PROPOSED RANNEY FALLS GENERATING STATION G3 EXPANSION PROJECT

CULTURAL HERITAGE RESOURCES TECHNICAL SUPPORT DOCUMENT

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EXECUTIVE SUMMARY

Ontario Power Generation Inc. (OPG) is proposing to expand the capacity of its Ranney Falls Generating Station (GS) located on the Trent-Severn Waterway (TSW) in the Municipality of Trent Hills. There are two powerhouses on site. The main powerhouse has the G1 and G2 turbine units, each operating at approximately 5 MW during maximum flows. A secondary powerhouse, referred to as the "Pup", contains the 0.72 MW G3 unit that ceased operations in June 2014.

Based on a Feasibility Study for the proposed Ranney Falls GS G3 Expansion Project (Ranney Falls G3 Project or Project), it was determined that a new G3 unit of up to 10 MW could be installed at the Ranney Falls GS site. This would increase total station capacity to approximately 20 MW. The "Pup" powerhouse would be decommissioned but the building will be left in place.

The proposed Ranney Falls G3 Project is being undertaken by OPG to improve the efficient use of the available hydroelectric potential at the site, to reduce greenhouse gas emissions and to increase the amount of clean renewable energy from OPG's Central Operations (COs). The Panel on the Future of the Trent-Severn Waterway (PFTSW, 2008) concluded that the development of renewable energy resources is a sound public policy goal and supported a vigorous effort to pursue green energy generating potential along the TSW. The proposed Project is consistent with the Provincial Policy Statement, which recommends that the use of existing infrastructure and public service facilities should be optimized, whenever feasible, before consideration is given to developing new infrastructure and public service facilities (OMMAH, 2014). OPG will operate the proposed expanded Ranney site within historical water levels (since 1951) and existing water management practices with a flow up to 171 cms at the Ranney site. There will be no increase in water levels operating the proposed site.

Spillway discharge capacity for flood control at Dam 10 (Ranney Falls) is the sole responsibility of the Trent-Severn Waterway (Parks Canada). Installation and operation of a new spillway to be built between the existing and new powerhouse to bypass powerhouse flows in the event of an emergency shutdown of the unit is the responsibility of OPG. The Spillway operation will minimize wave surge and mitigate any rapid increase in water level associated with unplanned station shutdown. The design for the new spillway will be developed during the next stage of development (Interim Licence) whereby General Construction Plans are prepared for the review and approval by the Parks Canada Agency.

This Detailed Environmental Impact Analysis (DIA) Report was prepared to fulfill federal department obligations to the *Canadian Environmental Assessment Act, 2012 CEAA,* section 67*.* Parks Canada's legal accountability under CEAA 2012 is to ensure that project activities undertaken on the lands it manages do not result in significant adverse effects (Section 67 CEAA 2012). Parks Canada has jurisdiction over the bed of the canal at Ranney Falls. The DIA Report provides a description of the proposed undertaking, summarizes the overall environmental setting and anticipated environmental effects, recommends appropriate

mitigation measures to minimize or obviate these effects, and describes public, agency and Aboriginal consultation. More detailed information on the environmental setting, anticipated environmental effects and recommended mitigation measures is provided in four Technical Support Documents (TSDs) addressing the aquatic environment, terrestrial environment, land use and socio-economic environment, and cultural heritage resources. Two additional TSDs provide a more detailed description of outcomes of public and government agency, as well as First Nation and Métis Nation of Ontario, consultation and engagement.

An Open House was held on the project on June 17, 2015 and over twenty-four individuals attended that meeting. No individuals indicated an opposition to the proposed Project and several people indicated support for it. However, a number of questions were asked about the Project and a few local residents raised questions with respect to traffic, noise and potentially other nuisance effects. Responses were provided to them and OPG takes the position that it is always willing to listen to concerns and issues and address them wherever possible.

Based on assessment of the available baseline information and potential effects, as well as the implementation of the recommended mitigation measures, it is concluded that effects due to construction activities associated with the proposed Project will be minimal, localized and short-term. It is anticipated that substantial economic benefits will be realized by Campbellford and other local communities due to the supply of required goods and services during the construction phase.

Based on assessment of the available baseline information and potential effects, as well as the implementation of the recommended mitigation measures, it is concluded that the operation of the proposed Project will have negligible effects on the environment.

1.0 INTRODUCTION

1.1 SCOPE OF PROJECT

The Ranney Falls Generating Station (GS) site was formerly leased by the Federal Government to the Seymour Power Company. With its purchase of the Seymour Power Company on March 9, 1916, ownership rights to the site were acquired by the Province. Ranney Falls GS G1 and G2 units were commissioned in August 22, 1922 and September 2, 1922, respectively. Unit G3, which started operation in 1926, was acquired by the Hydro-Electric Power Commission of Ontario from the Quinte and Trent Valley Power Company in 1937. Ranney Falls GS was transferred to OPG on April 1, 1999, and is managed by OPG's Central Operations (COs) with remote operation from its North Bay Control Centre and maintained by its Campbellford Service Centre.

OPG is proposing to expand the capacity of its Ranney Falls GS that is located on the Trent-Severn Waterway (TSW) within the community of Campbellford in the Municipality of Trent Hills (Trent Hills), Northumberland County (Figure 1.1). There are two powerhouses on site (Figure 1.2). The main powerhouse has the G1 and G2 turbine units, each operating at approximately 5 MW during maximum flows. A secondary powerhouse, referred to as the "Pup", contains the 0.72 MW G3 unit that ceased operations in June 2014.

Ranney Falls GS was first identified by Ontario Hydro (1992) to be within the scope of the Small Hydroelectric Assessment and Retrofit Program (SHARP) for assessment of its long-term viability as a generating resource. The SHARP was established as a formalized approach to address operational optimization of the 33 existing small and ageing hydroelectric stations within the hydraulic generation system. Based on the criteria for age, capacity and operating condition, the SHARP identified Ranney Falls GS as a potential opportunity for renewal and improvement.

As a result, a Concept Phase Study for the Ranney Falls GS was undertaken by KST Hydroelectric Engineers (KST, 1992) to review all available project options and recommend a preferred alternative, as well as to identify the detailed engineering and environmental studies and their associated costs for the Definition Phase. Due to the cancellation of the SHARP, further work associated with the redevelopment of Ranney Falls GS was terminated.

Figure 1.1 Project Location

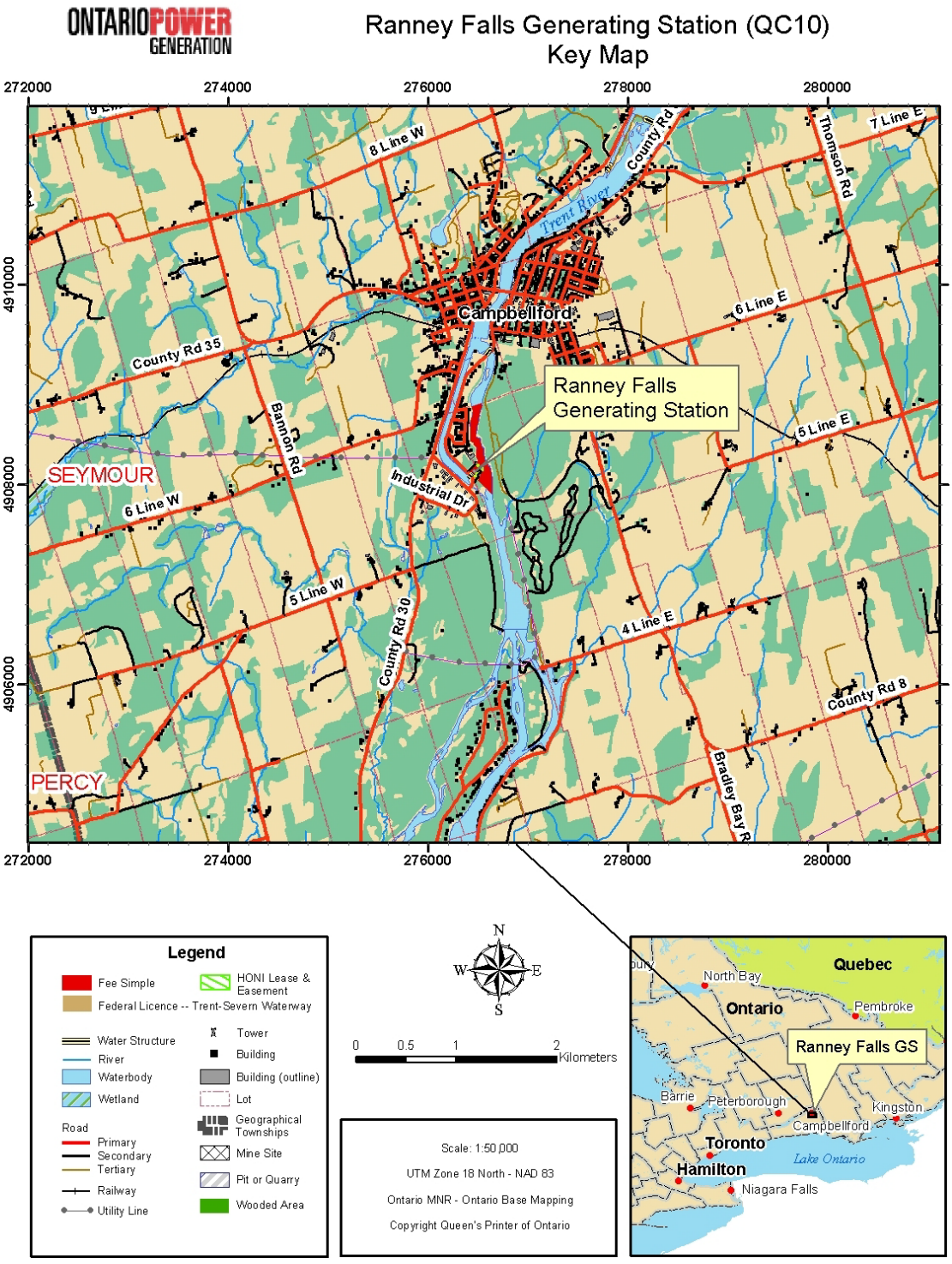


Figure 1.2 Aerial Photo of Ranney Falls GS Setting

In 2005, OPG again initiated a site evaluation and an assessment of concept alternatives for Ranney Falls GS expansion focusing on the redevelopment of the secondary "Pup" powerhouse. A Feasibility Study was completed in 2006, establishing that a new unit of up to 10 MW could be installed at the Ranney Falls GS site (Hatch Acres, 2006). This would increase the total station capacity to approximately 20 MW and result in total average annual generation of 83 GWh (an increase of 30.4 GWh). However, the project was deferred by OPG prior to initiation of the Definition Phase.

Based on the preliminary studies undertaken by KST (1992) and Hatch Acres (2006), OPG has concluded that the existing installed capacity does not make optimal use of the total water available (mean annual flow of approximately 118 m^3/s). As a result, OPG has identified an opportunity to expand its capacity by replacing the secondary "Pup" powerhouse with a new unit having an incremental capacity of up to 10 MW (OPG, 2011a).

Since 2006, the scope of the project including its layouts was further optimized and the proposed Ranney Falls G3 Project includes the following:

- expansion of the existing forebay;
- construction of a new G3 powerhouse with a new intake structure and 10 MW turbine unit adjacent to the existing main powerhouse;
- expansion of the existing tailrace channel;
- construction of a new electrical substation to connect with one of the Hydro One Networks Inc. (Hydro One) local distribution lines on site;
- construction of a new spillway to by-pass station flow to the tailrace channel for emergency situations;
- decommissioning the "Pup" powerhouse;
- rehabilitation of the forebay intake structure and its operating deck (work platform) adjacent to the roadway/TSW bridge;
- relocation of the existing upstream boom; and
- creation of enhanced habitat for Northern Map Turtle and Eastern Snapping Turtle and installation of fencing to prevent turtles accessing the construction area.

1.2 BACKGROUND

1.2.1 Purpose and Justification

The proposed Ranney Falls G3 Project undertaken by OPG is to improve the efficient use of the available hydroelectric potential at the site, to reduce greenhouse gas emissions and to increase the amount of clean renewable energy from OPG's COs, without any changes to the overall flow within the Trent River or to existing TSW water management. The proposed Project is consistent with the Provincial Policy Statement (PPS), which recommends that the use of existing infrastructure and public service facilities should be optimized, wherever feasible,

before consideration is given to developing new infrastructure and public service facilities (OMMAH, 2014).

The Ranney Falls GS is located on OPG land adjacent to Lock #11 and #12 of the TSW, which is designated as a National Historic Site of Canada. Water levels and flows in the Trent River and Trent Canal are managed by Parks Canada – TSW staff to:

- permit safe navigation;
- lessen flooding of agricultural, residential and commercial property;
- provide for recreational activities;
- protect fish and wildlife habitat;
- help maintain water quality; and
- generate green hydroelectric power.

Parks Canada – TSW staff work cooperatively with the MNRF and DFO to protect fish spawning areas and other wildlife habitat, as well as with local Conservation Authorities to reduce flooding. Parks Canada – TSW staff are also in daily contact with OPG, other public utilities and private interests, which operate and maintain generating stations within the TSW drainage basins.

A management plan for the TSW National Historic Site received ministerial approval in 2000 (Parks Canada, 2000). The Panel on the Future of the Trent-Severn Waterway (PFTSW, 2008) was mandated in 2007 to assess and make recommendations to the federal Minister of the Environment concerning the future contributions and management of the TSW. The PFTSW review pre-empted the typical five-year management plan review cycle. The process to develop a new management plan began in late 2011, and was subsequently postponed following a review of the management plan cycle. The next management plan review is scheduled for completion in 2018.

In addition to other considerations, the PFTSW considered “ways in which the Waterway can contribute to economically sustainable communities, including the role of renewable energy.” The PFTSW concluded that the development of renewable energy resources is a sound public policy goal and supported a vigorous effort to pursue the potential for generation of green energy along the TSW. The PFTSW acknowledged that the *Canadian Environmental Assessment Act* (*CEAA*), if applied knowledgeably and rigorously, provides the process and regulatory instrument for proposed hydroelectric projects to ensure the protection of natural and cultural values of the TSW. *CEAA* (S.C. 1992, c. 37) was repealed when the *Canadian Environmental Assessment Act, 2012* (*CEAA 2012*) came into force (see Section 1.0).

Northumberland-Quinte West MPP Rob Milligan held a public meeting on February 18, 2012 in Campbellford to promote new waterpower developments within the provincial riding with 37 potential hydroelectric sites identified that, if developed, could generate 21 MW of electricity, providing power to between 15,000 and 18,000 homes. The sites include old lumber and grist mills, as well as sites along the TSW.

1.2.2 Alternatives and Alternative Means

Alternative 1 – Redevelopment

OPG has concluded that the existing installed capacity of Ranney Falls GS does not make optimal use of the total water available at the site. As a result, OPG has identified an opportunity to expand its capacity by replacing the "Pup" with a new unit having an incremental capacity of up to 10 MW (OPG, 2011a).

Alternative 2 – Status quo

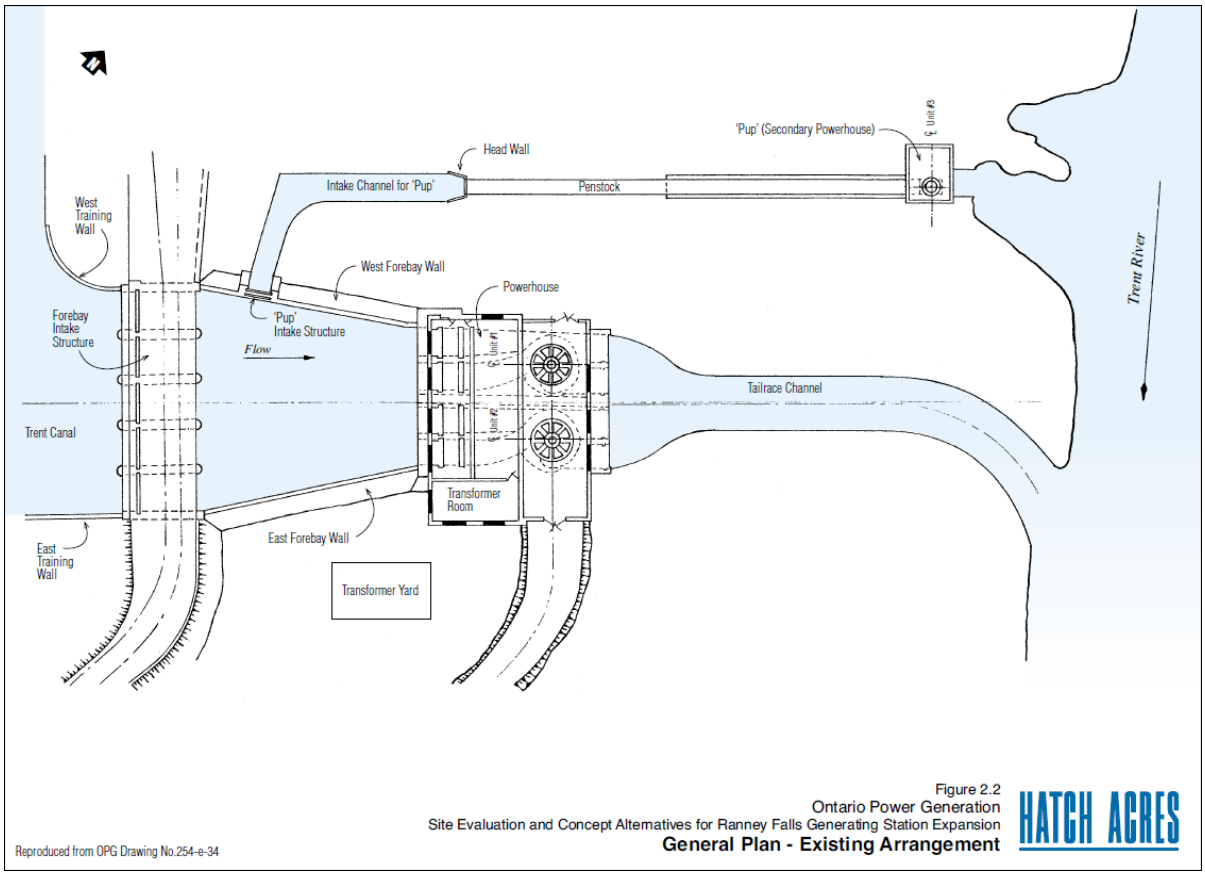
Maintenance of the "status quo" would result in the loss of hydroelectricity production capacity of 0.72 MW due to the decommissioning of the "Pup". It would also preclude the opportunity to expand the capacity of the Ranney Falls GS by replacing the "Pup" with a new unit having an incremental capacity of up to 10 MW.

