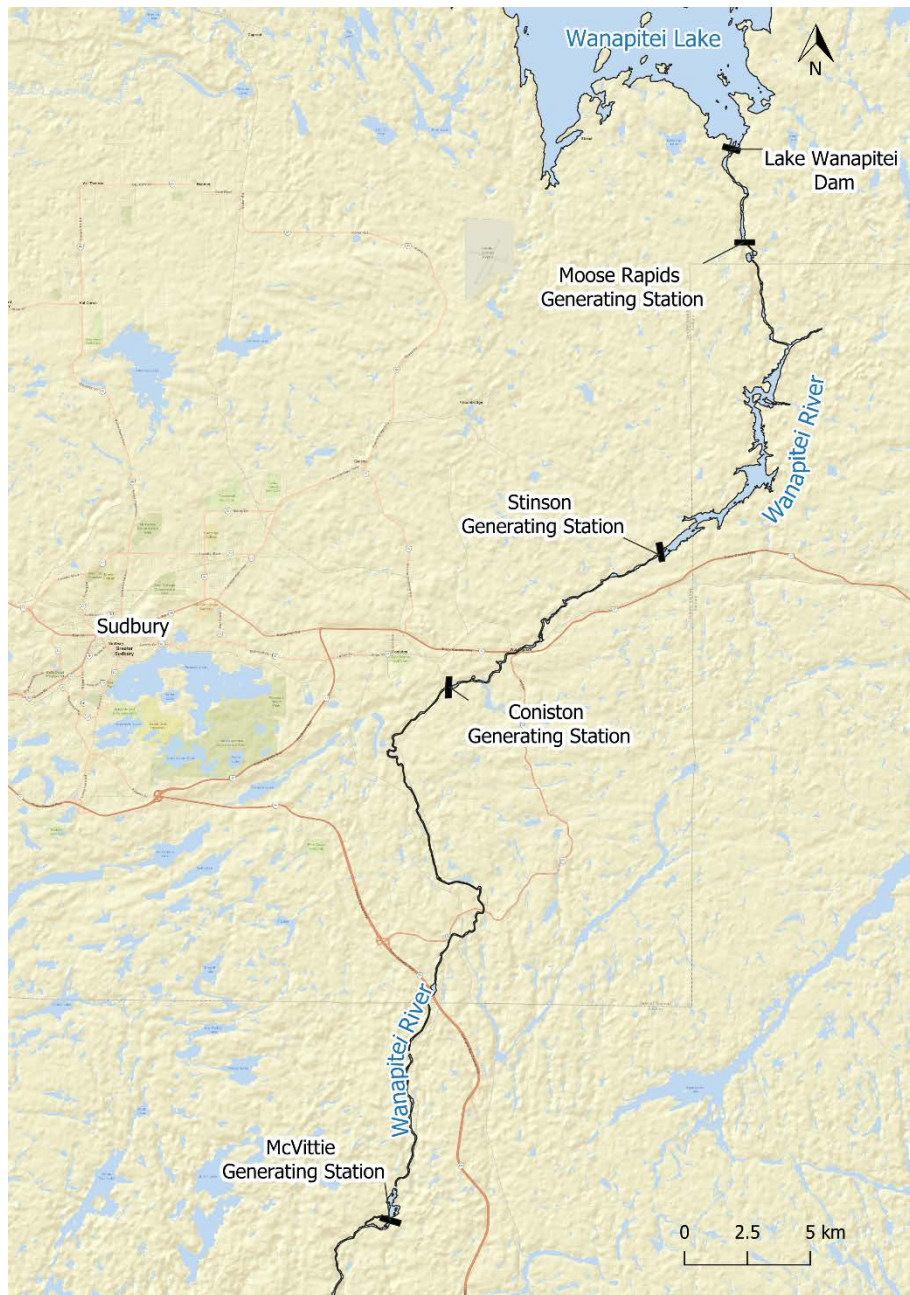


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## 1 Introduction

C. Portt and Associates was retained by Ontario Power Generation Inc. (OPG) to conduct an initial aquatic habitat and fish community investigation at the Stinson Generating Station (GS) on the Wanapitei River, approximately, 20 km east of Sudbury, Ontario (Figure 1-1). This initial investigation is in support of the assessment of options for development opportunities at this site, which considers overhaul, refurbishment, and redevelopment. This document presents the results of the background information review and the field investigations undertaken in 2020.

Figure 1-1. Location of the Stinson GS on the Wanapitei River.



## 2 Background

### 2.1 Project location and infrastructure

The two unit generating station was placed in service in 1925 with an installed capacity of 5.4 MW and a maximum flow of 48.8 m<sup>3</sup>/s (OMNR *et al.*, 2011). It is located on the Wanapitei River, south of Lake Wanapitei, where the river flows in a southerly direction, eventually discharging into the French River which flows into Lake Huron. Lake Wanapitei water levels and downstream river flow are regulated by the Lake Wanapitei dam (Figure 1-1), which is operated by OPG (OMNR *et al.* 2011). A total of four generating stations are located along the Wanapitei River, downstream of Lake Wanapitei (Figure 1-1). Moose Rapids GS (operated by TransAlta) is approximately 16 river kilometers upstream from the Stinson GS, while Coniston and McVittie generating stations, both operated by OPG, are located approximately 11 and 38 river kilometers downstream of Stinson, respectively (Figure 1-1).

Figure 2-1 illustrates the general habitat and flow conditions in the vicinity of the GS and identifies project infrastructure. The Stinson GS bypasses water around a 140 m section of river that is now the spillway. The forebay, located between the intake and penstocks is approximately 75 m long. Water discharged from the powerhouse enters the river directly, as there is no tailrace.

Figure 2-1. Wanapitei River in the vicinity of the Stinson GS.





## 2.2 Fish Community

The McVittie, Coniston and Stinson GS dams are barriers to upstream fish passage, and from a fish population perspective, divide the Wanapitei River, upstream of McVittie GS, into partially isolated reaches (Figure 1-1). There is no upstream fish passage at these three generating stations, and downstream passage can only occur through a powerhouse, or via the spillways when river flow exceeds plant capacity.

A diverse community of fishes exists in the Wanapitei River, downstream of Lake Wanapitei, with 23 species of fish known to be present (Table 2-1). None of the fish species within this section of the Wanapitei River are considered at-risk in Ontario (<https://www.ontario.ca/page/species-risk-ontario#section-3>, checked November 13, 2020) or federally (<https://www.dfo-mpo.gc.ca/species-especies/sara-lep/identify-eng.html?province=Ontario>, checked November 13, 2020). Chinook Salmon do not occur at the Stinson GS; this species only occurs in the Wanapitei River as the result of a spawning run from Lake Huron via the French River, and they are blocked from moving farther upstream at the McVittie GS. Emerald Shiner is a resident of lakes, and is unlikely to be found at the Stinson GS. Stocking of Splake, Brook Trout, and Rainbow Trout have occurred in the watershed both upstream and downstream of the Stinson GS (OMNRF 2020), and therefore it cannot be ruled-out that an occasional individual of these species may be found nearby the facility. Walleye are present in the river, and spring spawning is known to occur downstream of McVittie, Coniston, and Moose Rapids generating stations (OMNR *et al*, 2011, C. Portt and Associates 2017). A population of Walleye is probably present within the 11 km reach of the Wanapitei River between Coniston and Stinson.

The following main information gaps related to fish and fish habitat in the Wanapitei River were identified in the Wanapitei Water Management Plan (OMNR *et al*, 2011):

- Inventories of fish species in regulated sections of the river are required to fill data gaps for fish communities and to identify the specific life-history requirements that need to be considered in the water management plan; and
- It is unknown whether minimum flows established at the facilities are sufficient to meet the downstream velocity, depth, temperature and oxygen requirements of river-spawning fish in the Wanapitei River. Bathymetric mapping for river sections is required to calculate flows and model impacts to habitat under low flow conditions.

These data gaps are to be addressed under various effectiveness monitoring projects that were outlined in the Water Management Plan (OMNR *et al*, 2011) and included:

- Walleye spawning surveys below McVittie GS;
- Habitat mapping below Coniston GS under different flows to assess habitat suitability;
- Habitat mapping below the Wanapitei Control Dam to determine habitat suitability under minimum flows and the extent of the river affected by minimum flows; and
- Index surveys (e.g., fall Walleye index netting, riverine index netting) when/if site specific issues arise.



Table 2-1. Known fish species in the Wanapitei River, downstream of Lake Wanapitei (OMNR *et al.*, 2011).

Group	Common name ( <i>Scientific name</i> )
Suckers	White Sucker ( <i>Catostomus commersonii</i> ) Shorthead Redhorse ( <i>Moxostoma macrolepidotum</i> )
Trouts and Salmon	Chinook Salmon ( <i>Oncorhynchus tshawytscha</i> ) Rainbow Trout ( <i>Oncorhynchus mykiss</i> ) Brook Trout ( <i>Salvelinus fontinalis</i> ) Splake ( <i>Salvelinus fontinalis</i> x <i>S. namaycush</i> )
Pikes	Northern Pike ( <i>Esox lucius</i> )
Codfishes	Burbot ( <i>Lota lota</i> )
Perches and Darters	Walleye ( <i>Sander vitreus</i> ) Yellow Perch ( <i>Perca flavescens</i> ) Logperch ( <i>Percina caprodes</i> ) Iowa Darter ( <i>Etheostoma exile</i> ) Johnny Darter ( <i>Etheostoma nigrum</i> )
Catfishes	Brown Bullhead ( <i>Ameiurus nebulosus</i> ) Channel Catfish ( <i>Ictalurus punctatus</i> )
Trout Perches	Trout Perch ( <i>Percopsis omiscomaycus</i> )
Sunfishes	Rock Bass ( <i>Ambloplites rupestris</i> ) Smallmouth Bass ( <i>Micropterus dolomieu</i> )
Minnows	Bluntnose Minnow ( <i>Pimephales notatus</i> ) Blacknose Shiner ( <i>Notropis heterolepis</i> ) Emerald Shiner ( <i>Notropis atherinoides</i> ) Golden Shiner ( <i>Notemigonus crysoleucas</i> ) Mimic Shiner ( <i>Notropis volucellus</i> )
Mudminnows	Central Mudminnow ( <i>Umbra limi</i> )

### 2.3 Operational procedures related to fish protection

There are no specific fish-related flow requirements for the Stinson GS, although it is expected that this facility will pass sufficient water to meet the minimum flow requirements that are defined for the Coniston GS and McVittie GS located downstream (OMNR *et al.* 2011). Coniston GS must maintain a mean daily flow of 3.0 m<sup>3</sup>/s to facilitate dilution of downstream effluent, while McVittie GS must maintain a flow greater than 10 m<sup>3</sup>/s from April 01 to June 15 to maintain Walleye spawning habitat.

Although not related to fish habitat protection, Stinson GS has defined minimum and maximum upstream water elevation limits for two time periods, May 01 to October 15, and October 16 to April 30, set for social/recreational purposes (OMNR *et al.* 2011).

### 2.4 Instream work timing window

Timing windows restricting instream works are based on the fish species that are present and are intended to protect fish from impacts of works or undertakings in and around water during spawning migrations or spawning and to prevent eggs and embryos from being adversely affected, either directly or by sediment transported from the site. (<https://www.ontario.ca/document/water-work-timing-window-guidelines>, OMNR 2013). The presence of spawning Walleye would restrict in-water work from April 01 to June 20.

The presence of Smallmouth Bass extends this restriction to July 15 (Table 2-2). Fall spawning species such as Brook Trout are not expected to be present within this section of river in sufficient numbers to constitute a spawning population and, therefore, are not likely to influence the instream work timing window. As a result, based on the guidelines, instream work would be permitted from July 16 through March 31.

Table 2-2. Timing window when instream work is restricted, based on fish species present (OMNR 2013).

<b>Species</b>	<b>Restricted Work Date Range</b>
Walleye	April 1 to June 20
Northern Pike	April 1 to June 15
Smallmouth Bass	May 15 to July 15

## 3 Field Investigations

### 3.1 Methods

Field investigations were conducted on July 13 and 14 by C. Portt and Associates staff (G. Coker, J. Ellenor). Flow through the generating station was 32.4 cms during the field investigations on July 13 and ranged from 41.0 to 48.6 cms during the field investigations on July 14 (data provided by OPG). Flow through the spillway was limited to dam leakage.

#### 3.1.1 Electrofishing

Electrofishing was conducted on July 14, 2020, within the spillway and in four areas downstream of the powerhouse (Figure 3-1), using a Model HT 2000B Mrk 5 backpack electrofisher, set to 350 volts and 60 hertz. All fish collected were identified to species, counted, and released near the point of capture. As a measure of fishing effort, the number of electroseconds (duration that current was generated), start and stop locations, and electrofishing path (i.e. distance electrofished, determined using a Garmin GPSmap76CSx GPS unit) were recorded.

#### 3.1.2 Habitat Investigation and Mapping

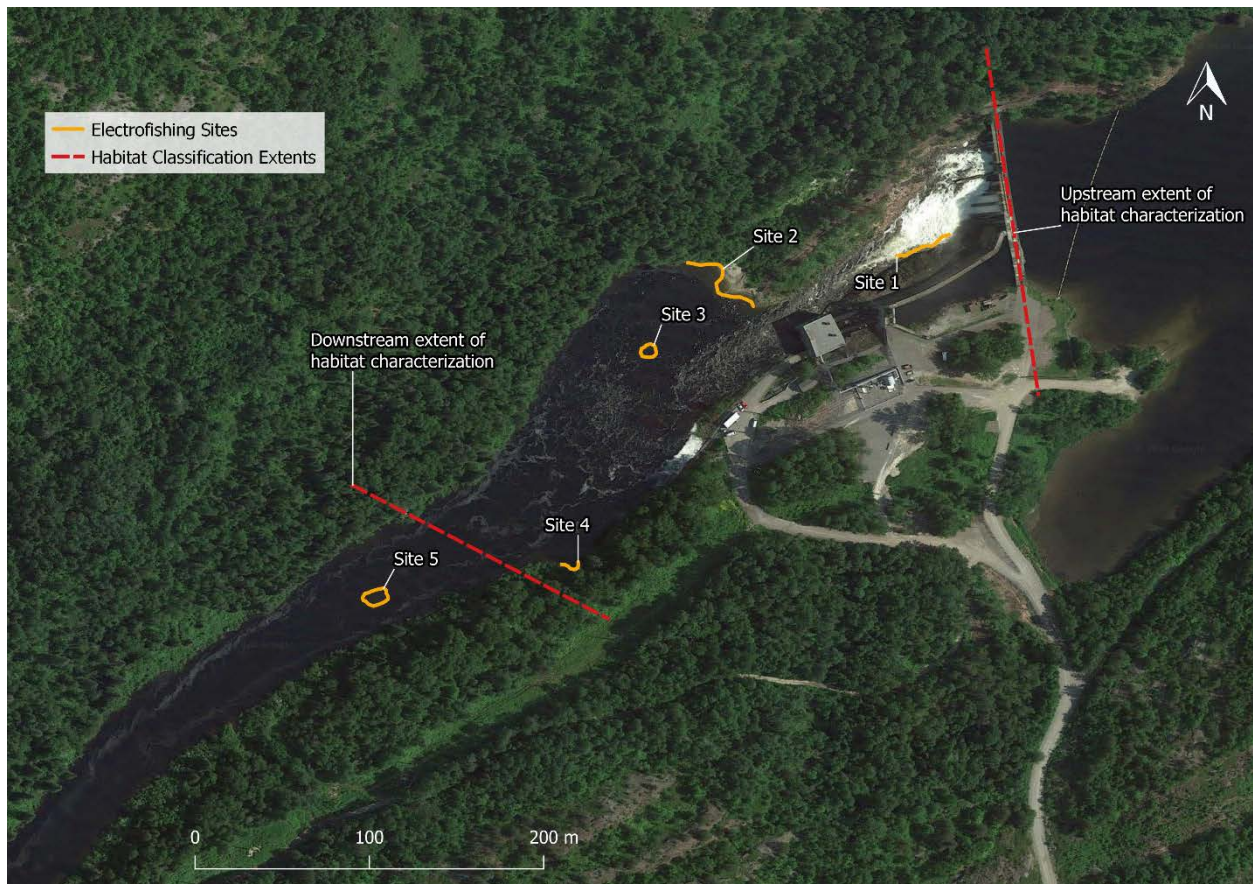
Habitat investigations were conducted on July 13-14, 2020. A Humminbird 898ci HD SI sonar unit was used to record georeferenced sonar data, within the spillway and downstream of the GS where the water depth was sufficient to operate a boat. Sonar data were used to construct a bathymetric map, using ReefMaster software (ver. 2.0).