1.2.3 Existing Conditions

The existing Ranney Falls GS consists of a forebay intake structure, forebay, the main powerhouse and its tailrace, the Pup and its Intake, penstock and tailrace, and storage facilities (see Figures 1.3 and 1.4). A brief description of this existing infrastructure is provided below.

Figure 1.3 Aerial Photo of Existing Ranney Falls GS Infrastructure Layout

Figure 1.4 Schematic of Existing Ranney Falls GS Infrastructure Layout



Forebay Intake Structure

The forebay intake structure, which diverts flow from the Trent Canal to the Ranney Falls GS, consists of five bay sluiceways with a road bridge to the northeast and an operating deck (work platform) for stoplog operation to the southwest. The bridge and the portions of the supporting piers under the bridge are owned and operated by Parks Canada – TSW. Parks Canada – TSW recently rehabilitated the piers with new concrete surfacing.

The operating deck, stoplogs and the portions of the supporting piers under the deck are owned and operated by OPG. The stoplogs are used to dewater the forebay. The stoplog gains and operating deck, and the portions of the supporting piers under the operating deck require repairs.

Safety booms are installed in the Trent Canal and forebay upstream and downstream of the forebay intake structure (see Figures 1.2 and 1.3).

Forebay

The existing forebay is located between the forebay intake and the headworks for the main powerhouse. Concrete gravity retaining walls contain the forebay on the east and west sides. The forebay substrate consists of bedrock. A channel in the west forebay wall supplies water to the "Pup" powerhouse. The east and west retaining walls were resurfaced in 1994 and meet current dam safety requirements.

Main Powerhouse

The main powerhouse accommodates two concrete gravity type intakes, two vertical Kaplan turbine generator units (G1 and G2) and associated electrical and mechanical equipment and systems, auxiliary mechanical and electrical systems, restroom and control room.

The main powerhouse can be accessed by the existing road to the east which was rebuilt in 1992. The road connects to Trent Drive at the bridge spanning Lock #12.

The main powerhouse tailrace channel is a man-made open cut through the layered rock formation to the Trent River.

Main Substation

The main outdoor substation (transformer yard), located to the south of the main powerhouse, accommodates one 44 kV transformer and associated electrical equipment with supporting structures and underground piping (see Figure 1.4). It connects to Hydro One's 44 kV distribution line (R8S) at the wood pole located at the south of the Trent Drive.

Pup Facilities

The Pup facilities include the entrance gate, approach channel, intake, penstock, and powerhouse and tailrace channel. The entrance gate is located at the west retaining wall and controls the flows to the G3 unit. The approach channel is a concrete-lined open channel extending from the entrance gate to the concrete gravity intake structure at the upstream end of the penstock. The penstock is an exposed steel pipe on supporting concrete saddles which connects to the vertical Kaplan turbine generator (G3) in the "Pup" powerhouse. A short tailrace channel extends from the "Pup" powerhouse to the Trent River.

The "Pup" substation is located to the southeast of the powerhouse, accommodating a 44 kV transformer and associated electrical equipment. It connected to Hydro One's 44 kV distribution line (R9S) at the wood pole located at the south abutment of the Ranney Gorge Suspension Bridge.

The "Pup" powerhouse is accessed from Trent Drive by a road that runs parallel to the penstock to the west of the main powerhouse. A stormwater culvert draining the adjacent property to the west discharges into the penstock trench.

Storage Facility

The storage facility consists of a fenced yard and storage shed to the east of the main powerhouse and public trail to Ranney Gorge Suspension Bridge (see Figure 1.3).

Existing Ranney Falls GS Operation

The current spill discharge for flood control at the site and emergency shutdown and normal outage of the GS is the sole responsibility of Trent-Severn Waterway (TSW). TSW Dam #10 has been operated to discharge the relevant flows.

The main powerhouse has the G1 and G2 units each operating at approximately 5 MW at design flows of 47.5 m^3/s and 45.4 m^3/s, respectively (OPG, 2011a). The "Pup" powerhouse contains the 0.72 MW G3 unit with a design flow of 8 m^3/s. Total design flow is 100.9 m^3/s. The G3 unit has reached its end-of-life and ceased operation in June 2014.

Both powerhouses share a common forebay intake structure, with the G3 unit fed by a penstock from a channel branching off the forebay. The headwater of the Ranney Falls GS is the Trent Canal at the upstream end of Lock #12, with the tailwater merging into the Trent River. The average gross head is approximately 14.27 m. Dam #10 diverts flow down a 1.5 km section of canal to feed the Ranney Falls GS and the operational requirements of Locks #11 and #12. The average available flow is approximately 118 m^3/s. River flow that is in excess to the GS and lockage requirements is spilled through Dam #10 (upstream of the GS) to the original Trent River channel. The Trent River flow merges with flows from the Ranney Falls GS tailrace at 1.1 km downstream of Dam #10.

1.2.4 Federal and Provincial Approvals

Federal Approvals

A number of permits, licences and approvals under federal legislation may be required for the proposed Ranney Falls G3 Project to proceed, including:

- Parks Canada licence to carry out the undertaking under the *Dominion Water Power Act* regulations;
- Parks Canada – TSW Work Permit under the Historic Canals Regulations pursuant to the *Department of Transport Act*;
- *Fisheries Act* authorization from the DFO for harm to fish and fish habitat with conditions for mitigation and compensation; DFO has determined that the proposed Project "will not

likely result in impacts to fish and fish habitat", a formal approval from DFO is not required (C. Strand, DFO, 2012, pers. comm. and follow up DFO Fisheries Protection email dated July 31, 2014);

- *NPA* approval of any substantial interference with navigation, or determination of no interference with navigation, from Transport Canada for any works built or placed in, on, over, under, through or across "scheduled" waters;
- *Species at Risk Act (SARA)* permit for the removal of plant species at risk (SAR), or damage or destruction of SAR habitat on federal lands in Ontario; and
- Explosives Transportation Permit from Natural Resources Canada under the *Explosives Act*.

As indicated in Section 1.0, based on technical information provided by OPG, DFO has determined that the proposed Project "is not likely to result in impacts to fish and fish habitat provided that additional mitigation measures are applied" (see Section 4.1.4). Based on the LOA dated July 17, 2012, a formal approval (authorization) from DFO is not required (C. Strand, DFO, 2012, pers. comm. and follow-up DFO Fisheries Protection email dated July 31, 2014).

Environment Canada, CWS, has approved the "Turtle Nesting Habitat Mitigation Plan" prepared by OPG to create and enhance access and nesting habitat for Northern Map Turtle (*Graptemys geographica*) and Eastern Snapping Turtle (*Chelydra serpentina serpentina*), both designated as Special Concern federally and provincially (K-A. Fagan, Environment Canada, 2012, pers. comm.) (see Section 4.1.3). An In-water and Shoreline Work Permit Application was submitted to Parks Canada – TSW on December 9, 2014 to obtain approval for implementation of the Plan under the Historic Canals Regulations pursuant to the *Department of Transport Act*.

As the Trent River/Canal from Rice Lake to Lake Ontario is included in the *NPA* List of Scheduled Waters, an application (Notice of Works Form) for approval of the proposed Project was submitted by OPG to Transport Canada on December 19, 2014. OPG subsequently received a letter dated December 30, 2014 from Transport Canada indicating that the information provided by OPG was complete for the purpose of commencing agency review.

Provincial Approvals

Based on current information, a number of permits, licences and approvals under provincial legislation may also be required. These approvals and permits may include:

- Permit for SAR plant removal, or disturbance or destruction of SAR habitat from the MNRF under the *Endangered Species Act (ESA)*;
- Permits to Take Water (PTTW) for construction (including use of temporary settling pond) and dewatering if greater than 50,000 L/day from the MOECC (MOE, 2007) under the *Ontario Water Resources Act (OWRA)*;

- Environmental Compliance Approval (MOE, 2011a) for air, noise, waste disposal and/or sewage works and wastewater for spill containment associated with the new facility from the MOECC under the *Environmental Protection Act (EPA)*;
- Waste Manifest from the Ontario Ministry of Transportation (MTC) under the *Dangerous Goods Transportation Act*;
- Letters of Clearance for archaeological resources from the Ontario Ministry of Tourism, Culture and Sport (MTCS) under the *Ontario Heritage Act*; and
- Fish Scientific Collectors Permit for fish removal and relocation from the MNRF under the *Fish and Wildlife Conservation Act*.

A transmission line (115 kV or higher) greater than 2 km long associated with a generation project requires a Section 92 Leave to Construct under the *Ontario Energy Board Act* from the Ontario Energy Board. As the proposed Ranney Falls G3 Project does not involve transmission infrastructure, a section 92 Leave to Construct will not be required.

As indicated in Section 1.0, OPG is exempt from the LTC Permit for Development, Interference with Wetlands and Alterations to Shorelines and Watercourses under Ontario Regulation 163/06 of the *Conservation Authorities Act* (M. Lovejoy, LTC, 2012, pers. comm.).

Under subsection 62.0.1(1) of the *Planning Act*, energy projects that are approved under the *EA Act* are exempt from *Planning Act* requirements. However, as the proposed Ranney Falls G3 Project is not subject to the *EA Act*, OPG will apply for Site Plan approval and a Building Permit from Trent Hills. OPG will also consult with Trent Hills regarding construction planning, schedules, noise regulation (Trent Hills, 2005) and local traffic management. An Access/Use permit for municipal road and heavy load transportation may be required from Trent Hills.

Other Relevant Regulations/Guidelines Not Requiring Permitting

There are a number of federal and provincial regulations/guidelines that need to be considered throughout the regulatory approval process and the subsequent construction phase that do not necessarily require a formal permitting process. These include but are not limited to the following:

Federal

- *Migratory Birds Convention Act (MBCA)* and Migratory Birds Regulations prohibit the taking or killing of migratory birds and their nests and eggs, and the deposit of substances harmful to migratory birds in areas they frequent;
- Migratory birds environmental assessment guideline (Milko, 1998a);
- Ontario In-water Construction Timing Window Guidelines for the Protection of Fish and Fish Habitat (DFO, 2010);

- Canadian Technical Report of Fisheries and Aquatic Sciences 2107 Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters. (Department of Fisheries and Oceans, 1998);
- Policy on Wetland Conservation (Environment Canada, 1991) with the goal of sustaining wetland functions;
- Wetlands environmental assessment guideline (Milko, 1998b);
- A Wildlife Policy for Canada (CWS, 1990; Lynch-Stewart, 2004) with the goal to maintain and restore ecological processes and the diversity of ecosystems, species and genetic variability within species;
- Canadian Biodiversity Strategy (Environment Canada, 1995) based on the Convention on Biological Diversity (UNEP, 1994) with the goal of conserving biological ecosystems, species and genetic variability within species; and
- Practitioner's Guide to the Risk Management Framework for DFO Habitat Management Staff (DFO, 2006).

Provincial

- PPS which provides policy direction on matters of provincial interest related to land use planning and development (OMMAH, 2014);
- *Places to Grow Act* administered by the Ontario Ministry of Infrastructure and the Growth Plan for the Greater Golden Horseshoe (OMPIR, 2006);
- Under the *EPA*, regulations regarding the systematic control of collection, storage, transportation, treatment, recovery and disposal of waste including hazardous waste;
- Water Management Policies and Guidelines (Policy 1 and 2) of the MOECC (MOEE, 1994);
- Ontario Biodiversity Strategy (MNR, 2005; Ontario Biodiversity Council, 2011);
- Standards and Guidelines for Consultant Archaeologists (MTC, 2010); and
- Statements of Environmental Values by the Ontario Ministry of Natural Resources, (now MNRF), Ontario Ministry of the Environment (now MOECC) and Ontario Ministry of Culture (now MTCS) under the *Environmental Bill of Rights*.

In addition, the proposed Ranney Falls G3 Project must conform to Parks Canada policy and directives (see Section 2.2.5).

A final determination of the likely applicable federal and provincial permits and approvals cannot be made until the detailed design phase of the proposed Project is complete.

1.2.5 Conformance with Parks Canada Policy and Directives

As indicated in Section 2.2.1, the management plan for the TSW National Historic Site of Canada received ministerial approval in 2000 (Parks Canada, 2000). The process to develop a new management plan began in late 2011, and was subsequently postponed following a review

of the management plan cycle. The next management plan review is scheduled for completion in 2018. The proposed Project must conform to relevant Parks Canada policy and directives. Those policies and directives include:

Parks Canada Guiding Principles and Operational Policies guides stewardship responsibility to ensure that the record of our past, the rich diversity of wild spaces and species, the beauty and grandeur of our lands and seas, and the cultural character of our communities are not inadvertently lost over time. This policy document guides these efforts, designation and management.

National Historic Site Policy objectives are to foster knowledge and appreciation of Canada's past through a program of historical commemoration and to ensure commemorative integrity of national historic sites are maintained by protecting and presenting these sites and their associated resources for future generations.

Cultural Resources Management (CRM) Policy serves as the overall management policy for Parks Canada-administered national historic sites. As *CRM Policy* supports the management of cultural resources, it applies to conserving and preserving the national treasures that are under the stewardship of the Parks Canada Agency.

Historic Canals Policy Regulations outlines respecting the management, maintenance, proper use and protection of the historic canals administered by the Parks Canada Agency.

Historic Canals Policy fosters appreciation, enjoyment and understanding of Canada's historic canals by providing for navigation; by managing cultural and natural resources for purposes of protection and presentation; and by encouraging appropriate uses.

Canal Regulations outlines respecting the use and operations of canals.

OPG respectfully submits that the proposed Ranney Falls G3 Project does conform to the Parks Canada policy and directives presented above. As indicated in Section 3.1.7, the Trent Canal, Trent River, Ferris Provincial Park and Ranney Falls GS are considered to be cultural heritage landscapes (CHLs). As indicated in Section 4.2.5, construction of the proposed Project will not result in displacement of these CHLs. However, there is potential for temporary disruption to public access from the Ranney Falls GS property via the Ranney Gorge Suspension Bridge to Ferris Provincial Park on the opposite side of the Trent River (see Figure 1.3). To minimize and/or manage the potential conflict between public and construction traffic access, an Access Management Plan will be developed in consultation with Ontario Parks and Friends of Ferris Provincial Park. TSW will also be kept informed on the progress of the access management plan.

In addition, there is potential for disruption of local viewsheds from vessels using the section of the Trent Canal adjacent to the proposed Project forebay expansion, as well as for the public accessing the Ranney Gorge Suspension Bridge and Ferris Provincial Park. As partial mitigation, construction will not occur on Sundays and public holidays, likely the time of peak public boating use on the Trent Canal and recreational use of Ferris Provincial Park.

The potential access and visual disruption effects on these CHLs will be temporary, i.e., occurring during the construction phase of the proposed Project, and will be dissipated with the implementation of the Site Rehabilitation Plan.

Furthermore, there will be no displacement of the existing Ranney Falls GS powerhouse buildings. The proposed Ranney Falls G3 Project powerhouse building will adjoin the existing main powerhouse building and have a similar structure and façade, thereby providing overall architectural coherence. The “Pup” powerhouse building and tailrace will be preserved.

The operation of the proposed Ranney Falls GS Project will not affect the status and significance of the Trent Canal, Trent River, Ferris Provincial Park and Ranney Falls GS as CHLs.

As indicated in Section 4.2.4, during proposed Project operation, there will be negligible impacts on vessel utilization of the Trent Canal during the navigation season as a result of slightly higher flow velocities.

As indicated in Section 3.7, the Ranney Falls GS property supports a number of ecological functions and attributes that would potentially qualify portions of the property as Significant Wildlife Habitat. The displacement of turtle nesting habitat and potential snake hibernacula habitat will be offset by existing habitat enhancement on areas of the Ranney Falls GS property unaffected by the proposed Project, as well as on nearby TSW property (see Sections 4.1.2 and 4.1.3). Moreover, habitat on the property will be considerably increased in extent and enhanced after construction. Similarly, the implementation of mitigation measures will ensure that the proposed Project will not have an adverse effect on the proximate Significant Woodlands or their ecological functions (see Section 4.1.2).

As indicated in Section 2.2.1, the PFTSW (2008) was mandated in 2007 to assess and make recommendations to the federal Minister of the Environment concerning the future contributions and management of the TSW. The PFTSW concluded that the development of renewable energy resources is a sound public policy goal and supported a vigorous effort to pursue the potential for generation of green energy along the TSW. The proposed Ranney Falls G3 Project conforms with this policy recommendation.

1.3 PROJECT DESCRIPTION

1.3.1 Project Components

It should be noted that the proposed Project components/structures and activities presented in this section will be refined in this phase, which involves detailed engineering design to be undertaken concurrently with DIA Report preparation.

With the exception of the electrical substation, all of the structures will be located entirely on the west side of the existing main powerhouse.

As indicated in Section 2.1, the stoplog gains and operating deck, and the portions of the supporting piers under the operating deck of the forebay intake structure require rehabilitation, which will be undertaken during construction of the proposed Ranney Falls G3 Project.

The general arrangement of the proposed Project components/structures is presented in Figures 1.5 and 1.6. A brief description of each proposed infrastructure is provided below.