Substrate and aquatic macrophytes were characterized from the Stinson GS sluiceways to approximately 100 m downstream of the powerhouse (Figure 3-1). Visual observations of substrate were made, either from the surface where the water was shallow, and visibility allowed, or using an Aqua-Vu 740c underwater colour video system where the water was deeper. All substrate observations were georeferenced with a Garmin GPSmap76CSx GPS unit, and data were delineated and mapped using GIS software (QGIS version 3.12). Substrate was characterized using a modified Wentworth (1922) scale (Table 3-1).

Table 3-1. Substrate size classes used in habitat mapping, modified from Wentworth (1922)

Material	Size (mm)	Description
Bedrock	-	Rock not granulated.
Hard Clay	-	Consolidated parent material. Functions similarly to bedrock with regards to habitat, but is softer and slippery.
Silt/Soft Clay	<0.062	Mud. Feels soft and smooth between fingers.
Sand	0.062-2	Feels gritty between fingers.
Gravel	2-64	
Cobble	64-256	
Boulder	>256	

Figure 3-1. Areas electrofished and extent of the habitat characterized on July 13-14, 2020.



## 3.2 Results and Discussion

### 3.2.1 Electrofishing

The electrofishing effort and total number of individuals of each species that were captured at each electrofishing location are presented in Table 3-2. In total, seven species were captured within the study area, including two that were not reported in OMNR *et al*, (2011) to be present within this section of the Wanapitei River (Pumpkinseed and Longnose Dace). However, Pumpkinseed and Longnose Dace were captured within the spillway of the Coniston GS during fish investigations in 2015 and 2020 (C Portt and Associates, 2017 and unpublished data), and it is likely that these species are widespread in the river.

Within the Stinson GS spillway, one adult Smallmouth Bass was captured, and a school of Smallmouth Bass adults was observed. Logperch and a Rock Bass were also captured in the spillway. Downstream of the powerhouse, a total of five species were captured. Within a backwater section of the river (Site 2) fourteen Mimic Shiners, three Yellow Perch, and a Pumpkinseed were captured. At sites 3 and 5, which were higher velocity riffle habitat, Logperch and Longnose Dace were captured. No fish were captured at site 4, which was short.

Table 3-2. Results of electrofishing in the Wanapitei River within the spillway and immediately downstream of the Stinson GS.

	Spillway	Downstream			
	Site 1	Site 2	Site 3	Site 4	Site 5
<b><u>Effort</u></b>					
Electrofishing Seconds	423	549	198	83	256
Distance Electrofished (m)	46	37	26	14	38
<b><u>Total Catch by Species (latin name)</u></b>					
Smallmouth bass ( <i>Micropterus dolomieu</i> )	1	0	0	0	0
Rock bass ( <i>Ambloplites rupestris</i> )	1	0	0	0	0
Pumpkinseed ( <i>Lepomis gibbosus</i> )	0	1	0	0	0
Yellow perch ( <i>Perca flavescens</i> )	0	3	0	0	0
Logperch ( <i>Percina caprodes</i> )	3	0	1	0	2
Longnose dace ( <i>Rhinichthys cataractae</i> )	0	0	1	0	1
Mimic shiner ( <i>Notropis volucellus</i> )	0	14	0	0	0

### 3.2.2 Habitat Investigation and Mapping

The results of the habitat mapping are presented in Figure 3-2. The spillway consists of a broad, steep bedrock outcrop in the upstream section, below the dam, which flows into a steep-sided channel, with poorly sorted boulder and cobble substrate (Figure 3-3 and Figure 3-4). Immediately downstream of the powerhouse the river widens, with cobble/boulder substrates dominating the higher velocity areas and sand and gravel substrate, with macrophytes present, in the low velocity, backwater areas (Figure 3-5). Farther downstream of the powerhouse, the river is deeper and lower velocity, with substrates dominated by cobble and gravel (Figure 3-6). Based on substrate, and expected spring water velocities, the most likely location for Walleye and White Sucker spawning to occur is the shallow cobble/gravel area that is approximately 90 m downstream from the GS.



Figure 3-2. Substrate and bathymetry, within the spillway and immediately downstream of the Stinson GS on July 13-14, 2020. For each substrate class, the size classes are listed in order of decreasing proportion. Location and direction of representative stream habitat photos are also identified using arrows.

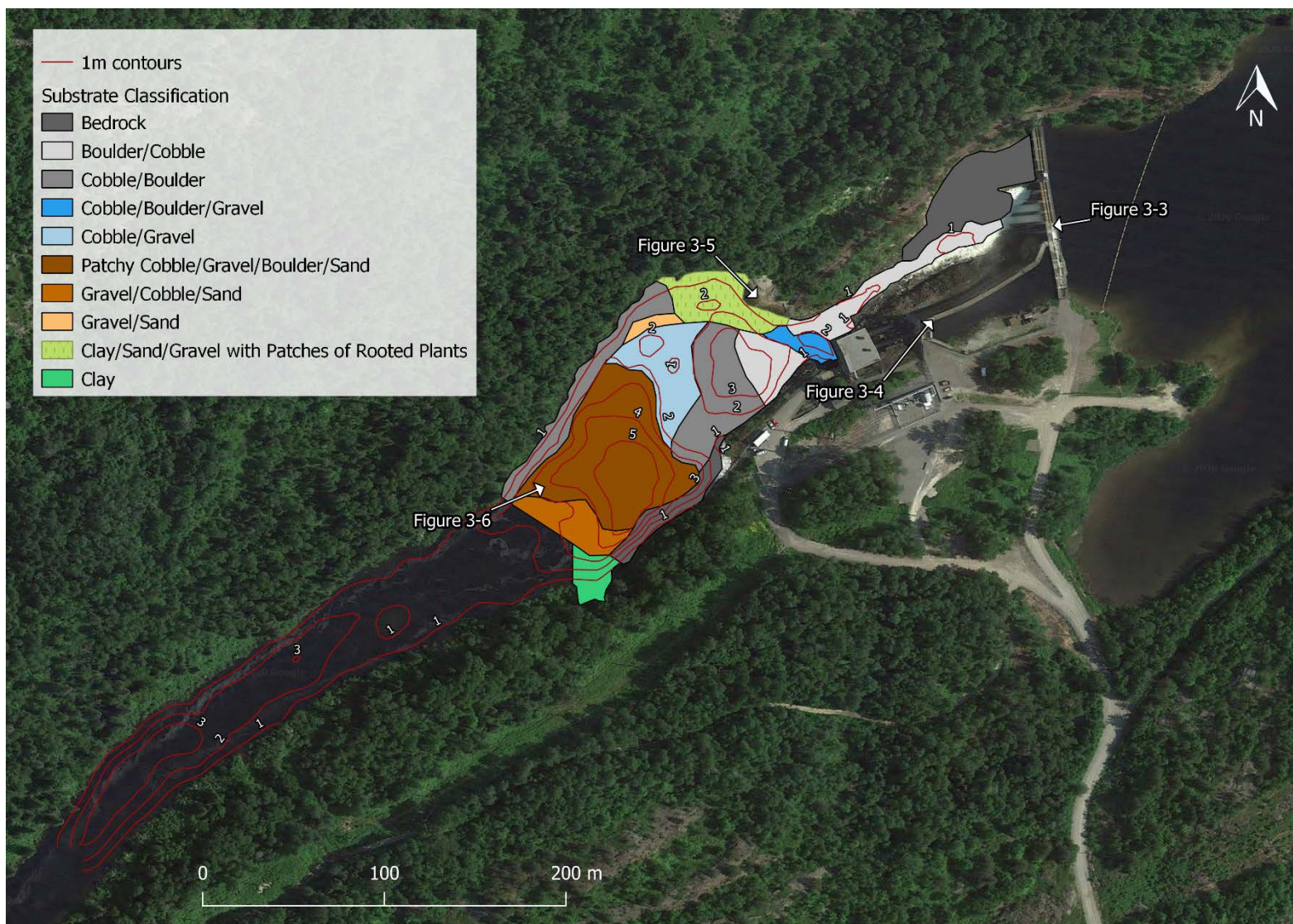




Figure 3-3. Looking downstream at the spillway at the Stinson GS on July 14, 2020 (see Figure 3-2 for approximate location). The bedrock in the upper spillway transitions to boulder and cobble substrate downstream.



Figure 3-4. Looking upstream at the spillway and sluiceways at the Stinson GS on July 2, 2019 under higher flow conditions than present during field investigations in 2020 (OPG supplied photo, see Figure 3-2 for approximate location).





Figure 3-5. Looking across the Wanapitei River immediately downstream of the Stinson powerhouse on July 14, 2020 (see Figure 3-2 for approximate location). Sand, gravel, and macrophytes are present in the low velocity portion of the stream in foreground, while cobble/boulder substrate dominates the higher velocity areas nearer the powerhouse.



Figure 3-6. Looking upstream at the, wide, low velocity area downstream of the Stinson GS on July 13, 2020 (see Figure 3-2 for approximate location).



## 4 Conclusions

- A total of 23 fish species have been reported to occur in the Wanapitei River, downstream of Lake Wanapitei.
- Seven species were captured by electrofishing in this study, including Pumpkinseed and Longnose Dace, which were not reported by OMNR *et al* (2011) to be present in this section of the Wanapitei River, yet were captured downstream during previous fish investigations.
- The fish communities in reaches of the Wanapitei River immediately upstream and downstream from the Stinson GS are partially isolated as a result of the Coniston and McVittie GS dams downstream, and the Moose Rapids and Wanapitei Lake dams upstream. While downstream passage of fish is possible, upstream passage of fish is prevented by the dams and generating stations. It is possible that viable populations of some of the 23 species do not occur in each of the reaches.
- Aquatic species at risk are not known to occur in the vicinity of the Stinson GS.
- Based on MNRF guidelines and the fish species present, instream work would be permitted from July 16 through March 31.
- Based on substrate, and expected spring water velocities, the most likely location for Walleye and White Sucker spawning to occur is the shallow cobble/gravel area that is approximately 90 m downstream from the GS.



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- Wentworth, C.K. 1922. A scale of grade and class terms for clastic sediments. J. Geol. 30: 377-392.

# Appendix B

## **2022 Walleye Spawning and Habitat Investigations for the Stinson GS, Wanapitei River**

## **2022 WALLEYE SPAWNING AND HABITAT INVESTIGATIONS FOR THE STINSON GS, WANAPITEI RIVER**



Submitted to:

Ontario Power Generation Inc.  
700 University Avenue  
Toronto, Ontario, M5G 1X6

July 2022

C. PORTT and ASSOCIATES  
56 Waterloo Avenue  
Guelph, Ontario, N1H 3H5  
[cportt@sentex.net](mailto:cportt@sentex.net)

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## 1 Introduction

Arcadis Canada, with C. Portt and Associates, were retained by Ontario Power Generation Inc. (OPG) to conduct a Walleye (*Sander vitreus*) spawning and spawning habitat assessment in 2022 at the Stinson Generating Station (GS) on the Wanapitei River, approximately 20 km east of Sudbury, Ontario (Figure 1-1). This investigation is in support of the assessment of options for development opportunities at this site, which potentially considers overhaul, refurbishment, and/or redevelopment options. This document presents the results of the Walleye spawning field investigations undertaken in April and May 2022.

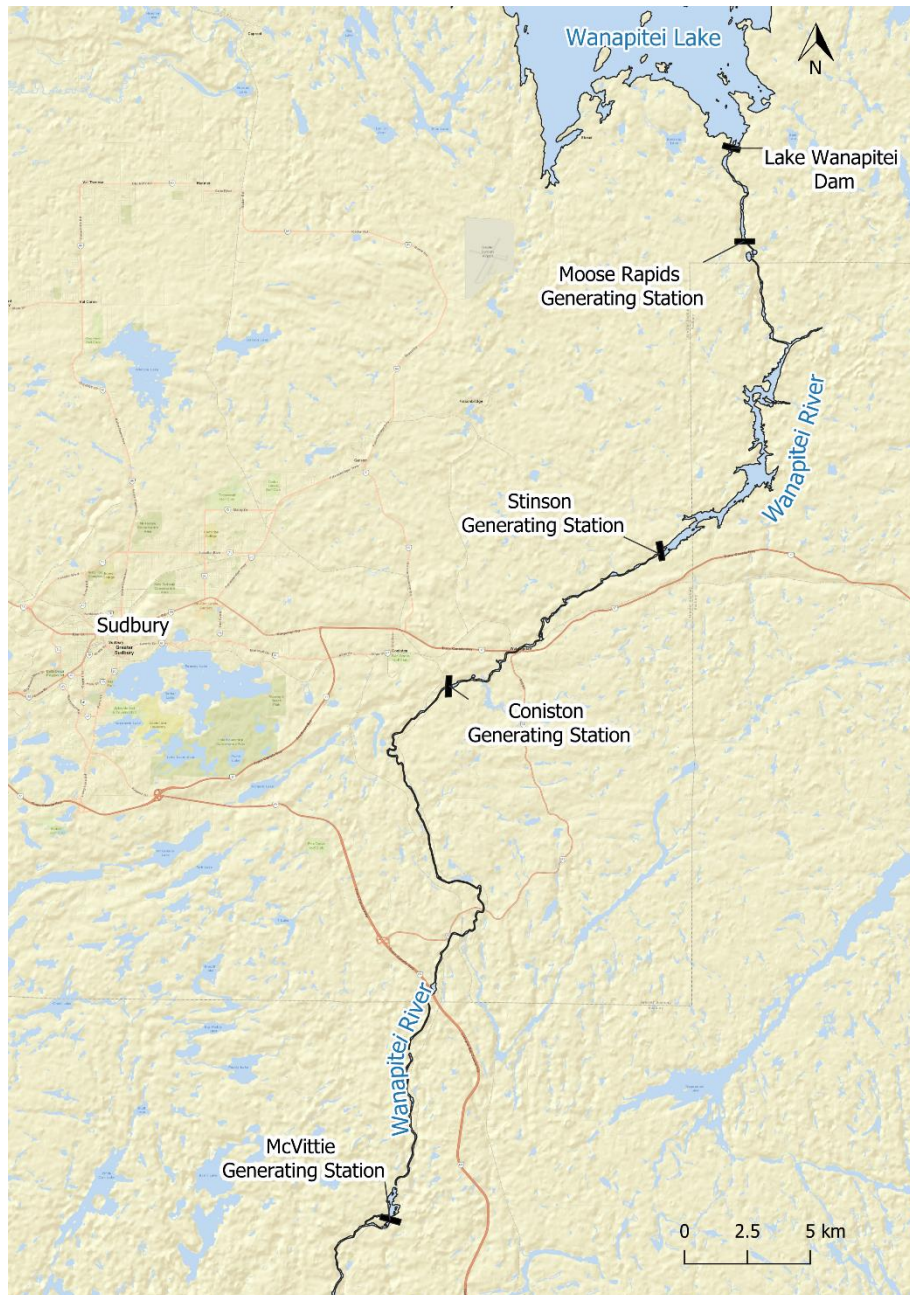


Figure 1-1. Location of the Stinson GS on the Wanapitei River.