Figure 1.5 Aerial Photo of Existing Ranney Falls GS Showing Proposed Project Infrastructure Layout

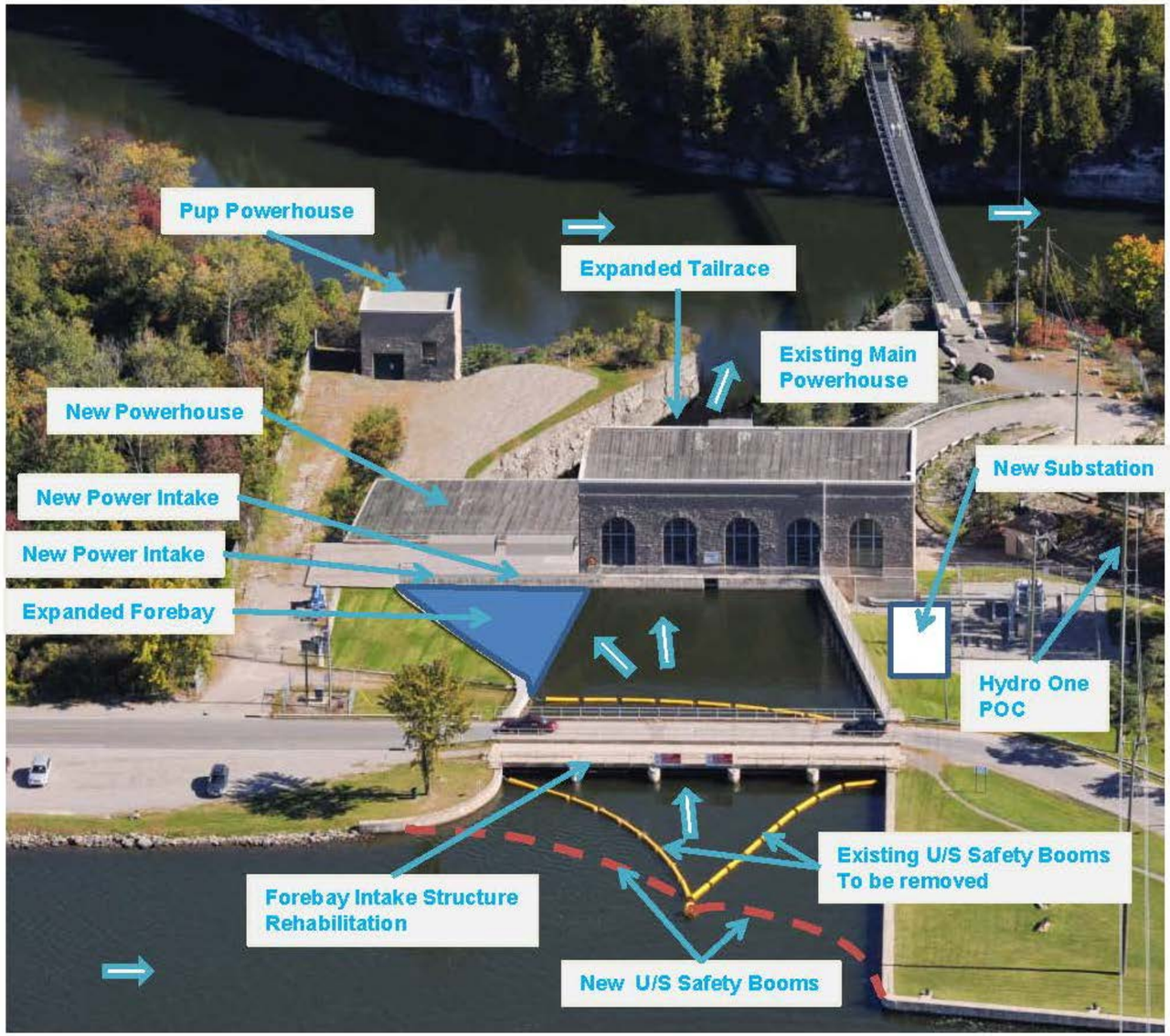
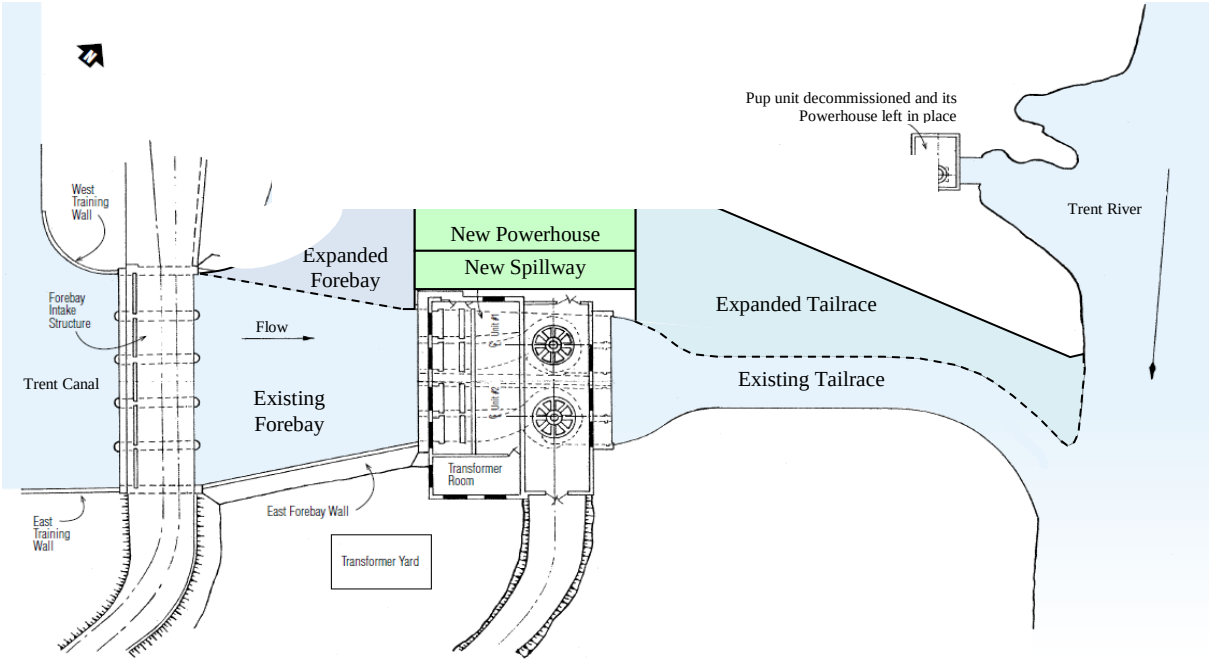


Figure 1.6 Schematic of Proposed Ranney Falls G3 Project Infrastructure Layout



Forebay Intake Rehabilitation

The forebay intake rehabilitation includes repairing the stoplog gains and operating deck, and resurfacing the portions of the supporting piers under the operating deck. The operating deck will be upgraded to accommodate the operational loads incorporate modern railings and safety signage to facilitate pedestrian use. All of the upgrade and repair work will include contemporary concrete and steel materials to renew the structure. The TSW will be provided with engineering drawings and will be consulted with on proposed repairs.

Expanded Forebay

The existing forebay will be extended westward to form a large open channel which will draw water from the Trent Canal through the forebay intake into the intakes of the existing two units (G1 and G2), the new unit (G3) and the new spillway. The new intakes will align with the existing intakes.

The west side wall of the approach channel will be streamlined from the west abutment pier of the forebay intake to the new spillway intake west wall.

The bottom slope of the expanded forebay starting from the forbay intake downstream bottom will smoothly transit downward at an approximately 16% grade. A 2 m wide and 1 m deep rock trap to capture potential debris will be constructed in front of the new powerhouse intake and spillway intake.

The expanded forebay will be designed and verified to satisfy hydraulic requirements under all new operating scenarios. Under normal operational conditions, the expanded forebay will be designed to pass the design flow of 80 m^3/s for the new G3 (a 10-time increase over the existing "Pup" unit), with total station design flow of 171 m^3/s (compared to existing flow of 100m^3/s). The current operating levels in the existing forebay fluctuate from 145.76 m to 146.21 m. The operating levels in the expanded forebay will not change. Under emergency conditions, the expanded forebay will be designed to pass the design flow of 171 m^3/s.

New Powerhouse Intake

The new G3 intake, to be constructed on competent rock foundation, will have one concrete hydraulic passage, approximately 24 m long and 10 m wide, which will initially consist of rectangular sections converging to a circular section of 7.5 m diameter that connects to a Kaplan turbine. The structure will be subject to dam safety requirements.

Trashracks made of steel will be installed in front of the new G3 intake. A 6.5 m high by 7.5 m wide vertical sliding steel gate with a lifting mechanism will be installed to allow for the complete shutdown of the turbine. The gate will be heated for winter operation. Two new sets of stoplogs will be installed upstream and downstream to dewater the water passage for station inspection and maintenance.

New Powerhouse Structures

The new powerhouse footprint will be approximately 10 m by 22 m with sufficient space to satisfy equipment operation and maintenance requirements. The powerhouse will be constructed on competent rock foundation to support the turbine generator, associated equipment and the powerhouse structure. The powerhouse will be above the unit draft tube and the spillway tunnel. The roof will be at elevation 143.0 m to facilitate the mechanical handling for turbine, spillway gate, unit gate and downstream sectional gates. The main floor will be at elevation of 134.0 m to accommodate the electrical and mechanical equipment and associated systems. All floor slabs will be designed and constructed to provide adequate lay-down area and to withstand the heaviest equipment anticipated for loading/unloading of the turbine generator. The west side wall of the powerhouse will be against rock surfaces. The east wall will be against the rock surface of the rock partition between the existing main powerhouse and the new spillway. The north bulkhead wall will face the tailrace. The south side wall will form the power intake downstream wall. All walls will be designed and constructed to be watertight. The walls will be designed to support all loads without dependence on the rock support and the support from second phase concrete. The north bulkhead wall will be designed to withstand the ice load from tailrace freezing.

A single Kaplan turbine (horizontal axis) unit with a nominal capacity of up to 10 MW at design flow of 80 m^3/s will be installed. The design of the draft tube will take into account the turbine hydraulic design requirements which prevent draft tube hydraulic instability.

New Spillway

OPG will operate the proposed expanded Ranney site within historical water levels (since 1951) and existing water management practices with a flow up to 171 cms at the Ranney site. There will be no increase in water levels operating the proposed site.

Spillway discharge capacity for flood control at Dam 10 (Ranney Falls) is the sole responsibility of the Trent-Severn Waterway (Parks Canada). Installation and operation of a new spillway to be built between the existing and new powerhouse to bypass powerhouse flows in the event of an emergency shutdown of the unit is the responsibility of OPG. The Spillway operation will minimize wave surge and mitigate any rapid increase in water level associated with unplanned station shutdown. The design for the new spillway will be developed during the next stage of development (Interim Licence) whereby General Construction Plans are prepared for the review and approval by the Parks Canada Agency.

The spillway consists of intake, tunnel, outlet and stilling basin with an overall foot print of 7 m wide by 37 m long and will be constructed on competent rock foundation. A 5 m high by 5 m wide vertical sliding steel spillway gate with heating system for winter operation will be installed at the downstream to control the flows. Stoplogs will be installed upstream and sectional gates will be installed downstream of the spillway gate to dewater the spillway tunnel.

The spillway intake will be designed to satisfy the hydraulic requirements and the outlet floor will be submerged below the minimum tailrace level to prevent ice formation in the tunnel. The spillway tunnel is 5 m by 5 m tunnel with floor sloping from elevation 13.0 down to elevation 121.44 m. The stilling basin will have energy dissipating concrete blocks to dissipate energy.

The intake and tunnel will be designed as watertight hydraulic structures and to meet dam safety requirements.

Expanded Tailrace Channel

The expanded tailrace channel will be designed with a maximum discharge capacity of 171 m^3/s, either from unit G1, G2 and G3 under normal operation or from spillway during emergency shutdown of the units. The expanded tailrace channel will be located to the east of the “Pup” powerhouse tailrace to accommodate paths for the G3 and stilling basin for the spillway. The tailrace channel will be expanded with the width near the powerhouses from 18 m to 36 m and the width at the outlet from 7 m to 18 m. The channel floor from the new G3 draft tube outlet will have a 5 m horizontal section and then subsequently change from elevation 123.0 m to 126.0 m with a slope 1V:5dvH. The channel floor from the spillway outlet will have a 15 m long stilling basin with energy dissipating blocks and then subsequently change from elevation 120.44 m to 126.0 m with a slope of 1V:2H. The channel floor from the existing G1 & G2 draft tube outlets will not be altered.

Distribution Connection

The new G3 will be connected to the other Hydro One 44 kV distribution line (R8S) that parallels the R9S line east of the existing Ranney Falls GS. The new substation will be built south to the existing substation to accommodate connecting electrical equipment and supporting structures and foundations.

Decommission of the Existing Pup Facilities

The existing Pup facilities will be decommissioned. The entrance gate will be dismantled. The existing approach channel will be incorporated into the expanded forebay. The intake structure and penstock will be removed. The powerhouse building will be preserved in accordance with the environmental assessment commitments. The existing Pup tailrace will be returned back to river bed. The single transformer station will be dismantled and all structures will be removed.

Relocation of the Upstream Safety Boom

The safety boom upstream of the forebay intake will be relocated slightly further upstream to accommodate the new operation. Safety fencing will be installed accordingly.

Creation of Habitat for Northern Map Turtle and Eastern Snapping Turtle

A complimentary habitat for Northern Map Turtle and Eastern Snapping Turtle has been created adjacent to the existing Pup tailrace area (TSW, Environment Canada and Ontario Parks will be consulted with respect to post construction monitoring).

1.3.2 Construction

The Ranney Falls G3 Project will be executed under a design-bid-build approach. During the Definition Phase, a water-to-wire (W2W) contractor will be engaged through a Request-for-Proposal (RFP) to complete the final design and layouts, and then the owner's engineer will complete the detailed design for permanent civil works. A Civil Contractor will be selected through a RFP process. All the temporary works will be the sole responsibility of the selected Civil Contractor and W2W Contractor. The Definition Phase is anticipated to be completed in December 2016.

The Execution Phase includes two stages – stage 1 for civil construction and stage 2 for W2W installation. During the stage 1, the existing G1 and G2 will be taken out of service, the Civil Contractor will design, build and remove the upstream and downstream cofferdams, complete the civil construction, including forebay intake rehabilitation, excavation and construction of the expanded forebay, powerhouse intake and powerhouse, spillway, expanded tailrace and new substation foundations, installation of auxiliary electrical and mechanical equipment and systems, trashrack, unit headgate, spillway headgate and stoplogs/section gates, water up the

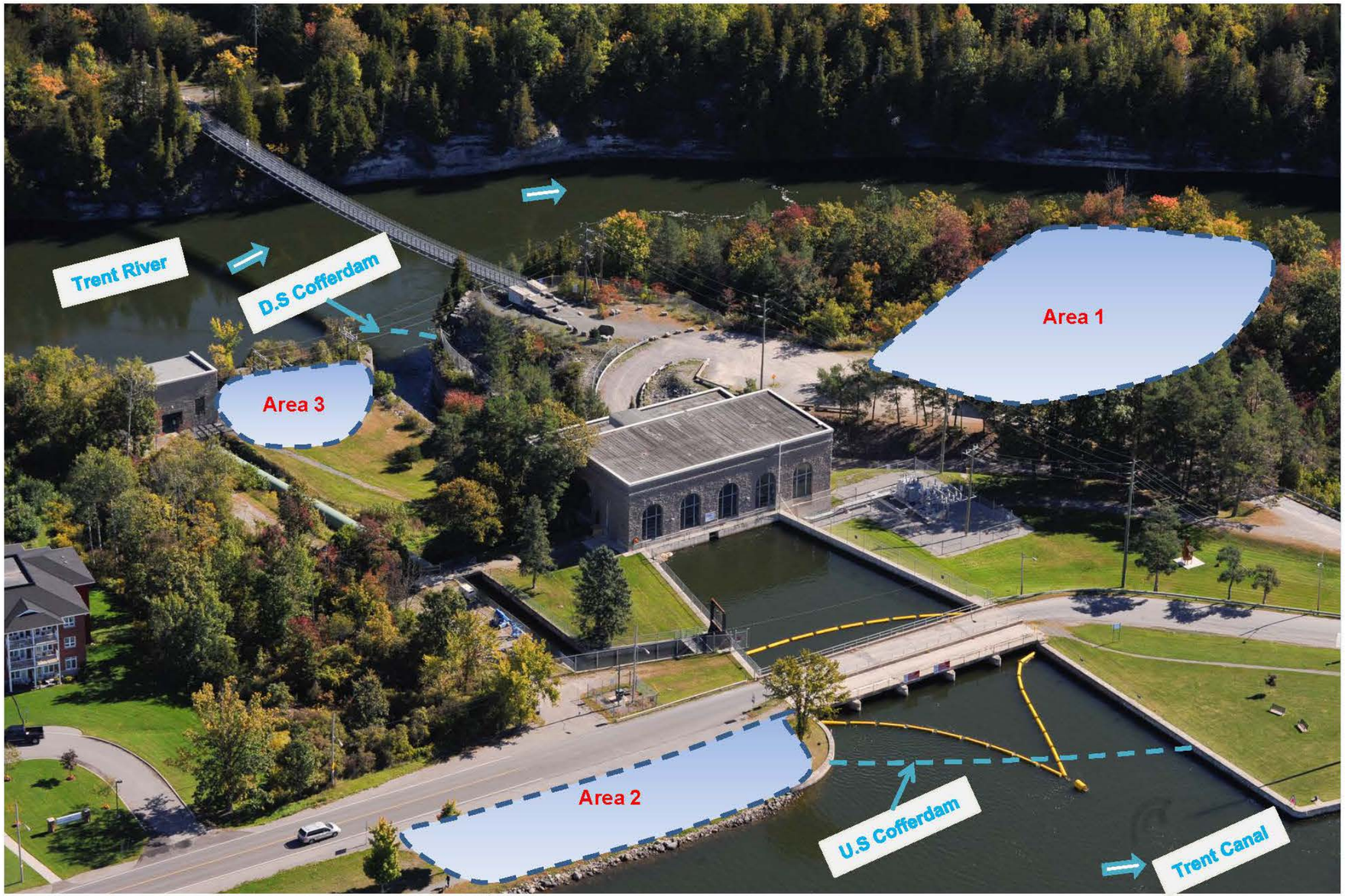
expanded forebay and tailrace, and return the existing G1 and G2 into service. Then the stage 2 starts. The W2W Contractor will install, test and commission the turbine, generator and ancillary electrical and mechanical equipment and systems, and place the new G3 into service. The OPG project team including Owner's engineer will provide oversight during the two stages to ensure quality and schedule. The Execution Phase is anticipated to start in January 2017 and be completed by December 2019.

As the environmental assessment process will be completed during the Definition Phase, the detailed engineering design will be undertaken concurrently with DIA Report preparation. Commitments made in the DIA are being communicated to the design team.

An initial perspective on what might be the construction and installation methods that would be employed by the contractors is presented below. However, it should be noted that the final sequencing, construction and dewatering methods used would be defined by the successful contractors on the basis of environmental requirements and constraints outlined in the OPG procurement process.

Proposed construction laydown areas include OPG's storage yard, the lawn to the south of the main powerhouse and the area between the access road to the "Pup" powerhouse and the proposed expanded tailrace (see Section 4.1.2). OPG is also pursuing approval from Parks Canada – TSW for use of the lawn area south of Trent Drive to the east and west of the existing forebay.

Figure 1.7 Construction Laydown Areas



Fencing will be installed prior to construction initiation to prevent turtle access to current nesting habitat in the construction area.

During stage 1, the Civil Contractor will be the Constructor. An upstream cofferdam will be installed upstream of the forebay intake for repairing the forebay structure and civil construction. The upstream cofferdam may be made of sheet piles or rock fill. The downstream cofferdam will consist of a dam within the existing tailrace channel outlet and rock plug to seal the expanded channel portion. The dam within the existing tailrace may be made of rocks from the excavation and waterproof membrane. A cementitious grout curtain may be installed through the rock plug to stop inflows from the Trent River.

After cofferdams installation, the existing forebay and tailrace channel will be dewatered and any fish present transferred to the Trent Canal and Trent River, respectively, prior to complete dewatering. Cofferdams installation and dewatering will be undertaken outside of the timing restriction for in-water construction to protect the fish spawning and egg incubation period for warmwater and coolwater fish communities (April 1 to June 30).