## 2 Background

The two unit generating station was placed in service in 1925 with an installed capacity of 5.4 MW and a maximum flow of 48.8 m<sup>3</sup>/s (OMNR *et al.*, 2011). It is located on the Wanapitei River, south of Lake Wanapitei, where the river flows in a southerly direction, eventually discharging into the French River which flows into Lake Huron. Lake Wanapitei water levels and downstream river flow are regulated by the Lake Wanapitei dam (Figure 1-1), which is operated by OPG (OMNR *et al.* 2011). A total of four generating stations, operating as run-of-the-river, are located along the Wanapitei River, downstream of Lake Wanapitei (Figure 1-1). Moose Rapids GS (operated by TransAlta) is approximately 16 river kilometers upstream from the Stinson GS, while Coniston and McVittie generating stations, both operated by OPG, are located approximately 11 and 38 river kilometers downstream of Stinson, respectively (Figure 1-1)(MNR *et al.*, 2011).

McVittie GS, Coniston GS, and Stinson GS are all barriers to upstream fish passage. Downstream passage at the Stinson GS can only occur through the GS or via the spillway when river flow exceeds the plant capacity. Based upon aerial photography, other than the generating stations there is only a small number of other short rapids or chutes that punctuate the river along the 38.7 km of channel between the Stinson GS and the McVittie GS. Between these few rapids, chutes and generating stations, there are long sections where the river is generally deep flatwater (Figure 2-1).



Figure 2-1. Typical flatwater section of the Wanapitei River. Upstream view from Hwy 537 bridge. May 4, 2016.

Figure 2-2 illustrates the general habitat and flow conditions in the vicinity of the GS and identifies project infrastructure. The Stinson GS bypasses water around a 140 m section of river that is now the spillway. The forebay, located between the intake and penstocks is approximately 75 m long. Water discharged from the powerhouse enters the river directly, as there is no tailrace.





Figure 2-2. Wanapitei River in the vicinity of the Stinson GS. Aerial photo taken on July 2, 2019. Major flow through dam and spillway.

## 3 Field Investigations

### 3.1 Methods

To determine the proper timing and locations of Walleye spawning observations, knowledge of the environmental conditions required for Walleye spawning is necessary. These are:

- Normal spawning temperature ranges from 6.7 to 8.9°C (Scott and Crossman, 1973), but they have been known to spawn at temperatures as low as approximately 2°C (Coad *et al.* 1995; Holm *et al.* 2021), and as high as 17.2°C (Becker, 1983).
- They usually spawn over substrates of boulder to coarse gravel (Scott and Crossman, 1973).
- In rivers, walleye typically spawn in water that is from 0.2 – 0.8 m deep (Bozek *et al.* 2011), and Smith (1985) states that Walleye generally spawn in water that is less than 1.2 m deep.
- Spawning is usually where water velocity is 0.3-1.0 m/s (McMahon *et al.* 1984) and Stevens (1990) reported spawning in Wisconsin streams where mean water column velocities were 0.35 –



0.75 m/sec and nose velocities were less than 0.25 m/s. Similarly, interpretation of the graphs in Gillenwater *et al.* (2006), indicates that water velocity for Walleye spawning is optimal at 0.3 to 0.95 m/s, and marginal below 0.3 m/s or between 0.95 and 1.2 m/s. Velocities greater than 1.2 m/s are unsuitable.

In mid-March, 2022, contact was initiated with local OPG personnel to monitor river flow and local snow and ice conditions. A temperature logger (Tidbit MX Temp 5000) was deployed in the tailrace of the Stinson GS by OPG personnel on March 12, 2022, logging the water temperature at 15 minute intervals. The logged temperature data were periodically offloaded by OPG staff and transmitted to C. Portt and Associates for evaluation. The logger was removed from the water for approximately six hours on April 26 but otherwise was in place throughout the monitoring period. The water temperature data and monitoring of local weather forecasts were used to determine the time of the field investigations.

Field investigations were conducted on April 30, May 1, and May 9, 2022, by C. Portt and Associates staff (G. Coker), accompanied by OPG staff and two representatives of the Wahnapiitae First Nation (WFN). The study area was examined during daylight hours on the first day in order to identify safety hazards, access routes, river conditions, barriers to upstream migration by Walleye and potential Walleye spawning habitat. A Garmin GPSmap 76CSx Global Positioning System (GPS) unit was used to determine the coordinates of key features and observations, including digital photographs of habitat at selected locations. Substrate characterization, which was conducted at Stinson on July 13-14, 2020, informed the locations examined.

After nightfall, a powerful spotlight (1.5 million candlepower) was used from shore to search for Walleye, which are differentiated from other fishes primarily by the light reflected by the *tapetum lucidum* of their eyes, as well as the white tip of the lower caudal lobe. Spawning observations were conducted in the Stinson spill channel from a vantage point on the penstock headgates; in the downstream end of the spill channel and in the tailrace from the vantage of the GS catwalk; along the southeast side of the river for 125 m downstream of the GS; and, at the downstream end of Timmins Chute, that is located approximately 750 m downstream from the Stinson GS.

## 3.2 Results and Discussion

### 3.2.1 Water temperature and flow

The tailrace water temperature ranged between 4.72°C and 6.30°C from April 27 through April 29; hovering around 6°C on April 27; and being below 6°C on April 28 and 29, and below 5°C during the night of April 28. On April 30 the temperature climbed steadily from a low of 5.15°C to 6.30°C at the time of the first observations conducted on the evening of April 30. The temperature remained above 6 degrees for much of May 1, climbing to 6.52°C by early afternoon, and then dropping slightly to about 6.2°C at the time of the May 1 nighttime observations. The water temperature remained generally between 5.5 and 6.5 degrees from May 2 to May 5, and then steadily increased daily so that the temperature was about 8.5°C at the time of the May 9 nighttime observations (Figure 3-1). These temperatures are within the range for Walleye spawning.

Flow through the GS was 46.7 m<sup>3</sup>/s on April 30 and May 1, 2022, with mean spillway flow being 23.8 m<sup>3</sup>/s and 23.5 m<sup>3</sup>/s, respectively. On May 9, 2022, flow through the GS was 44.9 m<sup>3</sup>/s, and flow in the spillway was 15.9 m<sup>3</sup>/s.



Figure 3-1. Logged water temperature in the Stinson GS tailrace for the period April 24 – May 11, 2022.

### 3.2.2 Spawning Observations at Stinson GS

The areas examined during the spawning survey at the Stinson GS are shown in Figure 3-2. No Walleye were observed in the immediate vicinity of the Stinson GS on any of the three nights, however, a small number were observed each night immediately downstream of Timmins Chute, which is 750 m downstream of the Coniston GS. Two Walleye were observed on April 30; three on May 1; and four on May 9, 2022. They were observed in very close proximity to each other, indicating that spawning was ongoing. It is suspected that the length of the Timmins Chute, and the water velocity that was estimated at 3-4 m/s in the centre of flow (Figure 3-3), prevented Walleye from moving upstream to the Stinson GS under the prevailing river flow conditions. Also, the 11.23 km section of the Wanapitei River, downstream of the Stinson GS to the Coniston GS, likely does not support a large Walleye population that might spawn in the vicinity of the Stinson GS.

The best potential spawning habitat in the vicinity of the Stinson GS appears to be a shallow shoal across the river that is located 80-100 m downstream from the GS, composed of cobble/boulder on the south side of the river, and cobble/gravel in the central part of the river (Figure 3-4). At the time of this investigation this shoal appeared to have the flow velocity, water depth, and substrate attributes of good Walleye spawning habitat.





Figure 3-2. Area examined for Walleye on April 30, May 1, and May 9, 2022.



Figure 3-3. Upstream portion of Timmins Chute, viewed from the snowmobile/pedestrian bridge. May 9, 2022.



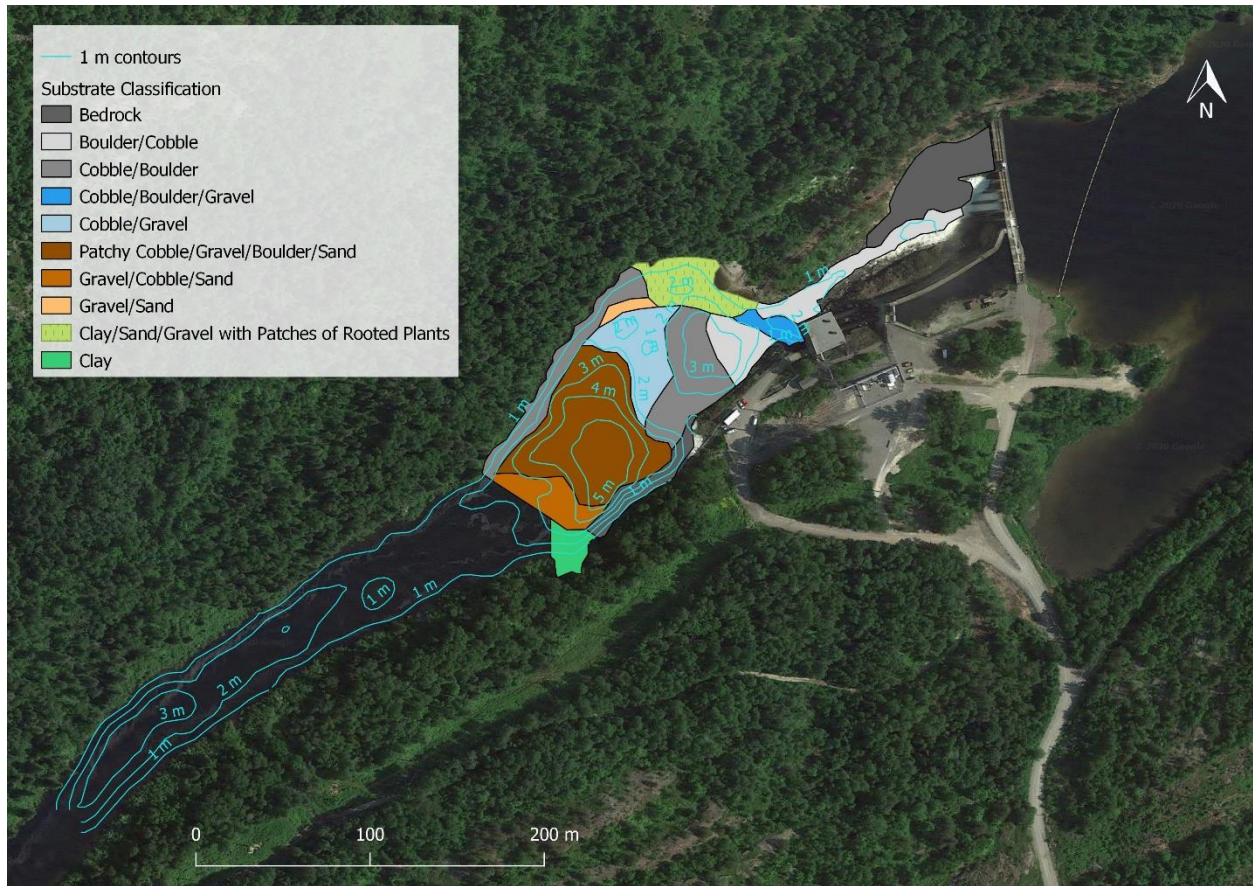


Figure 3-4. Substrate size class and bathymetry.

## 4 Conclusions

- The timing of the Walleye spawning investigation at the Stinson GS was appropriate to observe spawning at this location. Water temperature was suitable and a few Walleye were observed displaying spawning behaviour on the same nights at Timmins Chute, located approximately 750 m downstream.
- Walleye were not observed in the vicinity of the Stinson GS in 2022. It is suspected that the Timmins Chute, where water velocity that was estimated at 3-4 m/s during the field investigations, prevented Walleye from moving upstream to the Stinson GS. The Walleye population is likely not large, due to the habitat characteristics and limited habitat area in this isolated section of river.
- In the vicinity of the Stinson GS, the best potential Walleye spawning habitat appears to be a shallow shoal across the river that is located 80-100 m downstream from the GS, where water depth, water velocity, and substrate are all in the preferred range under some flow conditions.



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# Appendix C

## **2023 Walleye Spawning and Habitat Investigations for the Stinson GS, Wanapitei River**

## **2023 WALLEYE SPAWNING AND HABITAT INVESTIGATIONS FOR THE STINSON GS, WANAPITEI RIVER**



Submitted to:

Ontario Power Generation Inc.  
700 University Avenue  
Toronto, Ontario, M5G 1X6

June 2023

C. PORTT and ASSOCIATES  
56 Waterloo Avenue  
Guelph, Ontario, N1H 3H5  
[cportt@sentex.net](mailto:cportt@sentex.net)

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## 1 Introduction

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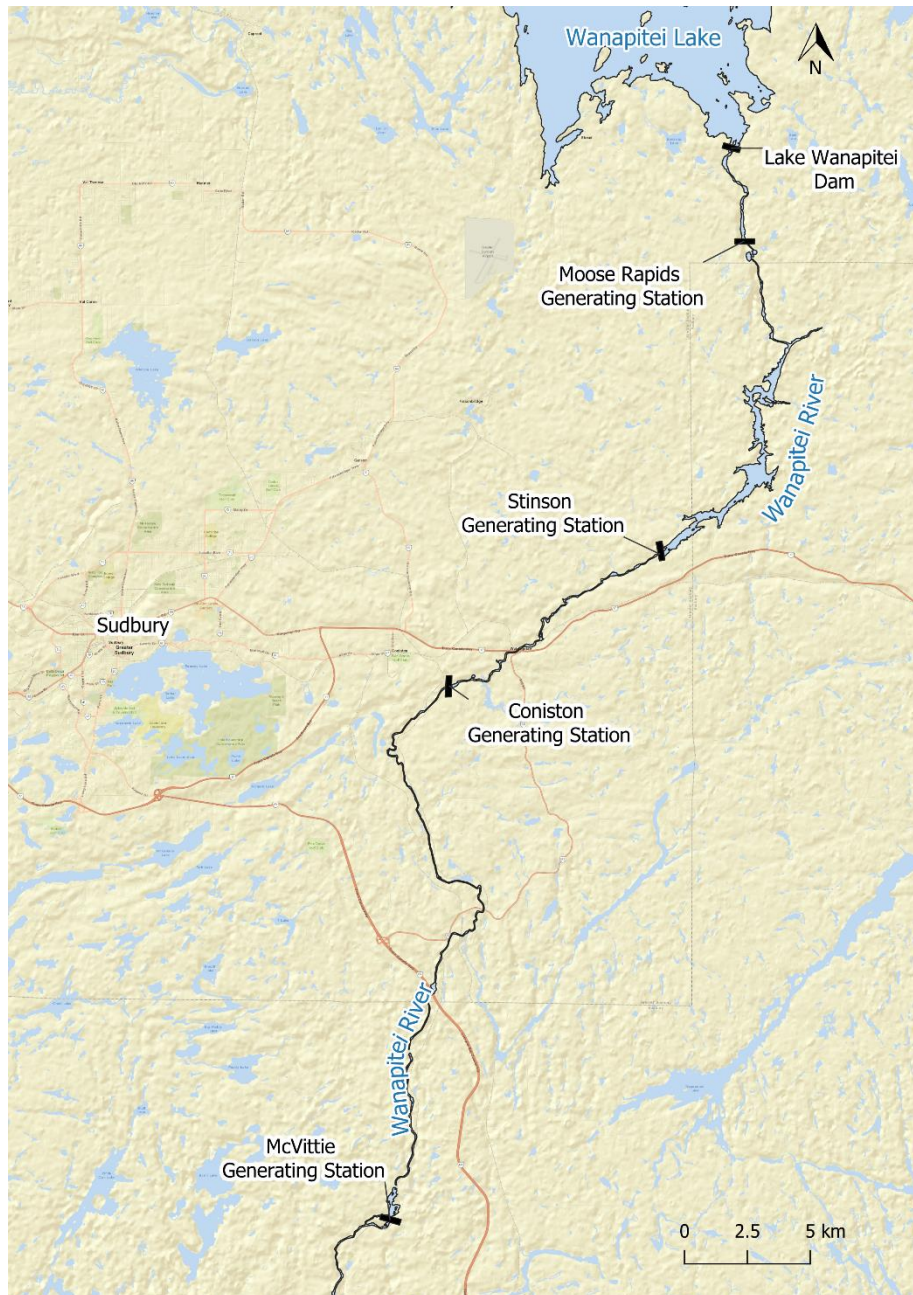