The upper shale-rich bedrock domain with a thickness in the range of 18 to 23 m will be the main domain encountered during excavation (see Section 3.4). This material will form the walls of all planned excavations, temporary plugs and at least some of the excavation floors, depending on excavation depth. It is expected that the overlying overburden and upper weathered bedrock horizon with a thickness likely varying between 1 and 4 m can be excavated using conventional earthmoving equipment such as excavators and bulldozers, without ripping, or drilling and blasting. Based on the geotechnical findings, the upper shale-rich bedrock domain is considered to be non-rippable and therefore its excavation is expected to require drilling and blasting (Knight Piésold Ltd., 2011a).

The lower shale-poor bedrock domain is likely to be near the base of the excavation and the new powerhouse may be founded on this domain, or near boundaries of the two domains, i.e., upper shale-rich and lower shale-poor. Therefore, significant excavation in the lower shale-poor bedrock domain is not anticipated. If excavation of the lower domain is necessary, it is expected that drilling and blasting will be required due to its greater competency. The current excavation plan indicates that the excavation will be limited to the upper shale-rich bedrock domain (Knight Piésold Ltd., 2011a).

As indicated in Section 3.4, the upper shale-rich bedrock domain consists of inter-bedded shale and limestone with a number of weak clay-like seams believed to be associated with the shale-rich layers. Any seams in the powerhouse foundation area will be excavated if they are within 1.5 m of the excavation base. In the absence of these weak materials in the immediate vicinity of the foundation, the bearing capacity is expected to be within the range of typical values for soft bedrock (Knight Piésold Ltd., 2011a).

It is expected that the material excavated from the upper shale-rich bedrock domain may be suitable for structural fill. It will be important to ensure that the excavated material is well graded and that it contains only a small proportion of thin, flat or elongated particles (which may come from the shale layers) if it is to be used for fill (Knight Piésold Ltd., 2011a).

The shale layers and soil seams encountered in the rock walls may become locally recessed during excavation, resulting in local wall stability issues associated with overhanging limestone beds. Intersecting steeper discontinuities will need to be mapped during excavation and may result in a few wedges that need to be stabilized. Rock mass performance is expected to be reasonable and steep walls should be achievable with careful excavation practices (Knight Piésold Ltd., 2011a).

The groundwater table on the lower level of the Ranney Falls GS property occurs within the upper shale-rich bedrock domain at an approximate depth of 5 to 7 m. Groundwater and precipitation/runoff inflows can be expected due to any excavation within the upper shale-rich bedrock domain. Based on the geotechnical survey findings, inflows are expected to be manageable during excavation with inflow at a rate up to 3 to 5 l/s. Higher than expected inflows may occur if high permeability features are encountered, or if blasting and rock excavation techniques significantly modify the intrinsic hydraulic conductivity of the rock mass (Knight Piésold Ltd., 2011a). To minimize dewatering requirements, a cementitious grouting curtain may be required along the excavation line just before starting the excavation to seal the paths of groundwater inflow. The cementitious grouting will be made of cement, fine sand and water in compliance with industrial practices. Other methods that are generally accepted in the construction industry to reduce or avoid the groundwater inflow may also be employed. All the water from the construction pit will be properly tested and pre-treated if required prior to discharging into Trent River.

The drainage culvert from the adjacent property will be diverted out of the construction pit.

Once the excavation is completed, the Civil Contractor will complete the repair of the forebay structure, decommission of the existing G3 facilities, the construction of the retaining walls, intakes, powerhouse and spillway and installation of the auxiliary electrical and mechanical equipment and systems and gates. Then the Contractor will remove the upstream cofferdam and water up the forebay. The expanded tailrace channel will be watered up, and then the downstream cofferdam including the rock plug and extended riverbed will be removed through in-water excavation, adequate silt curtains will be installed to protect the Trent River water body. After the downstream cofferdam is removed, the existing G1 and G2 units will be returned to service.

During stage 2, the W2W Contractor will be the Constructor. The W2W contractor will install, test, and commission the new G3, including turbine generator, transformer, switchgear, protection and control systems, and also have responsibility for the Hydro One Network connection.

After the Civil and W2W Contractors are retained, they will develop the EMPs that will be provided to the TSW to review. That EMP will be cover a number of details but may not include all the details such as rock plug removal in the EMPs. However, OPG is willing to involve the TSW in a further review of the grouting and removal of the rock plug activities when those work activities are further planned out.

The Execution Phase including civil construction and W2W installation is anticipated to last up to 36 months with the earliest possible in-service date in 2019.

1.3.3 Operation

Operation of the new Ranney Falls complex including the existing G1 and G2, new G3 and new spillway will result in optimal use of the total water available for power generation (mean annual flow of approximately 118 m^3/s), while still complying with the current water level limits.

The new spillway that is to be built in between the existing powerhouse and the new powerhouse will be used solely to control water levels within the Trent Canal which will ensure compliance with the current level limits during an emergency shutdown of the units.

During the navigation season from mid-May to mid-October, generating flows transported through the Trent Canal by TSW are generally up to the current Ranney Falls GS design capacity of 100.9 m^3/s. With the proposed project, the maximum flow transported through the Trent Canal for power generation will be increased from 100 to 120 m^3/s. During the non-navigation season from mid-October to mid-May, the maximum generating flows transported through the Trent Canal will be up to 171 m^3/s.

As illustrated in Figure 1.8 below, Dam #10 currently diverts flow to the 1.5 km section of the Trent Canal to feed the Ranney Falls GS and meet the operational requirements of Locks #11 and #12. River flow that is in excess of the generating station and lockage requirements is spilled through Dam #10 to the original Trent River. The Trent River flow merges with flows from the Ranney Falls GS tailrace approximately 1.1 km downstream of Dam #10. Currently, the 101 m^3/s, passes through the Ranney Falls GS and Locks #11 and #12. With the proposed increased generating capacity, it is planned that a flow of up to 171 cms will be diverted to the Ranney Falls complex and Locks #11 and #12. The hydrological conditions due to dam spillage and leakage are depicted in Photographs 1.1 and 1.2, respectively.

Figure 1.8 Dam #10 & Trent Canal &Trent River

Photograph 1.1 Trent River Hydraulic Regime During Dam #10 Spillage

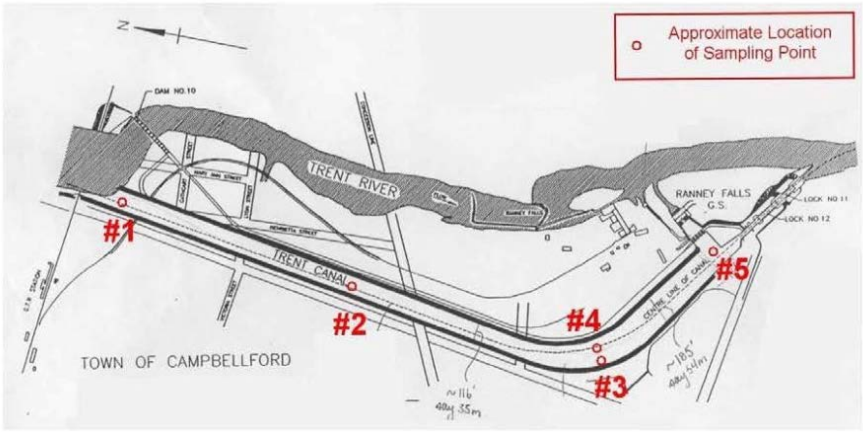
Photograph 1.2 Trent River Hydraulic Regime During Dam #10 Leakage

The new spillway will be used to by-pass station flow to the tailrace channel in emergency shutdown situations to control water levels within the Trent Canal in compliance with the current limits.

A number of studies have been undertaken to verify the hydraulic performance of this 1.5 km section of the Trent Canal under the existing water level limits with the existing and new operation flows, as well as the hydraulic performance of the existing G1 and G2 and proposed G3, and the new spillway. The conclusions have been taken into consideration ensuring the final design in compliance with the existing operation water level limits.

A study of erosion potential of bed substrate in the Trent Canal upstream of Ranney Falls GS (see Figure 1.9) due to increased flows as high as 171 m^3/s was undertaken by Environment Canada (Krishnappan, 2007). The objective of the study was to determine the critical shear stress and erosion rate of the canal's wetted perimeter. It was determined that with an applied shear stress of 8 Pa reflecting an increase in flow velocity from 0.9 m/s at the existing maximum flow of 101 m^3/s to 1.5 m/s at the proposed maximum flow of 171 m^3/s, the canal bottom armour layer remained stable with minor transport of fine material that underlies the armour layer. Moreover, the maximum equivalent canal flow rate of 171 m^3/s could be sustained in the canal without affecting canal dyke stability.

Figure 1.9 Trent Canal Bed Substrate Erosion Potential Study Locations



As part of a numerical hydraulic study, using HEC-RAS software, developed by the Hydrologic Engineering Centre (HEC) of the U.S Army Corps of Engineers (USACE), to investigate water surface profiles and flow velocities in the Trent Canal between Dam #10 and Ranney Falls GS, under the current water level limits, with the existing and future flows. The study concluded that the Trent Canal can transport the maximum power flows up to171 m^3/s, while maintaining the water levels within the current limits and maximum flow velocities within the Trent Canal will increase from 0.9 m/s to 1.5 m/s. Based on the scenarios modeled, the proposed spillway will be able to effectively control water level within the Trent Canal during an emergency shutdown of the units.

A hydraulic study using the Computational Flow Dynamics (CFD) model was undertaken to assess the potential for vortex formation at the forebay under existing and future flow conditions. Simulation of existing flow conditions indicated no major swirling flows in the flow field near the existing intakes, which is consistent with observations at Ranney Falls GS. Simulations of the future flow conditions indicated no significant cross-circulations near the new intakes, suggesting that the potential for vortex formation at the new G3 intake and spillway intake is likely to be negligible.

Figure 1.10 Flow Velocities in the Straight Canal Reach and at the Locks Based on Proposed Flow Increase

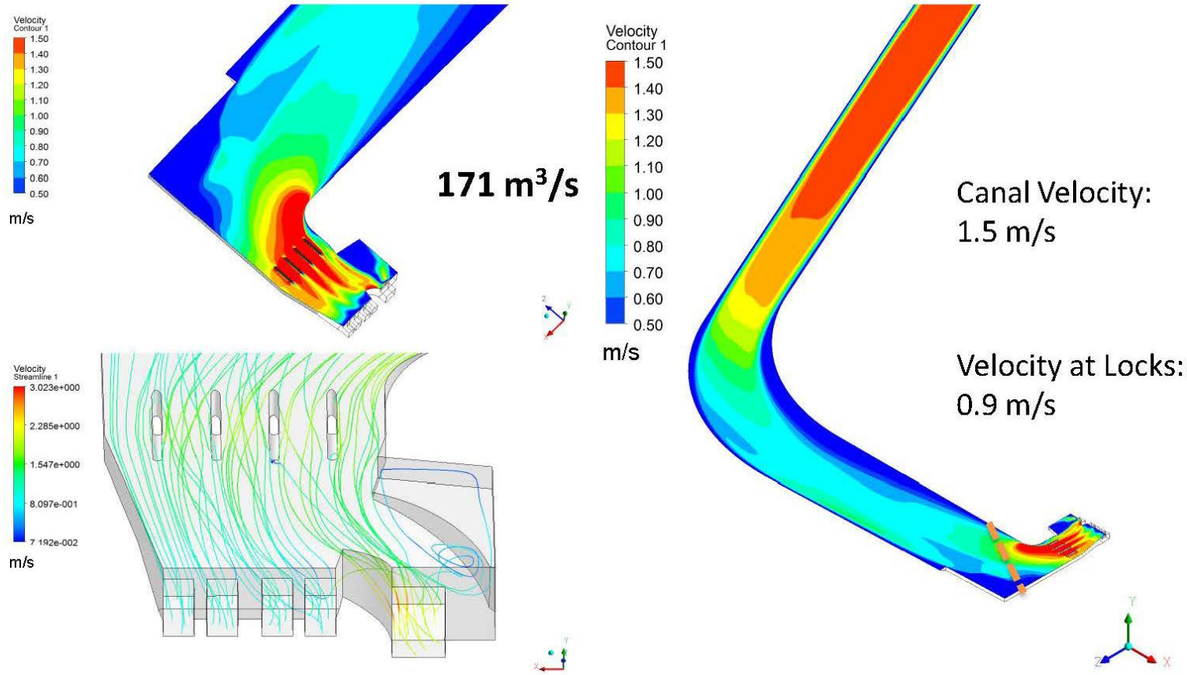
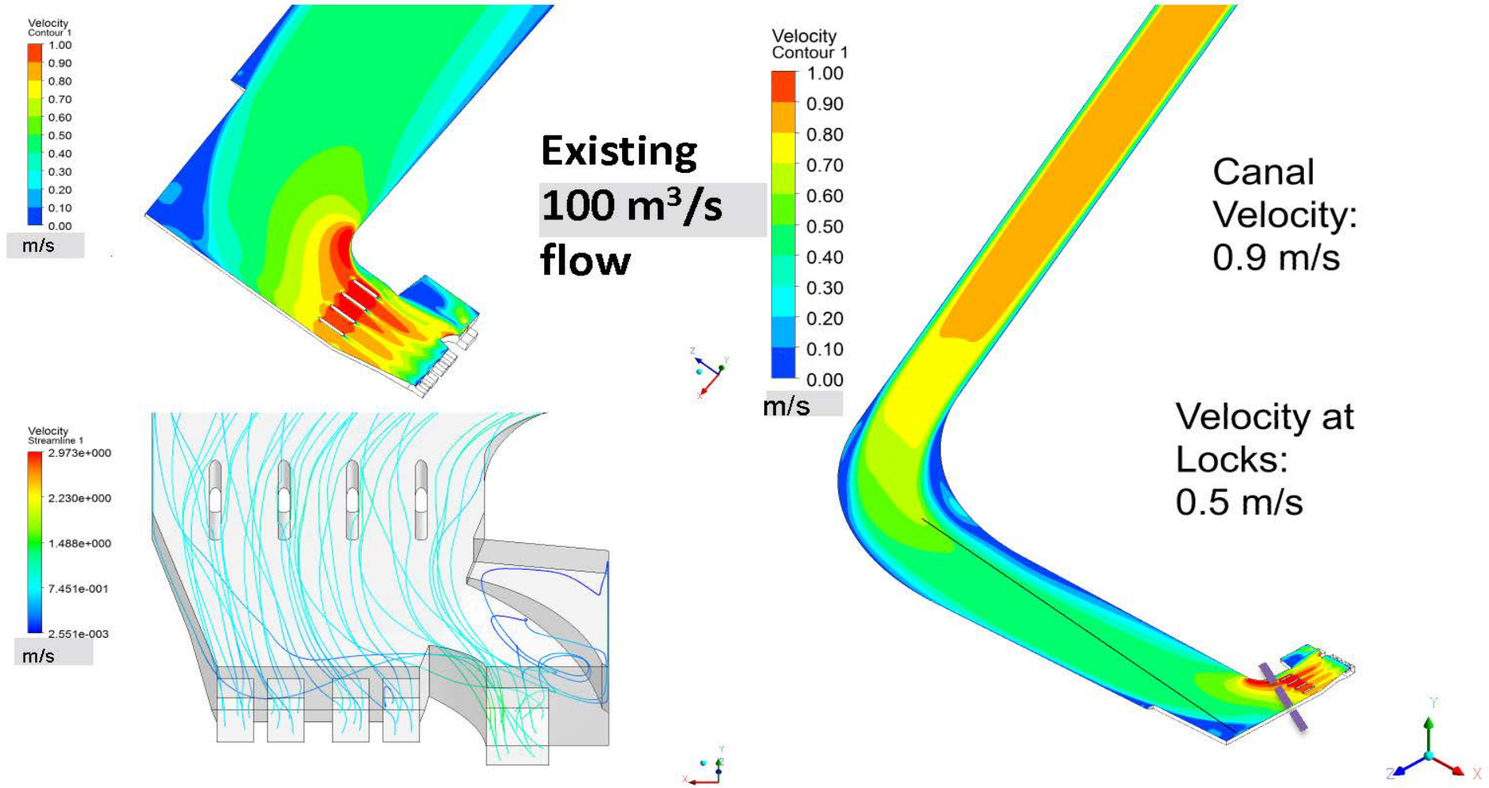


Figure 1.11 Flow Velocities in the Straight Canal Reach and at the Locks Based on Current Navigation Flow



Note: **velocities at flow of 120 m³/s is expected to be 1.0 m/s in the Canal and 0.6 m/s at the Locks**

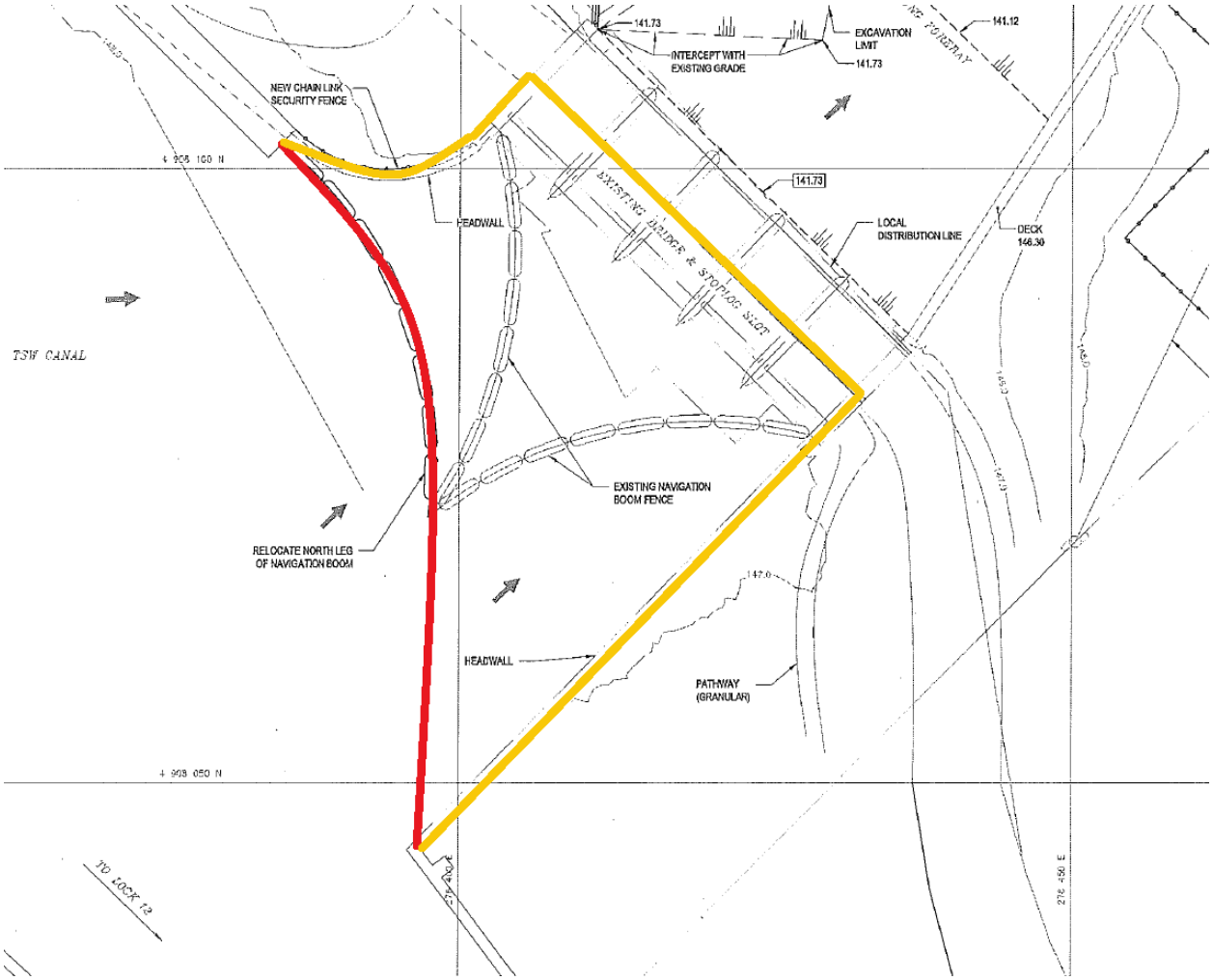
Based on a maximum flow of 171 m^3/s, velocities in the straight section of the canal and near the forebay intake structure were expected to increase from 0.9 to 1.5 m/s and from 0.5 to 0.9 m/s, respectively (see Figure 1.10). However, during the navigation season from mid-May to mid-October with flow limited to 120 m^3/s from the current 100 m^3/s, the maximum flow velocity in the straight section of the canal is expected to increase from 0.9 to 1.0 m/s (see Figure 1.11). In the area near the forebay intake structure, the maximum flow velocity is expected to only increase from 0.5 to 0.6 m/s. It should be noted that flow velocities in the navigable part of the Trent River near the Campbellford main town bridge are higher than those anticipated in the Trent Canal upstream of Locks #11 and #12.