Figure 1-1. Location of the Stinson GS on the Wanapitei River.

## 2 Background

The two unit generating station was placed in service in 1925 with an installed capacity of 5.4 MW and a maximum flow of 48.8 m<sup>3</sup>/s (OMNR *et al.*, 2011). It is located on the Wanapitei River, south of Lake Wanapitei, where the river flows in a southerly direction, eventually discharging into the French River which flows into Lake Huron. Lake Wanapitei water levels and downstream river flow are regulated by the Lake Wanapitei dam (Figure 1-1), which is operated by OPG (OMNR *et al.* 2011). A total of four generating stations, operating as run-of-the-river, are located along the Wanapitei River, downstream of Lake Wanapitei (Figure 1-1). Moose Rapids GS (operated by TransAlta) is approximately 16 river kilometers upstream from the Stinson GS, while Coniston and McVittie generating stations, both operated by OPG, are located approximately 11 and 38 river kilometers downstream of Stinson, respectively (Figure 1-1)(MNR *et al.*, 2011).

McVittie GS, Coniston GS, and Stinson GS are all barriers to upstream fish passage. Downstream passage at the Stinson GS can only occur through the GS or via the spillway when river flow exceeds the plant capacity. Based upon aerial photography, other than the generating stations there are a small number of other short rapids or chutes that punctuate the river along the 38.7 km of channel between the Stinson GS and the McVittie GS. Between these few rapids, chutes and generating stations, there are long sections where the river is generally flatwater (Figure 2-1).



Figure 2-1. Typical flatwater section of the Wanapitei River. Upstream view from Hwy 537 bridge. May 4, 2016.

Figure 2-2 illustrates the general habitat and flow conditions in the vicinity of the GS and identifies project infrastructure. The Stinson GS bypasses water around a 140 m section of river that is now the spillway. The intake channel, located between the intake and penstocks is approximately 75 m long. Water discharged from the powerhouse enters the river directly, as there is no tailrace.





Figure 2-2. Wanapitei River in the vicinity of the Stinson GS. Aerial photo taken on July 2, 2019. Major flow through dam and spillway.

## 3 Field Investigations

### 3.1 Methods

To determine the proper timing and locations of Walleye spawning observations, knowledge of the environmental conditions required for Walleye spawning is necessary. These are:

- Normal spawning temperature ranges from 6.7 to 8.9°C (Scott and Crossman, 1973), but they have been known to spawn at temperatures as low as approximately 2°C (Coad *et al.* 1995; Holm *et al.* 2021), and as high as 17.2°C (Becker, 1983).
- They usually spawn over substrates of boulder to coarse gravel (Scott and Crossman, 1973).
- In rivers, walleye typically spawn in water that is from 0.2 – 0.8 m deep (Bozek *et al.* 2011), and Smith (1985) states that Walleye generally spawn in water that is less than 1.2 m deep.
- Spawning is usually where water velocity is 0.3-1.0 m/s (McMahon *et al.* 1984) and Stevens (1990) reported spawning in Wisconsin streams where mean water column velocities were 0.35 –



0.75 m/sec and nose velocities were less than 0.25 m/s. Similarly, interpretation of the graphs in Gillenwater *et al.* (2006), indicates that water velocity for Walleye spawning is optimal at 0.3 to 0.95 m/s, and marginal below 0.3 m/s or between 0.95 and 1.2 m/s. Velocities greater than 1.2 m/s are unsuitable.

In early April, 2023, contact was initiated with local OPG personnel to monitor river flow and local snow and ice conditions. A temperature logger (Tidbit MX Temp 5000) was deployed in the tailrace of the Stinson GS by OPG personnel on April 12, 2023, logging the water temperature at 15 minute intervals. The logged temperature data were periodically offloaded by OPG staff and transmitted to C. Portt and Associates for evaluation. The water temperature data and monitoring of local weather forecasts were used to determine the time of the field investigations.

Field investigations were conducted on May 13, 2023, by C. Portt and Associates staff (C. Portt, G. Coker), accompanied by OPG staff (Paul Michon, Brad Crouse) and Wahnapiet First Nation, Lands and Environment Department staff (Mathieu Cayen). The study area was examined during daylight hours to identify safety hazards, access routes, river conditions, barriers to upstream migration by Walleye and potential Walleye spawning habitat. A Garmin GPSmap 76CSx Global Positioning System (GPS) unit was used to determine the coordinates of key features and observations, including digital photographs of habitat at selected locations. Substrate characterization, which was conducted at Stinson on July 13-14, 2020, informed the locations examined.

After nightfall, a powerful spotlight (approximately 1500 Lumen) was used from shore to search for Walleye, which are differentiated from other fishes primarily by the light reflected by the *tapetum lucidum* of their eyes, as well as the white tip of the lower caudal lobe. Observations were conducted in the downstream end of the spill channel and in the tailrace from the vantage of the GS catwalk; along the southeast side of the river for 125 m downstream of the GS; and, at the downstream end of Timmins Chute, that is located approximately 750 m downstream from the Stinson GS. However, the unusually high flows in the river severely limited the extent at which Walleye could be observed due to deep water, turbulence, and turbidity.

## 3.2 Results and Discussion

### 3.2.1 Water temperature and flow

The large upstream Lake Wanapitei has a strong influence upon water temperatures in the Wanapitei River. The ice cover on Lake Wanapitei disappeared on May 3, but air temperatures remained low (<10°C) with significant cloud cover until May 8, which slowed the rise in lake water temperature. This cold water coming from Lake Wanapitei resulted in the tailrace water temperature's slow rise from when the logger was first deployed on April 12 until about May 8 (Figure 3-1). From May 9 onward, cloud cover was significantly reduced, and from May 10 onward average air temperatures were significantly higher than 10°C, resulting in a more rapid increase in the tailrace water temperature (Figure 3-1). The water temperature first reached 6.0°C on May 10, and first reached 6.7°C on May 12 at about 11:00, and remained 6.7°C or greater (range 6.7°-7.4°C) until the Walleye spawning observations were completed on May 13, 2023, at 22:45 (Figure 3-1). Water temperatures of 6.7°-7.4°C are within the range for Walleye spawning.

Flow through the GS was 45.6 m<sup>3</sup>/s and spillway flow was 99.7 m<sup>3</sup>/s on May 13, 2023.

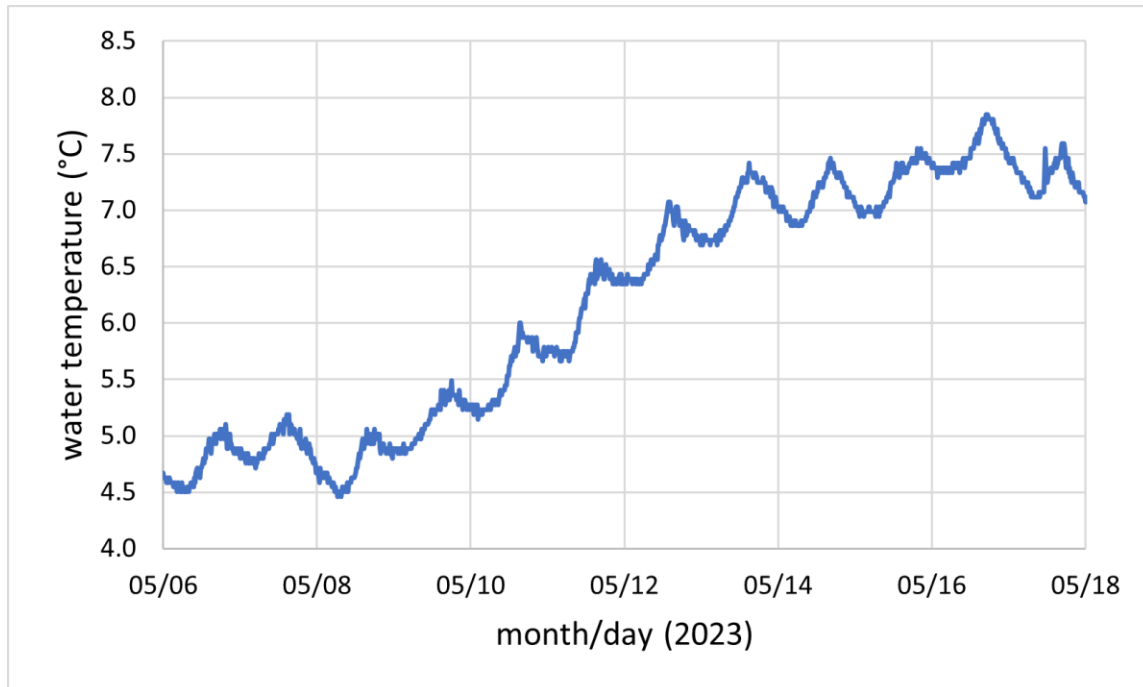


Figure 3-1. Logged water temperature in the Stinson GS tailrace for the period May 6 – May 17, 2023.

### 3.2.2 Spawning Observations at Stinson GS

The areas examined during the spawning survey at the Stinson GS are shown in Figure 3-2. The amount of area that could effectively be examined for spawning Walleye in 2023 was significantly reduced from the area examined in 2022, due to high river flows in 2023 (145.3 m<sup>3</sup>/s) that were more than twice the 2022 river flows (three day average of 67.2 m<sup>3</sup>/s). Spawning observations were not conducted in the Stinson spill channel, as they were in 2022; the unusually high flow made observations at that location impossible (see cover page photo), but also velocities were clearly too high for Walleye spawning. At other locations in the vicinity of the GS only areas close to shore could be effectively examined for spawning Walleye due to high flow. The depth and velocity in most areas where substrate is suitable appeared to both be too deep/high for Walleye spawning.

The areas that could be effectively examined for spawning walleye were also limited at Timmins Chute due to the high flows. The surface velocity in the centre of Timmins Chute was visually estimated (based on floating objects) at approximately 4 m/s (Figure 3-3) and it is very unlikely that Walleye could have moved upstream through the chute under the prevailing conditions.

No Walleye were observed at either of the locations examined during this assessment, likely due to the high river flow, but also the possibility that few Walleye occur in this section of the Wanapitei River because of limited habitat area and unfavourable habitat conditions for this species. In 2022 when river flows were more favourable for observing Walleye, a maximum of 4 Walleye on one night were observed immediately below the Timmins Chute, and none were observed upstream in the vicinity of the Stinson GS.



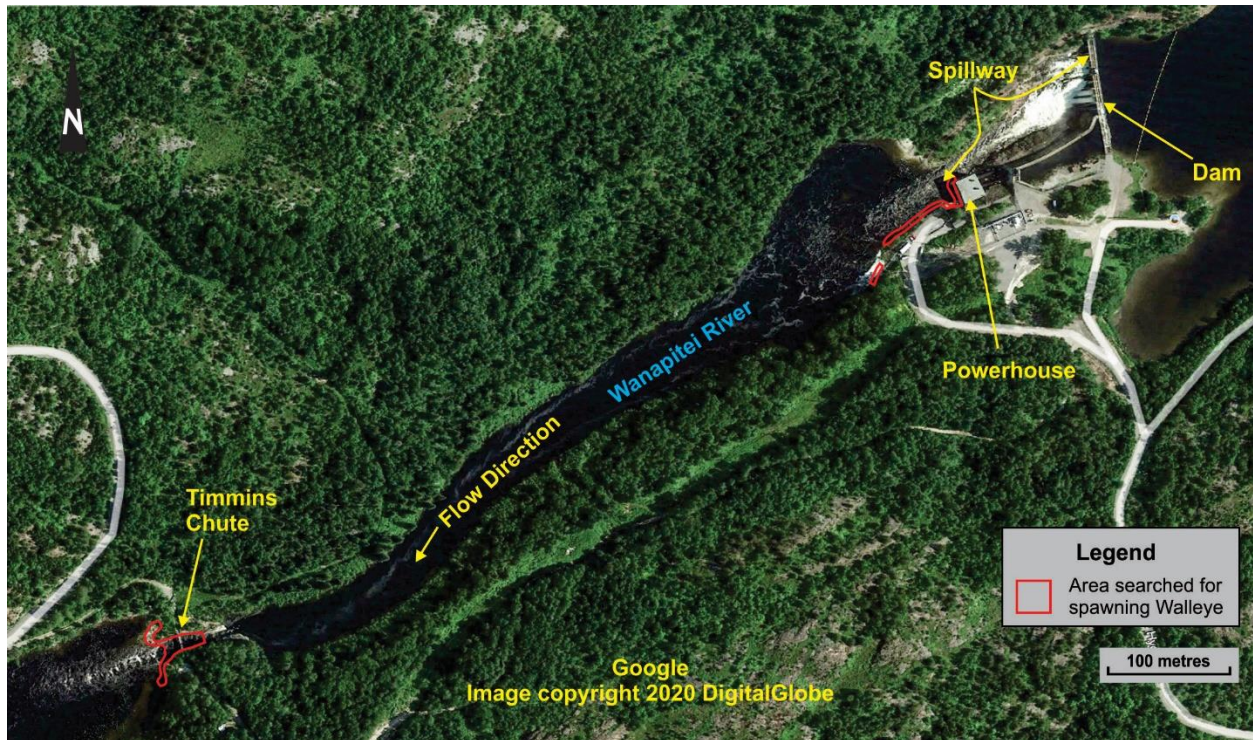


Figure 3-2. Area examined for Walleye on May 13, 2023.



Figure 3-3. Upstream portion of Timmins Chute, viewed from the snowmobile/pedestrian bridge. May 13, 2023.



## 4 Conclusions

- The timing of the Walleye spawning investigation at the Stinson GS was appropriate to observe spawning at this location, based upon water temperature. However, flows in the Wanapitei River were more than twice as high as in 2022, severely constraining the area that could be effectively examined for spawning fish.
- As in 2022, Walleye were not observed in the vicinity of the Stinson GS in 2023. No Walleye were observed in 2023 at Timmins Chute either. It is suspected that the Timmins Chute, where water velocity was estimated to be 4 m/s during this field investigation, prevents Walleye from moving upstream to the Stinson GS. Furthermore, the Walleye population is likely not large, due to the habitat characteristics and limited habitat area in this isolated section of river.



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