The simulation indicated that the proposed spillway would have sufficient capacity to pass the increased flow up to 171 m^3/s.

As indicated in Section 2.3, a gate with lifting mechanism will provide for complete isolation. The existing stoplog gates in the forebay intake structure will be utilized to dewater the expanded forebay for station inspection and maintenance.

The V-shaped safety booms currently installed in the Trent Canal in front of the Forebay Intake structure will remain in place (see Figure 1.5), but will be reconfigured to prevent vessels from being subjected to the slightly higher traverse velocity. The anchor point at the tip of the north and south leg of the V will be moved outward or upstream along the curved training wall (see Figure 1.12 below).

Figure 1.12 Safety Booms



OPG will operate the proposed expanded Ranney site within historical water levels (since 1951) and existing water management practices with a flow up to 171 cms at the Ranney site. There will be no increase in water levels operating the proposed site.

Spillway discharge capacity for flood control at Dam 10 (Ranney Falls) is the sole responsibility of the Trent-Severn Waterway (Parks Canada). Installation and operation of a new spillway to be built between the existing and new powerhouse to bypass powerhouse flows in the event of an emergency shutdown of the unit is the responsibility of OPG. The Spillway operation will minimize wave surge and mitigate any rapid increase in water level associated with unplanned station shutdown. The design for the new spillway will be developed during the next stage of development (Interim Licence) whereby General Construction Plans are prepared for the review and approval by the Parks Canada Agency.

The technical and environmental aspects associated with the operation of the proposed Ranney Falls G3 Project will be reviewed during this phase, and will be refined and confirmed as the engineering work and DIA proceed.

1.4 PUP FACILITIES DECOMMISSIONING

The Pup facilities ceased operation in June 2014 and will be decommissioned. This will involve incorporation of most of its existing approach channel into the expanded forebay, removal of the intake structure and penstock, removal of single transformer station, and preservation of the powerhouse building and tailrace.

1.5 RELEVANT FEDERAL AND PROVINCIAL REGULATORY REGIMES

As the proposed Ranney Falls G3 Project is on a federal waterway and subject to the federal *Dominion Water Power Act* administered by Parks Canada, it is not subject to the Ontario *Environmental Assessment Act* (V. Mitchell, MOE, 2012, pers. comm.). The proposed Project is also exempt from the Lower Trent Conservation (LTC) Permit for Development, Interference with Wetlands and Alterations to Shorelines and Watercourses under Ontario Regulation 163/06 of the *Conservation Authorities Act* (M. Lovejoy, LTC, 2012, pers. comm.).

As indicated in Section 1.2, the Ranney Falls GS is located on OPG land adjacent to Lock #12 of the TSW, which is designated as a National Historic Site of Canada based on the Historic Canals Regulations under the *Department of Transport Act*. Parks Canada (2000b) has developed a *National Historic Site Policy* with the following objectives:

- to foster knowledge and appreciation of Canada's past through a national program of historical commemoration;
- to ensure the commemorative integrity of national historic sites administered by Parks Canada by protecting and presenting them for the benefit, education and enjoyment of this and future generations, in a manner that respects the significant and irreplaceable legacy represented by these places and their associated resources; and
- to encourage and support the protection and presentation by others of places of national historic significance that are not administered by Parks Canada.

In addition, *Cultural Resources Management (CRM) Policy* serves as the overall management policy for Parks Canada – administered national historic sites. As *CRM Policy* supports the management of cultural resources, it applies to conserving and preserving the national treasures that are under the stewardship of Parks Canada.

Parks Canada is a federal authority for the proposed Ranney Falls G3 Project. As a result, regulatory oversight of the cultural heritage resources assessment will be provided by Parks Canada.

The Ontario Ministry of Tourism and Culture (MTC, 2010) has developed standards and guidelines for conservation of provincial heritage properties. These standards and guidelines are currently being implemented by OPG in assessing the cultural heritage values of properties under provincial jurisdiction. For the proposed Ranney Falls G3 Project, MTC will be providing technical expertise review and comment on the information provided in this Technical Support Document (TSD).

1.6 DESCRIPTION OF THE STUDY AREAS

The proposed Ranney Falls G3 Project is located in the community of Campbellford in Trent Hills, Northumberland County (Figure 1.1).

In the baseline description of cultural heritage resources, reference will be made to local and site-specific study areas, defined as the community of Campbellford and the Ranney Falls GS property, respectively.

1.7 STUDY APPROACH

Desk-top cultural heritage resources information was used to prepare a draft Environmental Impact Assessment (Coker *et al*., 2008) for the previous design concepts for the proposed expansion of the Ranney Falls GS "Pup" powerhouse. However, the project was deferred by OPG prior to commencement of the formal EA and consultation process.

This information was expanded during the preparation of this TSD for the proposed Ranney Falls G3 Project based on a Cultural Heritage Assessment Report prepared by UMA (2009) as part of an EA for the proposed Second Trent River Crossing in Campbellford. In addition, a Stage 1 Archaeological Assessment of the Ranney Falls G3 Project property was undertaken by Advance Archaeology (2011).

1.8 STRUCTURE OF THE REPORT

This report was prepared as a TSD to the DIA Report for the proposed Ranney Falls G3 Project (SENES, 2015) to fulfill federal department obligations to the *CEAA 2012*. As part of the federal government plan for Responsible Resource Development, which seeks to modernize the regulatory system for project reviews, the *CEAA* (S.C. 1992, c. 37) was repealed when the *CEAA 2012* came into force. For projects on federal lands that are not designated projects, *CEAA 2012* requires that before federal authorities make any decision that would allow a project to proceed, they must determine whether a project is likely to cause significant adverse environmental effects (Section 67 CEAA 2012). As *CEAA 2012* does not establish a process for determining whether the undertaking of a non-designated project is likely to cause significant adverse environmental effects, the involved federal departments, e.g., Parks Canada, DFO, Transport Canada, Environment Canada, must establish their own (or conduct joint efforts) for the environmental effects review process. The DIA Report and this Cultural Heritage Resources

TSD provide the requisite information to enable the involved federal departments to undertake the environmental effects review process.

The DIA Report provides a description of the proposed undertaking, summarizes the overall environmental setting and anticipated environmental effects, recommends appropriate mitigation measures to minimize or obviate these effects, and describes agency, public and Aboriginal consultation.

This Cultural Heritage Resources TSD is organized into four main chapters:

- Chapter 1.0 **Introduction** – provides a description of the proposed Ranney Falls G3 Project, the study areas and study approach;
- Chapter 2.0 **Baseline Cultural Heritage Resources Description** – describes the cultural heritage resources baseline;
- Chapter 3.0 **Effects Assessment and Mitigation Measures** – details the assessment of cultural heritage resources effects, presents mitigation measures to minimize or obviate these effects and delineates the net effects; and
- Chapter 4.0 **Summary and Conclusions** – summarizes the potential effects and recommended mitigation/remedial measures.

Chapters 5.0, 6.0 and 7.0 provide the References, Acronyms/Abbreviations and Glossary, respectively.

2.0 BASELINE CULTURAL HERITAGE RESOURCES DESCRIPTION

2.1 RANNEY FALLS GS HISTORY

As indicated in Section 1.0, the Ranney Falls GS site was formerly leased by the Federal Government to the Seymour Power Company. When the Provincial Government bought the Seymour Power Company on March 9, 1916, it acquired the rights to the site. Ranney Falls GS G1 and G2 units were commissioned in August 22, 1922 and September 2, 1922, respectively. Unit G3 which started operation in 1926 was acquired by the Hydro-Electric Power Commission of Ontario (Commission) from the Quinte and Trent Valley Power Company in 1937. As part of the Commission's "Central Ontario System", Ranney Falls GS helped to supply power to about 25 municipalities in central Ontario, including Peterborough, Kingston, Belleville, Oshawa, Lindsay, Trenton, Cobourg, Port Hope, Bowmanville, Picton, Deseronto, Napanee and Whitby. Ownership of Ranney Falls GS was transferred to OPG on April 1, 1999.

2.2 HYDROELECTRIC GS HERITAGE VALUES

Based on site investigations undertaken the Ontario Ministry of Citizenship and Culture in partnership with Ontario Hydro between June 1980 and November 1981, Simonton (1984) undertook a preliminary ranking of the heritage values of hydroelectric generating stations built prior to the mid-1930s as Class A, B, or C.

Class A stations are those that display a variety of heritage attributes which in combination serve to make them particularly fine examples. At the time construction a station design may have incorporated technical innovations which served as a prototype for subsequent development. A Class A station may be the best example of a type of station in Ontario Hydro's system, or it may be an anomaly in the system valuable because of its uniqueness. As first constructed by Ontario Hydro and being the oldest in the system, these landmark stations are likely to be included in this category. Class A stations are deemed to be those of the greatest heritage importance and may have provincial significance.

Class B stations display a number of attributes but are not the best or the finest examples. They are examples of stations where many survive with attractive environmental qualities and few alterations.

Class C stations are those whose main attribute is their age. They are a fair example of a type, and may have undergone extensive alterations.

Ranney Falls GS was considered by Simonton (1984) to be a Class C station with the following comments:

- "attractive site associated with Trent Canal and close connection to an early mill, now leather factory";

- "Quinte & Trent Power Co. drew water from forebay to operate small G.S. known as a "pup" for Cdn. Paperboard Co. Ltd. G.S."; and
- "The pup now owned by Ontario Hydro has interpretive possibilities".

The Ranney Falls GS main powerhouse will be retained in its present form and will continue to operate as a hydroelectric generating facility.

The secondary "Pup" powerhouse will be decommissioned which will involve the incorporation of most of its existing approach channel into the proposed forebay expansion, and removal of the intake structure, penstock and single transformer station. The powerhouse building and tailrace will be preserved.

2.3 CULTURAL HERITAGE ASSESSMENT

A Cultural Heritage Assessment Report was prepared by UMA (2009) for the proposed Alma Street/Second Street bridge alignment as part of the EA for the Second Trent River Crossing in Campbellford. The cultural heritage assessment was based on available desk-top information and windshield surveys of the 12 proposed bridge alternatives to identify and assess built heritage resources (BHRs) and cultural heritage landscapes (CHLs) within the study area.

This analysis of cultural heritage resources in the study area addressed those above-ground, person-made heritage resources over 40 years old. The application of this rolling 40-year principle is an accepted federal and provincial practice for the preliminary identification of cultural heritage resources that may be of heritage value. Its application does not imply however that all BHRs or CHLs that are over 40 years old are worthy of the same level of protection or preservation.

The core area of the community of Campbellford was identified by UMA (2009) as an historical settlement and therefore considered to be a stand-alone CHL. It was considered to be a "continuing landscape" in that it has maintained its historical use while evolving. The core area comprises other smaller CHLs within it such as streetscapes. The streetscapes comprise individual built heritage buildings and structures of 40 years of age or older. Although Trent Hills has designated some properties within Campbellford under Part IV of the *Ontario Heritage Act*, it does not include "listed" buildings of heritage interest or value on a municipal heritage register.

UMA (2009) identified four additional CHLs that are relevant to the proposed Ranney Falls G3 Project:

1. the Trent Canal (a Resource Type CHL under the Waterscape Category), a man-made navigation canal built in the early 20th century, is a dominant physical and visual element in the landscape;
2. the Trent River (a CHL under the Waterscape Category) is a dominant physical and visual element in the landscape and is associated with the historical development of the area;

3. Ferris Provincial Park (a CHL under the Recreational Category), situated on hilly drumlins on the east side of the Trent River, includes former agricultural land with remnants of overgrown stone fences and cleared meadows; and
4. Hague's Reach GS (a CHL) including the associated waterway to the south.

Simonton (1984) ranked the Hague's Reach GS as a Class A station with the following comments:

- one of the "first automated plants built by Ontario Hydro and marked the onset of the trend towards greater automation and centralization which has continued to present day";
- "the introduction of automation led to modification in plant design and removal of operators from the plants"; and
- "Hagues Reach was the first Ontario Hydro generating station to incorporate a fixed propeller turbine".

As none of the 12 alternative bridge alignments were located in the vicinity of the Ranney Falls GS property, the station was not identified as a CHL by UMA (2009). However, based on identification of Hague's Reach GS as a CHL, it is also inferred that Ranney Falls GS should also be considered as a CHL. As indicated in Section 2.2, Ranney Falls GS was ranked as a Class C facility by Simonton (1984) with lesser heritage importance than Hague's Reach GS.

2.4 STAGE 1 ARCHAEOLOGICAL ASSESSMENT

Based on a Stage 1 Archaeological Assessment, Advance Archaeology (2011) determined that given that there are no known indicators to suggest that there is the potential for the presence of archaeological sites, artifacts, or anything else of cultural heritage significance on the proposed Ranney Falls G3 Project lands, and given that the degree of prior soil disturbance is so extensive across the entire site, the archaeological potential of the lands was very low. As a result, a Stage 2 Assessment was not warranted and complete clearance of the archaeological condition on the site was recommended. The Stage 1 Archaeological Assessment Report is provided in Appendix A, together with correspondence from the MTC.

2.5 SUMMARY

In summary, the Ranney Falls GS has a Class C heritage value ranking based on Simonton (1984) and is considered a CHL. The Ranney Falls GS property has very low archaeological potential.

3.0 EFFECTS ASSESSMENT AND MITIGATION MEASURES

3.1 CONSTRUCTION PHASE

As indicated in Section 2.3, the Trent Canal, Trent River, Ferris Provincial Park and Ranney Falls GS are considered to be CHLs.

Although construction of the proposed Ranney Falls G3 Project will not result in displacement of these CHLs, there is potential for temporary disruption to public access from the Ranney Falls GS property via the Ranney Gorge Suspension Bridge to Ferris Provincial Park on the opposite side of the Trent River (see Figures 1.3 and 1.5). A public parking area is available on the east side of the Ranney Falls GS property with a trail available to the suspension bridge. To minimize and/or manage the potential conflict between public and construction traffic access, an Access Management Plan will be developed in consultation with Ontario Parks and Friends of Ferris Provincial Park, which would include the use of appropriate public access signage and barriers. Moreover, construction will not occur on Sundays and public holidays, likely the time of peak public access activities.

In addition, there is potential for disruption of local viewsheds from vessels using the section of the Trent Canal adjacent to the proposed Ranney Falls G3 Project forebay expansion, as well as for the public accessing the Ranney Gorge Suspension Bridge and Ferris Provincial Park. As indicated above, construction will not occur on Sundays and public holidays, likely the time of peak public boating use on the Trent Canal and recreational use of Ferris Provincial Park.

The potential access and visual disruption effects on these CHLs will be temporary, i.e., occurring during the construction phase of the proposed Project, and will be dissipated with the implementation of the Site Rehabilitation Plan.

As indicated in Section 2.4, the archaeological potential of the proposed Ranney Falls G3 Project site was considered to be very low. However, should previously undocumented archaeological resources be discovered during construction, they may be a new archaeological site and therefore subject to Section 48 (1) of the *Ontario Heritage Act*. The contractor or person discovering the archaeological resources must cease alteration of the site, and immediately engage a licensed consultant archaeologist to carry out archaeological fieldwork, in compliance with Section 48 (1) of the Act.

Under the *Cemeteries Act* and *Funeral, Burial and Cremation Services Act*, any person discovering human remains must notify the police or coroner and the Registrar of Cemeteries at the Ontario Ministry of Consumer Services.

3.2 OPERATION PHASE

As indicated above, potential access and visual disruption effects on the CHLs will be temporary, i.e., occurring during the construction phase of the proposed Project, and will be dissipated with the implementation of the Site Rehabilitation Plan.

There will be no displacement of the existing Ranney Falls GS powerhouse buildings. The proposed Ranney Falls G3 Project powerhouse building will adjoin the existing main powerhouse building and have a similar structure and façade, thereby providing overall architectural coherence. As indicated in Section 2.2, the secondary "Pup" powerhouse building and tailrace will be preserved. As a result, the status and significance of the Ranney Falls GS as a CHL will be perpetuated.

The operation of the proposed Ranney Falls G3 Project will not affect the status and significance of the Trent Canal, Trent River, Ferris Provincial Park and Ranney Falls GS as CHLs.

4.0 SUMMARY AND CONCLUSIONS

The proposed Ranney Falls G3 Project is being undertaken by OPG to improve the efficient use of the available hydroelectric potential at the site, to reduce greenhouse gas emissions and to increase the amount of clean renewable energy from OPG's CHPG. PFTSW (2008) concluded that the development of renewable energy resources is a sound public policy goal and supported a vigorous effort to pursue green energy generating potential along the TSW. Moreover, the proposed Project is consistent with the PPS, which recommends that the use of existing infrastructure and public service facilities should be optimized, whenever feasible, before consideration is given to developing new infrastructure and public service facilities (OMMAH, 2014). In early 2012, a public meeting was held by Northumberland-Quinte West MPP Rob Milligan to promote new waterpower development within the provincial riding.

Potential access and visual disruption effects due to the proposed Ranney Falls G3 Project on the Trent Canal, Trent River, Ferris Provincial Park and Ranney Falls GS CHLs will be localized and temporary, occurring during the construction phase.

Operation of the proposed Project will not affect the status and significance of the Trent Canal, Trent River, Ferris Provincial Park and Ranney Falls GS as CHLs.

As the archaeological potential of the proposed Project site was considered to be very low, no effects on archaeological resources are anticipated.

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6.0 ACRONYMS/ABBREVIATIONS

Acronyms

&	And
#	Number
BHR	Built heritage resource
c.	Chapter
CAT	Compact Axial Turbine
Cdn.	Canadian
CEAA	*Canadian Environmental Assessment Act*
CEAA 2012	*Canadian Environmental Assessment Act, 2012*
CFD	Computational Fluid Dynamics
CHL	Cultural heritage landscape
CHPG	Central Hydro Plant Group
Co.	Company
Commission	Hydro-Electric Power Commission of Ontario
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CRM Policy	*Cultural Resources Management Policy*
DFO	Department of Fisheries and Oceans
DIA	Detailed Environmental Impact Analysis
EA	Environmental Assessment
et al.	And others (et alia)
GS or G.S.	Generating Station
H	Horizontal
HEC	Hydrologic Engineering Centre
Hydro One	Hydro One Networks Inc.
i.e.	That is (id est)
Inc.	Incorporated
KST	KST Hydroelectric Engineers
LTC	Lower Trent Conservation
Ltd.	Limited
MNRF	Ontario Ministry of Natural Resources and Forestry
MOE	Ontario Ministry of the Environment
MPP	Member of Provincial Parliament
MTC	Ontario Ministry of Tourism and Culture
N	North
OMMAH	Ontario Ministry of Municipal Affairs and Housing
OPG	Ontario Power Generation Inc.
Parks Canada – TSW	Parks Canada – Ontario Waterways, Trent-Severn Waterway
pers. comm.	Personal communication
PFTSW	The Panel on the Future of the Trent-Severn Waterway

Project	Ranney Falls Generating Station G3 Expansion Project or Ranney Falls G3 Project
S.C.	Statutes of Canada
SENES	SENES Consultants
SHARP	Small Hydroelectric Assessment and Retrofit Program
3D	Three-dimensional
Trent Hills	Municipality of Trent Hills
TSD	Technical Support Document
TSW	Trent-Severn Waterway
UMA	Unterman McPhail Associates
U.S.	United States
V	Vertical
W	West

Measurement Units

º	degree
‘	minute
“	second
GWh	gigawatt-hour
ha	hectare
km	kilometre
kV	kilovolt
L/s	litre per second
m	metre
m/s	metre per second
m^3/s	cubic metre per second
MW	megawatt
Pa	pascal (unit of pressure)
%	percent

7.0 GLOSSARY

Archaeological Fieldwork	Any activity carried out on, above or under land or water for the purpose of obtaining and documenting data, recovering artifacts and remains or altering an archaeological site and includes monitoring, assessing, exploring, surveying, recovering and excavating.
Archaeological Resources	Include artifacts, archaeological sites, and marine archaeological sites. The identification and evaluation of such resources are based upon archaeological fieldwork.
Archaeological Site	Any property that contains an artefact or any other physical evidence of past human use or activity that is of cultural heritage value or interest.
Built Heritage	One or more significant buildings (including fixtures or equipment located in or forming part of a building), structures, monuments, installations, or remains associated with architectural, cultural, social, political, economic, or military history and identified as being important to a community.
Bulkhead	A steep or vertical wall retaining an embankment, often used to line shorelines and maintain embankment stability and absorb the energy of waves and currents.
Canal	A channel dug or built to carry water.
Capacity	The greatest load which a unit, station or system can supply (usually measured in kilowatts, megawatts, etc.).
Cavitation	The process of increased water velocities due to channel narrowing resulting in decreased pressure to maintain a constant total energy. If the pressure decreases to the pressure of water as a vapour, bubbles form. As the velocity decreases due to channel expansion, the water pressure increases and the bubbles collapse. The collapse causes shock waves in the water, which move out to the channel walls, causing pitting.
Cofferdam	A temporary dam made of concrete, rockfill, sheet-steel piling, timber/timber-crib or other non-erodible material and commonly utilized during construction to exclude water from an area in which work is being executed.
Cultural Heritage Landscape	A defined geographical area of heritage significance that human activity has modified and that a community values. Such an area involves grouping(s) of individual heritage features, such as structures, spaces, archaeological sites, and natural elements, which together form a significant type of heritage form distinct from that of its constituent elements and parts.

Dam	A concrete or earthen barrier constructed across a river and designed to control water flow or create a reservoir.
Draft Tube	The flared passage leading vertically from a water turbine to its tailrace.
Drumlin	A smooth, elongated, streamlined hill form by glacial ice and composed essentially of till.
Forebay	The part of a dam's reservoir that is immediately upstream from the powerhouse.
Gain	A cut or groove to receive a timber, as a girder or fastener.
Geotechnical	Concerned with the physical properties of soil, rock and groundwater usually in relation to the design, construction and operation of engineered works.
Head	The difference in elevation between the water surface at the intake and tailrace.
Headgate (Headworks)	The gate that controls water flow into a hydroelectric powerhouse.
Headwater	The water that flows into a hydroelectric powerhouse from the section of river or stream with the highest elevation above sea level.
Hydraulic	Of water conveyed through a pipe or channel.
Hydraulic Conductivity	Property of a soil or rock, in the vadose zone or groundwater, that describes the ease with which water can move through pore spaces or fractures.
Intake	A structure which regulates the flow of water into a water-conveying conduit.
Limestone	Sedimentary rock composed of carbonate materials, particularly calcium carbonate.
Lock	Structure designed to raise and lower boats vertically through the use of water-filled chambers hydraulically, mechanically, or pneumatically operated.
Operating Deck	Work platform.
Overburden	The soil, rock and other material which lie on top of the underlying mineral or other deposit, e.g., bedrock.
Penstock	A structure associated with a hydroelectric station designed to carry water from the intake to the turbine.
Pier	As part of a hydroelectric station, an abutment extending from the station, either upstream or downstream, and lending foundation support and directionality to water passed through the structure.

Powerhouse	A primary part of a hydroelectric facility where the turbines and generators are housed and where power is produced by falling water rotating turbine blades.
Shale	Fine-grained sedimentary rock composed of lithified clay particles.
Sluiceway (Sluice)	An open channel designed to divert excess water which could be within the structure of a hydroelectric dam or separate of the main dam (see spillway).
Spillway	A passageway, or channel, located near or at the top of a dam through which excess water is released or “spilled” past the dam without going through the turbine(s); as a safety valve for the dam, the spillway must be capable of discharging major floods without damaging the dam while maintaining the reservoir level below some predetermined maximum level.
Stoplog	A gate (sometimes made from squared lumber) which can be placed into an opening to shut off or regulate the flow of water.
Tailrace	A channel through which the water flows away from a hydroelectric plant following its discharge from the turbine(s).
Tailwater	The water from a generating station after it has passed through the turbine.
Trashrack	Bar screen with larger space openings installed to prevent logs, stumps and other large solids from penetrating the intake.
Transformer	A device that changes electric voltage. In Ontario, electricity typically leaves the generator at 20,000 volts or less, is stepped up to 115,000, 230,000 or 500,000 volts to be transmitted long distances and then stepped down to lower voltages to be distributed to customers. Each change in voltage is accomplished with a transformer. Alternatively, the electricity is stepped up directly to the local distribution voltage.
Turbine	A mechanism in an electrical generation facility which converts the kinetic and potential energy of water (in the case of hydroelectric turbines) into mechanical energy which is then used to drive a generator converting mechanical to electrical energy.
Weir	A dam in the river to stop and raise the water.

APPENDIX A

Stage 1 Archaeological Assessment of the Ranney Falls Generating Station G3 Expansion Project

STAGE 1 ARCHAEOLOGICAL ASSESSMENT OF THE RANNEY FALLS GENERATING STATION G3 EXPANSION PROJECT,

IN THE TOWN OF CAMPBELLFORD, MUNICIPALITY OF TRENT HILLS,
COUNTY OF NORTHUMBERLAND
(PART OF LOT 8, CONCESSION 5 IN THE GEOGRAPHIC TOWNSHIP OF SEYMOUR)

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November 21, 2011

EXECUTIVE SUMMARY

Advance Archaeology was contracted to conduct a Stage 1 archaeological assessment of the Ranney Falls Generating Station G3 Expansion Project in the community of Campbellford, in the Municipality of Trent Hills, Ontario. A small secondary powerhouse (called the "Pup"), which has reached its end-of-life, is scheduled to be decommissioned and a new powerhouse is to be built immediately adjacent to the existing main powerhouse. This Stage 1 archaeological assessment was undertaken as one of the requirements of the Ontario Waterpower Association Class EA planning process.

The subject property, which is approximately 2 hectares (4.9 acres) in size, is located between the Trent River (on the east side) and the Trent-Severn Waterway's Lock 11 on the Trent Canal (on the west side). The existing main powerhouse is built into a steep slope with a 15m drop from the upper site area to the lower site area, and the surrounding lands having been extensively disturbed during initial construction and site preparation activities for both the main and secondary powerhouses; in fact, the lower part of the subject property was stripped of overburden down to bedrock. Other types of extensive prior site disturbances include the construction of access roads, parking areas, and transformer yards, as well as site grading and landscaping activities.

The Stage 1 background research determined that this area was initially settled during the early-to-mid 1800s and the surrounding lands were used for agricultural and industrial purposes. However, there are no 19th-century roads, structures, or structural remains on the subject property; in fact, the nearest 19th-century transportation corridors or houses are at least 300m from the subject property. In addition, there are no archaeological sites registered on or within a radius of 1 km of the generating station. The original soil horizons on all parts of the subject property have previously been disturbed through construction of the various features of the generating station (which include the main powerhouse, the secondary "Pup" powerhouse, the intake structure, forebay, intake channel and penstock for the Pup, and the tailraces), as well as the access roads, parking areas, and transformer yards.

The extensive prior soil disturbance over the entire subject property, together with the lack of known archaeological sites and other historic or pre-contact features, indicates that the subject property has low archaeological potential. Therefore, Stage 2 testing of the property is not warranted and complete clearance of the archaeological condition is recommended.

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PROJECT PERSONNEL

Project & Field Director	Donna Morrison, M.A. *Director and Senior Archaeologist,* *Heritage Assessment Manager* *(Archaeological License # P-121)*
Report Preparation	Donna Morrison, M.A.
Graphics Preparation	Dale Bateman

1.0 DEVELOPMENT CONTEXT

A contract to carry out a Stage 1 archaeological assessment of the Ranney Falls Generating Station G3 Expansion Project in the Town of Campbellford, Municipality of Trent Hills, Northumberland County (Part Lot 8, Concession 5 in the former geographic township of Seymour) was undertaken by Advance Archaeology as one of the requirements of the Ontario Waterpower Association Class EA planning process. For this Stage 1 archaeological assessment, the Project Director and Field Director was Donna Morrison, the report was written by Donna Morrison, and maps were drafted by Dale Bateman. A property inspection visit was undertaken on November 16, 2011, under excellent weather and lighting conditions; photos taken at that time are found in Section 9.0. The PIF number for this project is P121-101-2011.

The subject property is located south of downtown Campbellford between the Trent River and the Trent Canal at Locks 11/12 on the Trent-Severn Waterway (TSW). It is on the north side of Trent Drive and is approximately 2 hectares (4.9 acres) in size. Maps 1, 2, and 3 in Section 8.0 and Images 1, 2, and 3 in Section 9.0 show the layout of the generating station. The station uses the Trent Canal as the headrace, channelling the water through the powerhouses and discharging it via the tailraces, roughly 15m below, into the Trent River.

The G3 Expansion Project is being undertaken as part of the proponent's mandate to improve the efficient use of the available hydroelectric potential at the site, to reduce greenhouse gas emissions, and to increase the amount of clean renewable energy, without any changes to the overall flow within the Trent River or to existing TSW water management (Senes 2011). The Project is consistent with the Provincial Policy Statement, which recommends that the use of existing infrastructure and public service facilities should be optimized, wherever feasible, before consideration is given to developing new infrastructure and public service facilities (Senes 2011).

The proposed G3 Expansion Project will involve the following:

- construction of a new powerhouse and installation of a 10 MW unit adjacent to the existing main powerhouse;
- construction of a new dedicated tailrace;
- construction of a new spillway to by-pass full station flow to the tailrace canal for emergency situations;
- decommissioning of the secondary ("Pup") powerhouse; and
- rehabilitation of the upstream part of the concrete structure adjacent to the roadway/TSW bridge that houses the stop logs to dewater the forebay (Senes 2011).

The Pup powerhouse will have all operational components removed from it, but the structure itself will not be demolished; it will be preserved and maintained on-site.

2.0 HISTORICAL CONTEXT

2.1 Historical Information and Settlement History

The subject property is located south of the town of Campbellford, in the former Geographic Township of Seymour in the County of Northumberland (now in the Municipality of Trent Hills). Seymour Township was surveyed in 1819 and again in 1833, and the first land patents were issued after 1833. The earliest settlers in the township were mainly from England, Ireland, and Scotland and by 1850 the township population was up to 2,100. One of the principal villages was Campbellford, which became renowned as a manufacturing town due to the many industries that made use of the water-power of the Trent River. Campbellford, which was named after its founder (Major Campbell), became incorporated in 1876 and, at that time, had large woollen and grist mills, a foundry, a tannery, and a planing factory, numerous other businesses (such as a printing office), as well as schools and churches (Belden 1878).

Lot 8, Concession 5 is shown on the Seymour Township map in the 1878 *Illustrated Historical Atlas of the Counties of Northumberland and Durham* (Belden and Co.). At that time, the entire 185-acre lot made up the "Romanes Estate", which was a parcel of land along the west side of the Trent River (adjacent to Ranney Falls) at the south end of the village. However, there are no houses shown on or anywhere near the portion of Lot 8 that makes up the subject property, or anywhere else on Lot 8. Furthermore, there are no transportation corridors, schools, churches, mills or other structures shown on or adjacent to the subject property. The closest roads, houses, or other buildings at that time were roughly 300m or more from the subject property. Map 4 in Section 8.0 shows the location of the subject property superimposed on the 1878 Belden & Co. map. It is unknown whether the lands on Lot 8 were cleared for agricultural purposes or if they were left in their natural state throughout the 1800s. The section of Lot 8 that makes up the subject property, however, would not have been suitable for such use, primarily due to the steepness of the riverbank.

2.2 Present Land Use

The subject property is located between the Trent Canal, on the west, and the Trent River, on the east. In the early 1900s (after construction of the Trent Canal and adjacent Locks 11 and 12), this site was leased by the federal government to the Seymour Power Company, but the provincial government acquired the rights to the site in 1916 when it bought the Seymour Power Company (Senes 2011). The main powerhouse at the Ranney Falls Generating Station (including the G1 and G2 units) was commissioned in 1922, followed by the small, secondary powerhouse (the "Pup") in 1926. The site has operated as a generating station ever since, with the only change to the lands being the construction and landscaping of the west access point for the Ranney Gorge Suspension Bridge, in 2003.

3.0 ARCHAEOLOGICAL CONTEXT

3.1 Known Archaeological Sites in the Vicinity

A search of the Ontario Archaeological Sites Database (maintained by the *Ontario Ministry of Tourism and Culture*) was carried out by *OMTC* Data Coordinator, Robert von Bitter, on November 21, 2011. According to the results of this search, there are no known archaeological sites located on the subject property. Furthermore, there are no sites registered within a 1-km radius of the subject property.

3.2 Existing Conditions on the Subject Property

The subject property is located on the west bank of the Trent River in the southern outskirts of Campbellford. This part of the lower Trent drainage is included within a section of the Iroquois Plain physiographic region called the Trent Embayment (Chapman and Putnam 1984). The Iroquois Plain is actually the near-shore lakebed of glacial Lake Iroquois, which formed about 12,600 B.P. and was drained by about 11,500 B.P., in the Ontario basin; the Trent Embayment was a very large bay of Lake Iroquois that contained many islands and is marked by various types of lacustrine deposits such as sand plains or stratified silt (Chapman and Putnam 1984). The subject property is surrounded to the north, west, and east by numerous drumlins within a drumlinized till plain that forms part of the Peterborough Drumlin Field, but is included in a limestone plain zone that borders the Trent River within a broader sand plain zone that forms part of the Trent Embayment (Ontario Dept. of Mines and Northern Affairs Map #2226; Chapman and Putnam 1984). Limestone plain soils are generally less than 30cm deep.

The subject property occupies approximately 2 hectares (4.9 acres) of land that includes the steep and rocky west bank of the Trent River, plus a terraced hillslope adjacent to the riverbank (see Images 4 to 11 in Section 9.0). At the top of this slope is the "Upper Site", which consists of the forebay intake structure on the east edge of the Trent Canal (that also acts as a bridge for vehicles using Trent Drive), the forebay, the main powerhouse that contains the G1 and G2 units, transformer yards, gravel access roads off Trent Drive, a gated entryway, and the intake channel for the Pup, which branches off from the forebay. The "Lower Site" consists of artificially-levelled terraces created for part of the main powerhouse as well as for the secondary ("Pup") powerhouse and its transformer yard, on the north side of the tailrace, and access roads and parking areas on the south. On the slope between the Upper Site and the Lower Site is a raised access road/ramp leading down to the Pup, as well as the penstock for the Pup. In terms of prior soil disturbance, the entire subject property has been impacted during construction of the powerhouses and other components of the generating station (such as the forebay and intake channel) as well as during grading, infilling, and landscaping activities. All of the overburden on the Lower Site was removed during construction, while fill materials were added on the slope and the Upper Site (Knight-Piesold 2011).

4.0 ANALYSIS AND CONCLUSIONS

There are no registered archaeological sites recorded on the subject property or within 1 km of the subject property. In terms of 19th-century Euro-Canadian settlement, there are no known historic-period houses, outbuildings, or transportation corridors on or near the subject property; in fact, the closest ones in the late 1800s were at least 300m away. Although there is a primary watercourse (the Trent River) located immediately adjacent to the subject property, virtually the entire site has previously undergone extensive disturbance of the original soil horizons (especially the topsoil layer) during construction of the powerhouses and other features of the generating station, as well as during grading, infilling, landscaping, and construction of the access roads and other site components. Those sections of the subject property where the original soil horizons have been completely disturbed by heavy machinery are considered to have low archaeological potential and are shown in grey on Map 5 of Section 9.0. They are considered to have no cultural heritage value or interest.

Since all of these factors indicate that the potential for the presence of historic and/or pre-contact archaeological sites or other cultural heritage resources on the subject property is low, a Stage 2 archaeological assessment would not be necessary for the subject property.

5.0 RECOMMENDATIONS

Based on this Stage 1 archaeological assessment, we offer the following two recommendations:

(1) Given that there are no known indicators to suggest that there is the potential for the presence of archaeological sites, artifacts, or anything else of cultural heritage significance on the project lands, and given that the degree of prior soil disturbance is so extensive across the entire site, the archaeological potential of the subject property is considered to be very low.

(2) Given the low archaeological potential of the subject property, no Stage 2 assessment is warranted and complete clearance of the archaeological condition on the subject property is recommended.

6.0 ADVICE ON COMPLIANCE WITH LEGISLATION

(1) This report is submitted to the Minister of Tourism and Culture as a condition of licensing in accordance with Part VI of the *Ontario Heritage Act*, R.S.O. 1990, C 0.18. The report is reviewed to ensure that it complies with the standards and guidelines that are issued by the Minister, and that the archaeological fieldwork and report recommendations ensure the conservation, protection, and preservation of the cultural heritage of Ontario. When all matters relating to archaeological sites within the project area of a development proposal have been addressed to the satisfaction of the Ministry of Tourism and Culture, a letter will be issued by the ministry stating that there are no further concerns with regard to alteration to archaeological sites by the proposed development.

(2) It is an offence under Sections 48 and 69 of the *Ontario Heritage Act* for any party other than a licensed archaeologist to make any alteration to a known archaeological site or to remove any artifact or other physical evidence of past human use or activity from the site, until such a time as a licensed archaeologist has completed archaeological fieldwork on the site, submitted a report to the Minister stating that the site has no further cultural heritage value or interest, and the report has been filed in the Ontario Public Register of Archaeology Reports referred to in Section 65.1 of the *Ontario Heritage Act.*

(3) Should previously undocumented archaeological resources be discovered, they may be a new archaeological site and therefore subject to Section 48 (1) of the *Ontario Heritage Act*. The proponent or person discovering the archaeological resources must cease alteration of the site, immediately engage a licensed consultant archaeologist to carry out archaeological fieldwork, in compliance with Section 48 (1) of the *Ontario Heritage Act.*

(4) The *Cemeteries Act*, R.S.O. 1990 c. C.4 and the *Funeral, Burial and Cremation Services Act*, 2002, S.O. 2002, C.33 (when proclaimed in force) require that any person discovering human remains must notify the police or coroner and the Registrar of Cemeteries at the Ministry of Consumer Services.

7.0 REFERENCES

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1878 *The Illustrated Historical Atlas of the Counties of Northumberland and Durham.* Toronto.

Chapman, L.J. and D. F. Putnam
1984 *The Physiography of Southern Ontario.* Third Edition. Ontario Geological Survey Special Volume 2.

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1878 *Illustrated Historical Atlas of the County of York and the Township of West Gwillimbury and Town of Bradford in the County of Simcoe.* Toronto.

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1984 Map # 2226: *Physiography of the South Central Portion of Southern Ontario.*

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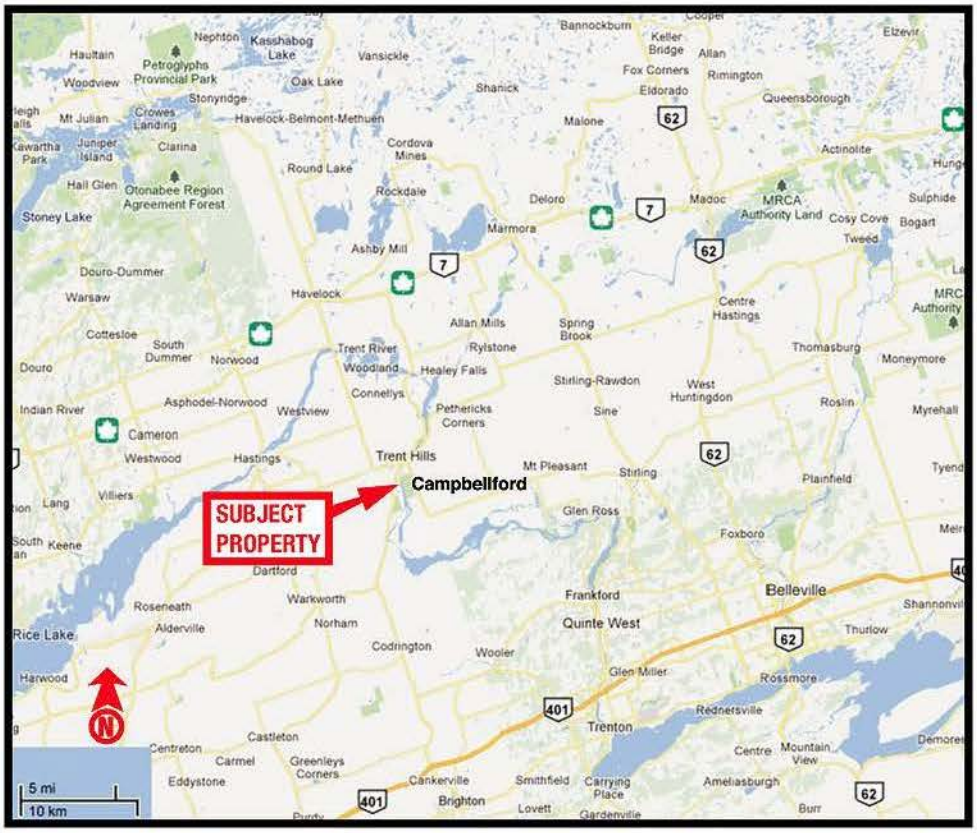
Ontario Ministry of Natural Resources
1984 Ontario Geological Survey Map P.2715: *Physiography of Southern Ontario.* Toronto.

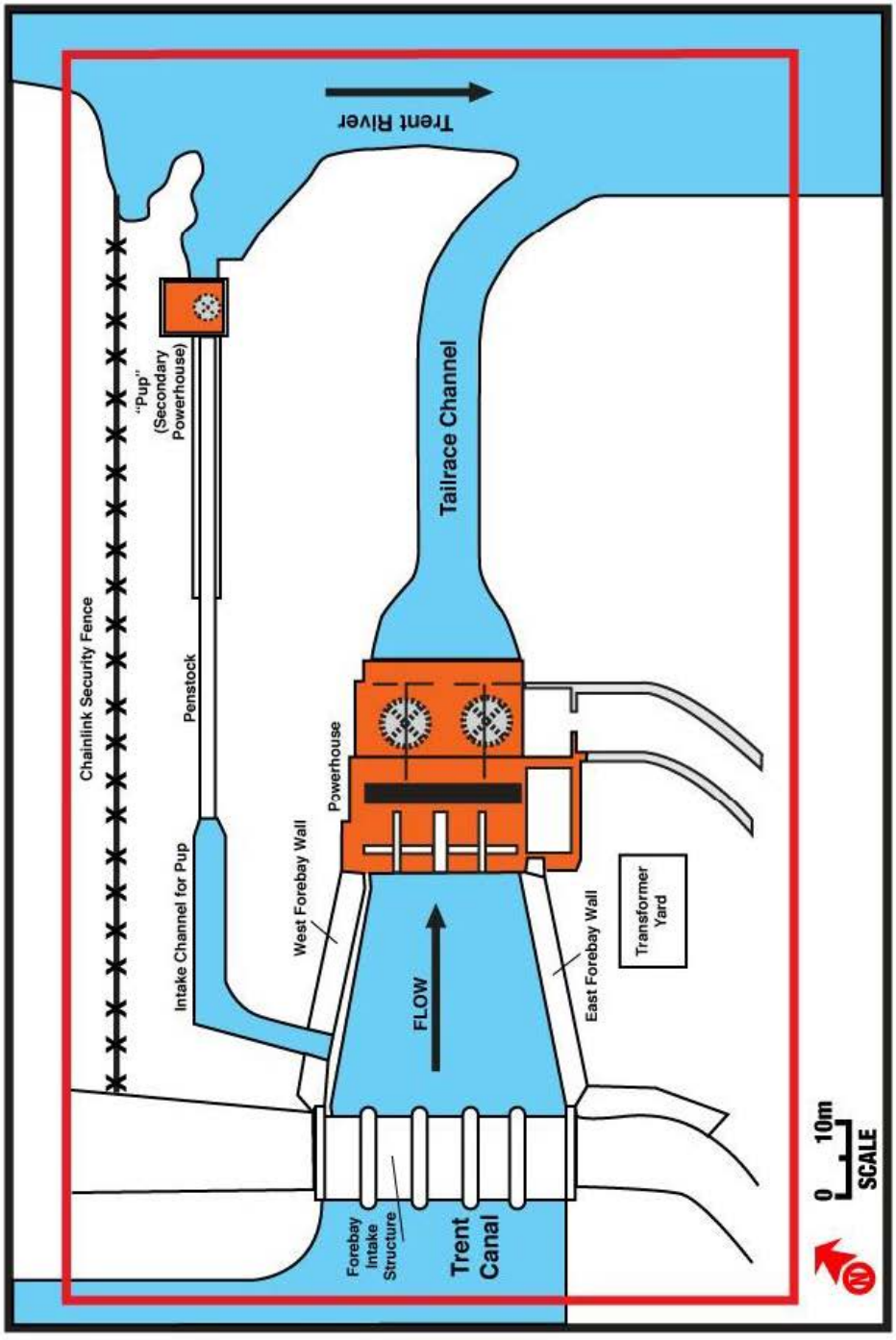
Ontario Ministry of Tourism and Culture
2011 *Standards and Guidelines for Consultant Archaeologists.* Queen's Printer for Ontario. Toronto.

Senes Consultants Limited
2011 *Project Description for Federal Agency Review, Ranney Falls Generating Station G3 Expansion Project.* Submission to Ontario Power Generation. December 2011.

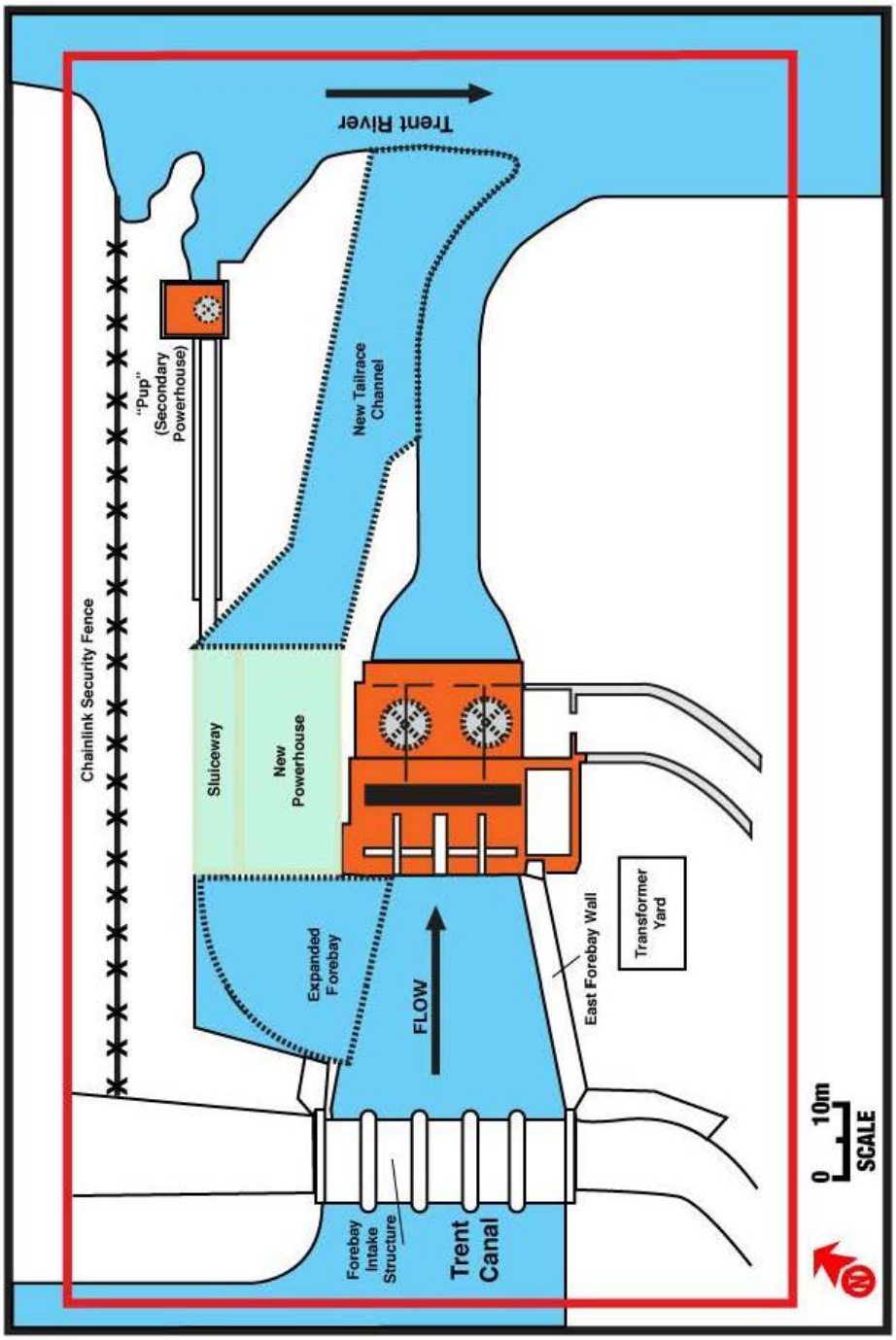
8.0 MAPS



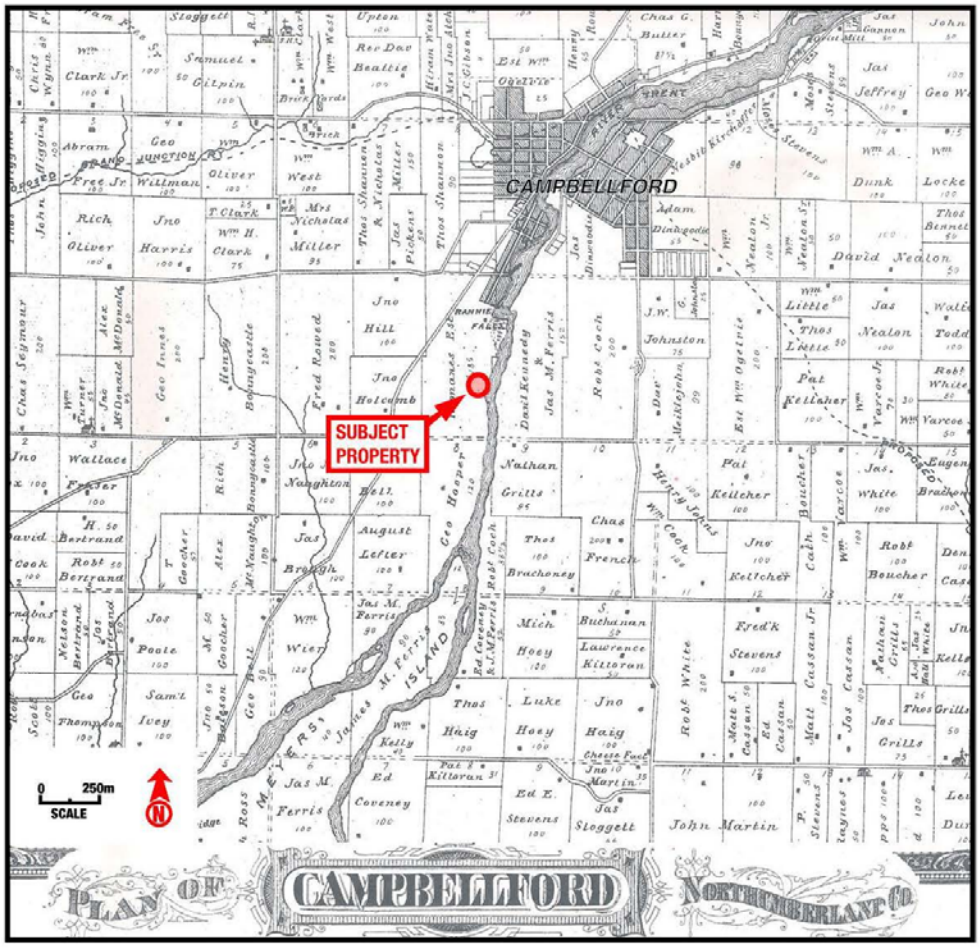
Map 1: Location of Subject Property.



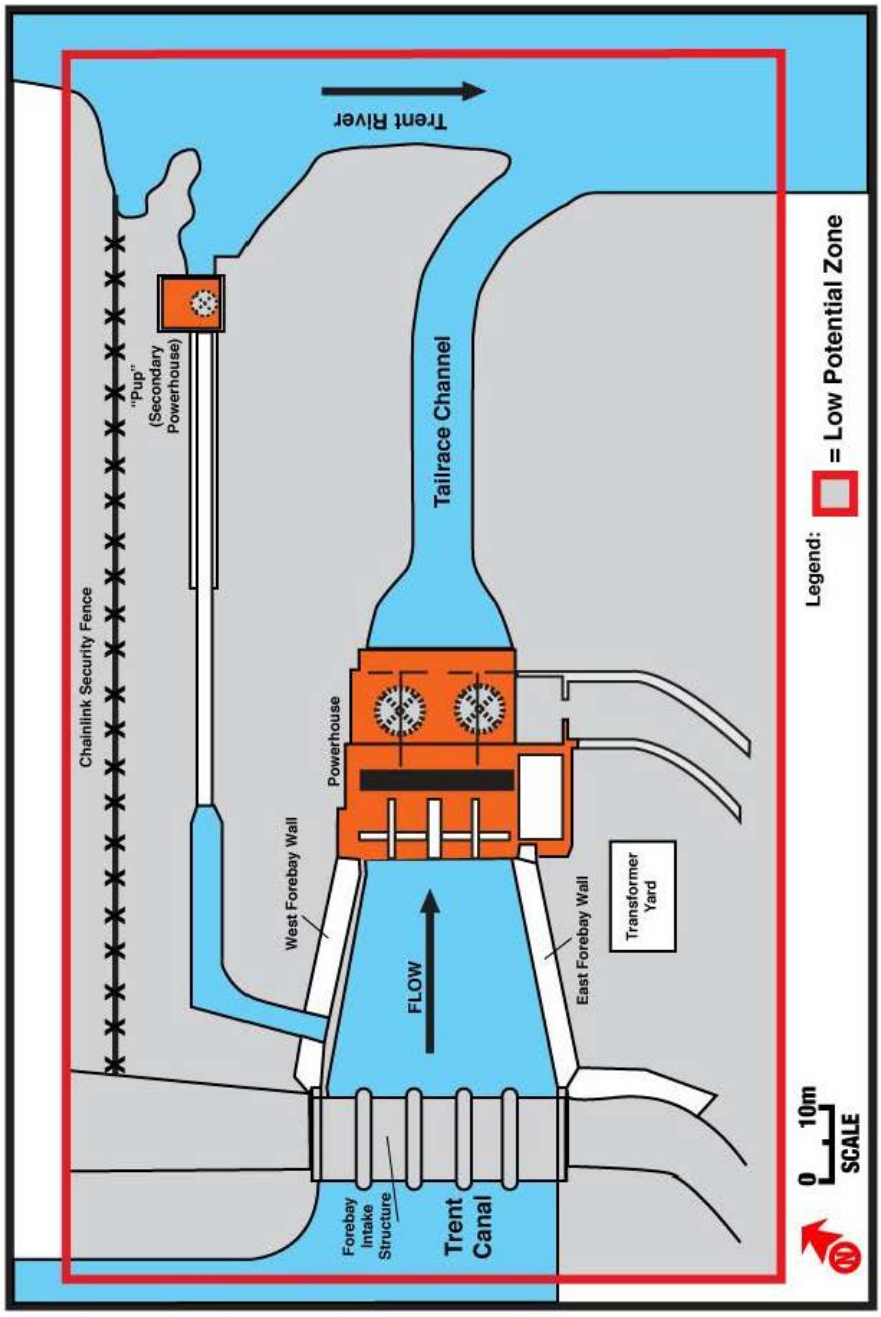
Map 2: Site Plan Showing the Current Features of the Subject Property.



Map 3: Site Plan Showing the Proposed Changes to the Subject Property.



Map 4: 1878 Historical Atlas Map Showing Approximate Location of Subject Property (after Belden & Company).



Map 5: Zones of Archaeological Potential on the Subject Property.

9.0 IMAGES

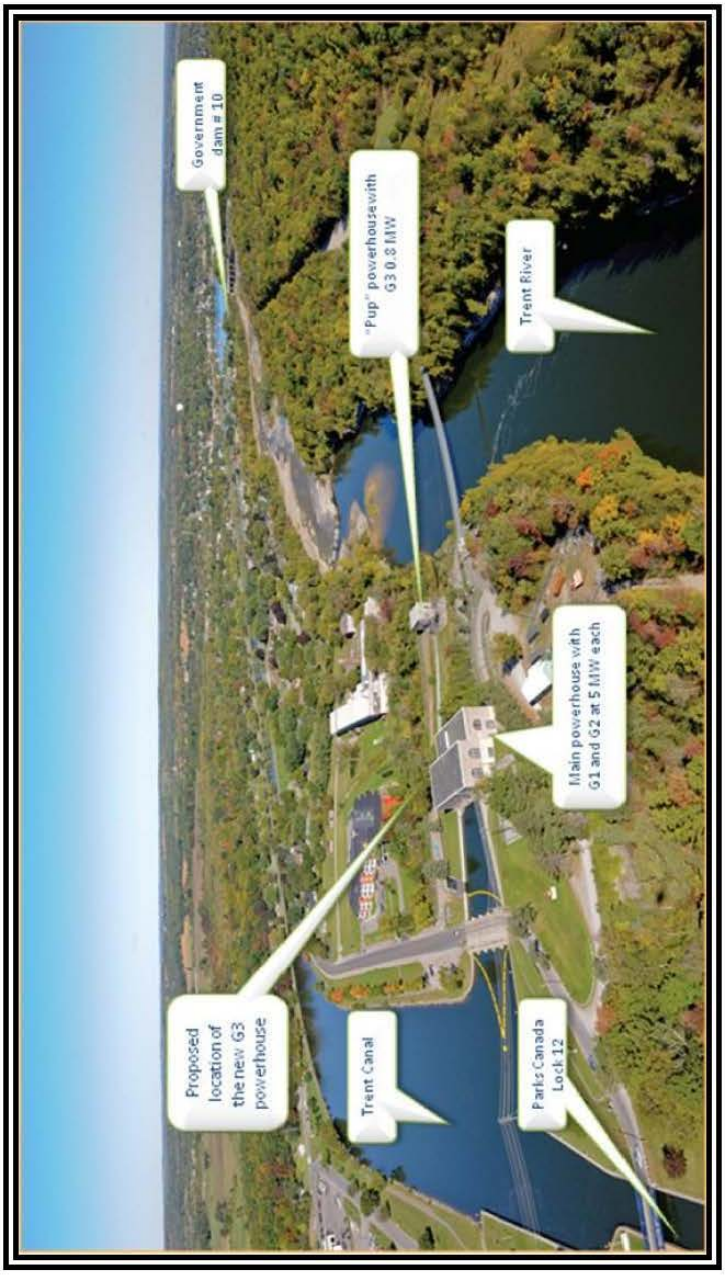


Image 1: View to North of Subject Property (Senes 2011).

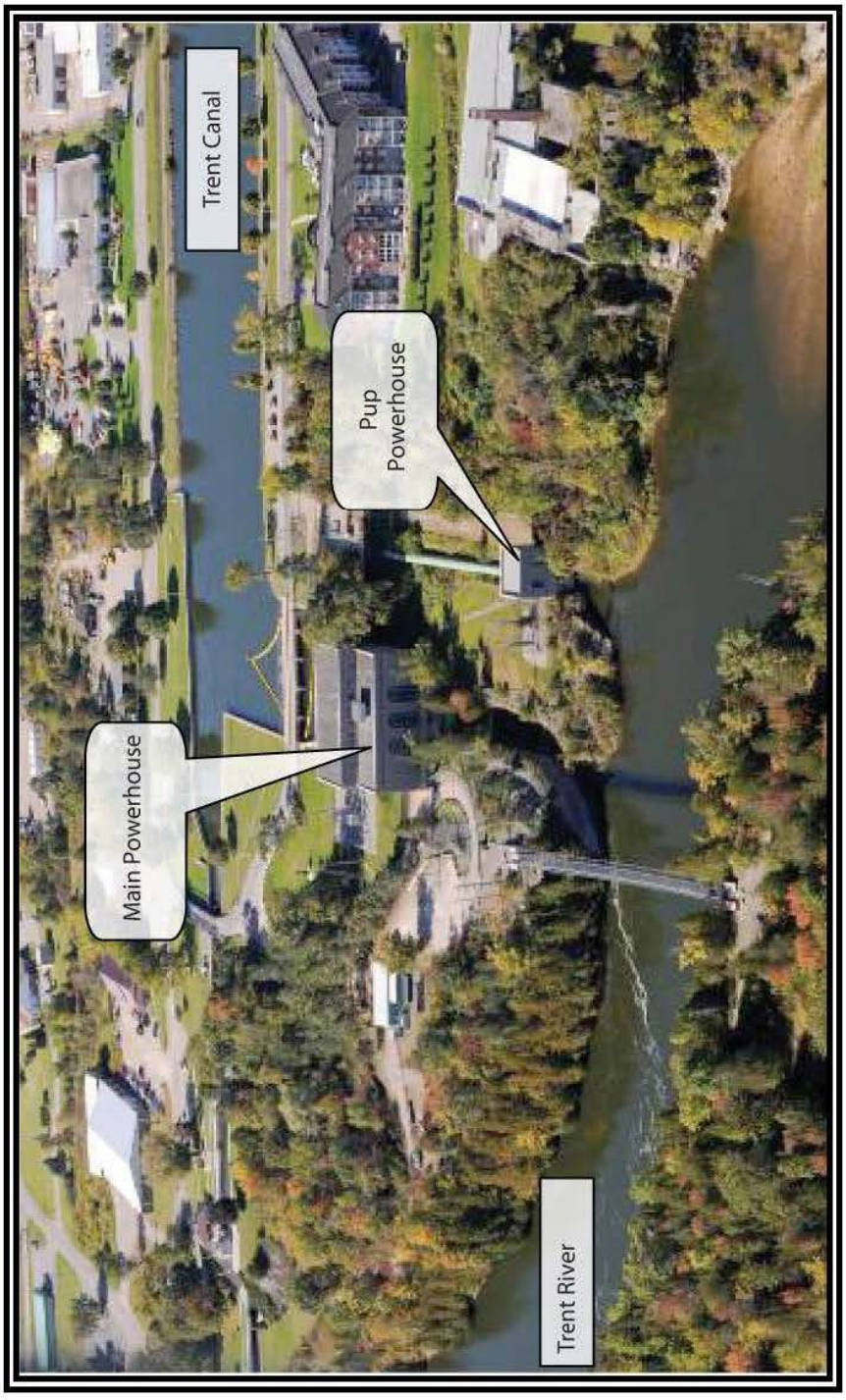


Image 2: View to West of Subject Property (Senes 2011).

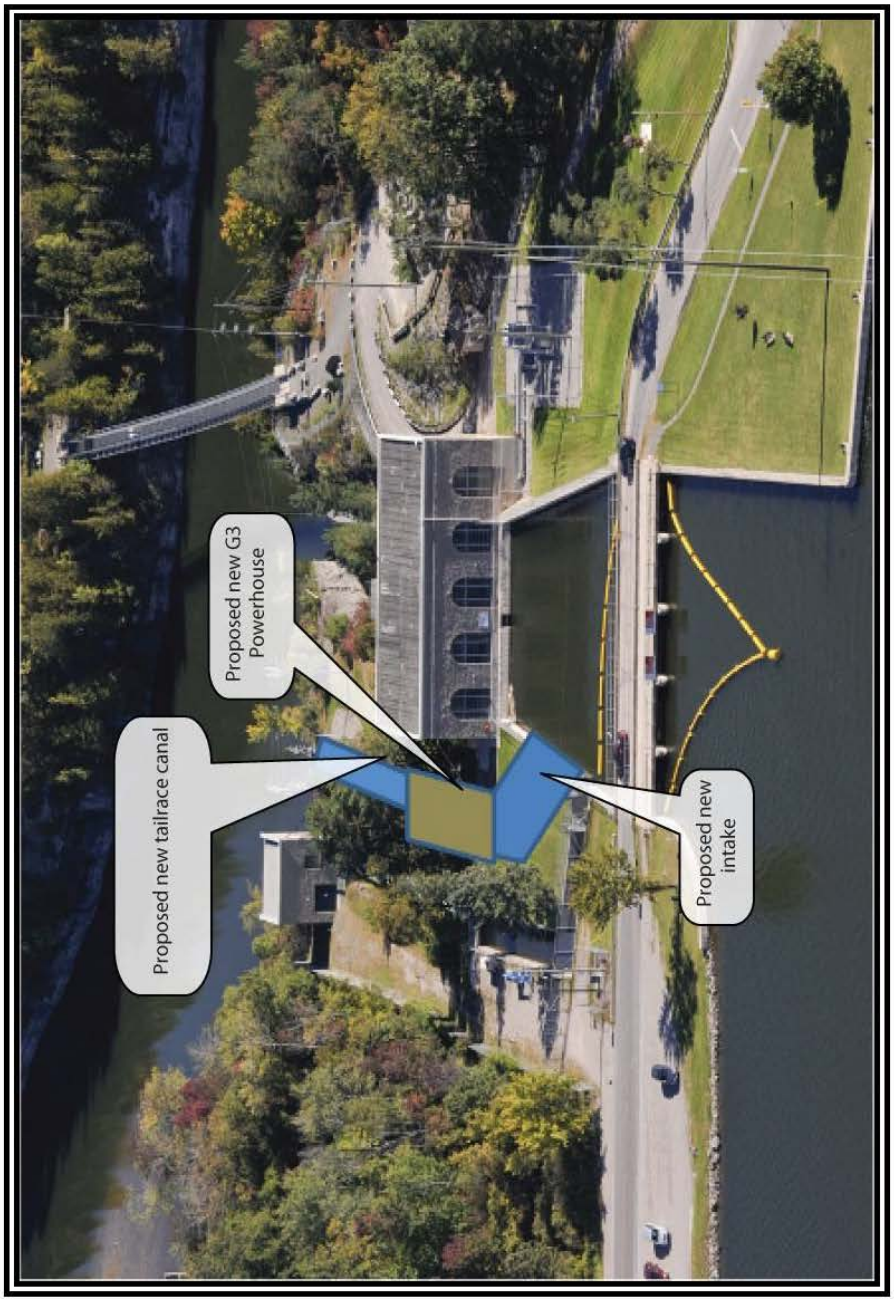


Image 3: View to East of Subject Property (Senes 2011).

Image 4: View to North of Main Powerhouse and Forebay (Upper Site).

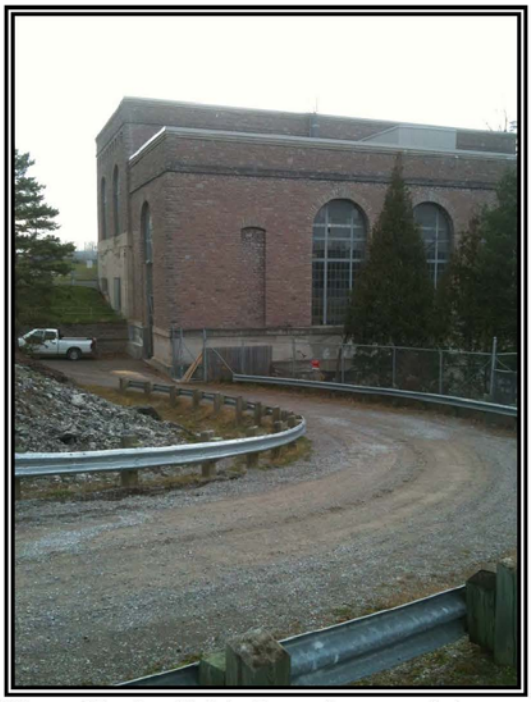


Image 5: View to West of Back of Main Powerhouse and Access Road (Lower Site).

Image 6: View to Northeast of Lower Site (Trent River in Background), including Secondary ("Pup") Powerhouse, Access Ramp, Small Transformer Yard, and Penstock.

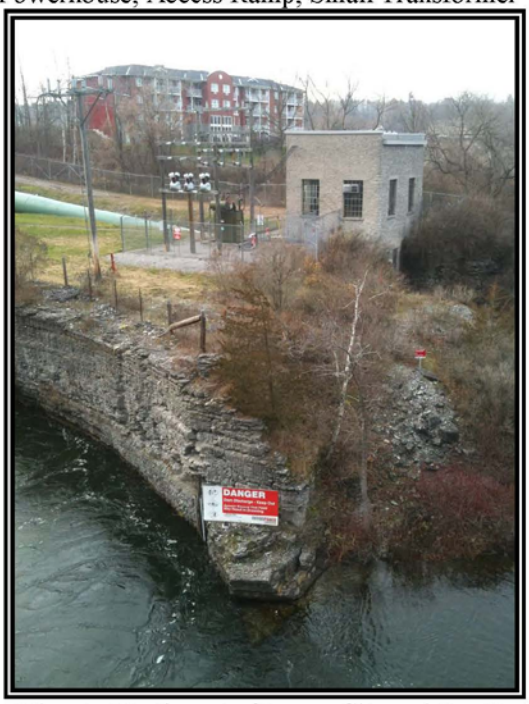


Image 7: View to Northwest of Lower Site and Pup Powerhouse.

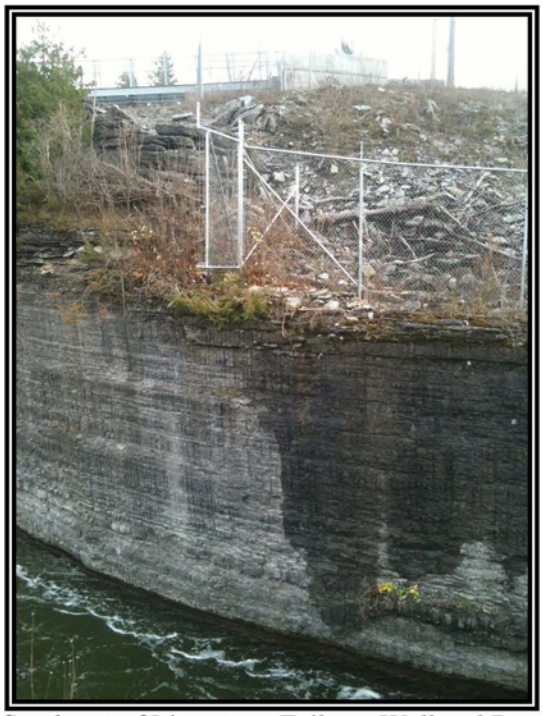


Image 8: View to Southeast of Limestone Tailrace Wall and Ramp to Ranney Gorge Suspension Bridge's West Access Point (in background).

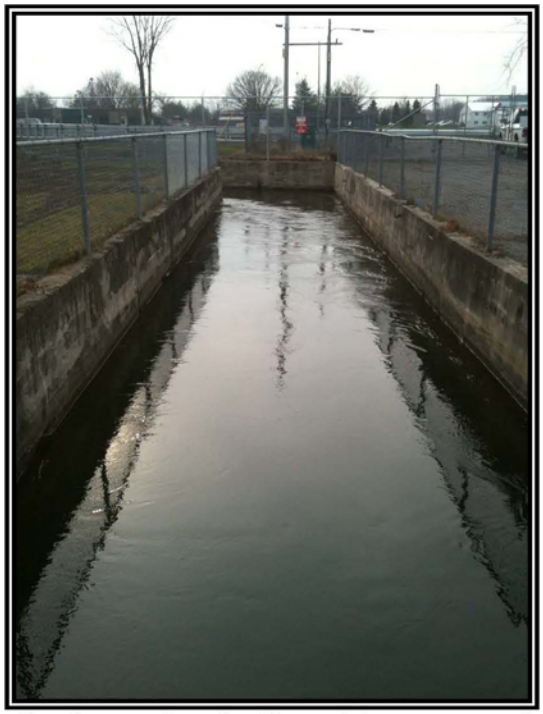


Image 9: View to Southwest of Intake Channel for Pup Powerhouse (Upper Site).

Image 10: View to Southwest of Gravel Yard and Gated Entryway off Trent Drive (Upper Site).

Image 11: View to South of Yard between Forebay and Pup Intake Channel, Upper Site. (Note Intake Structure and Trent Drive in background).