PROPOSED RANNEY FALLS GENERATING STATION G3 EXPANSION PROJECT

SOCIO-ECONOMICS AND LAND USE 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

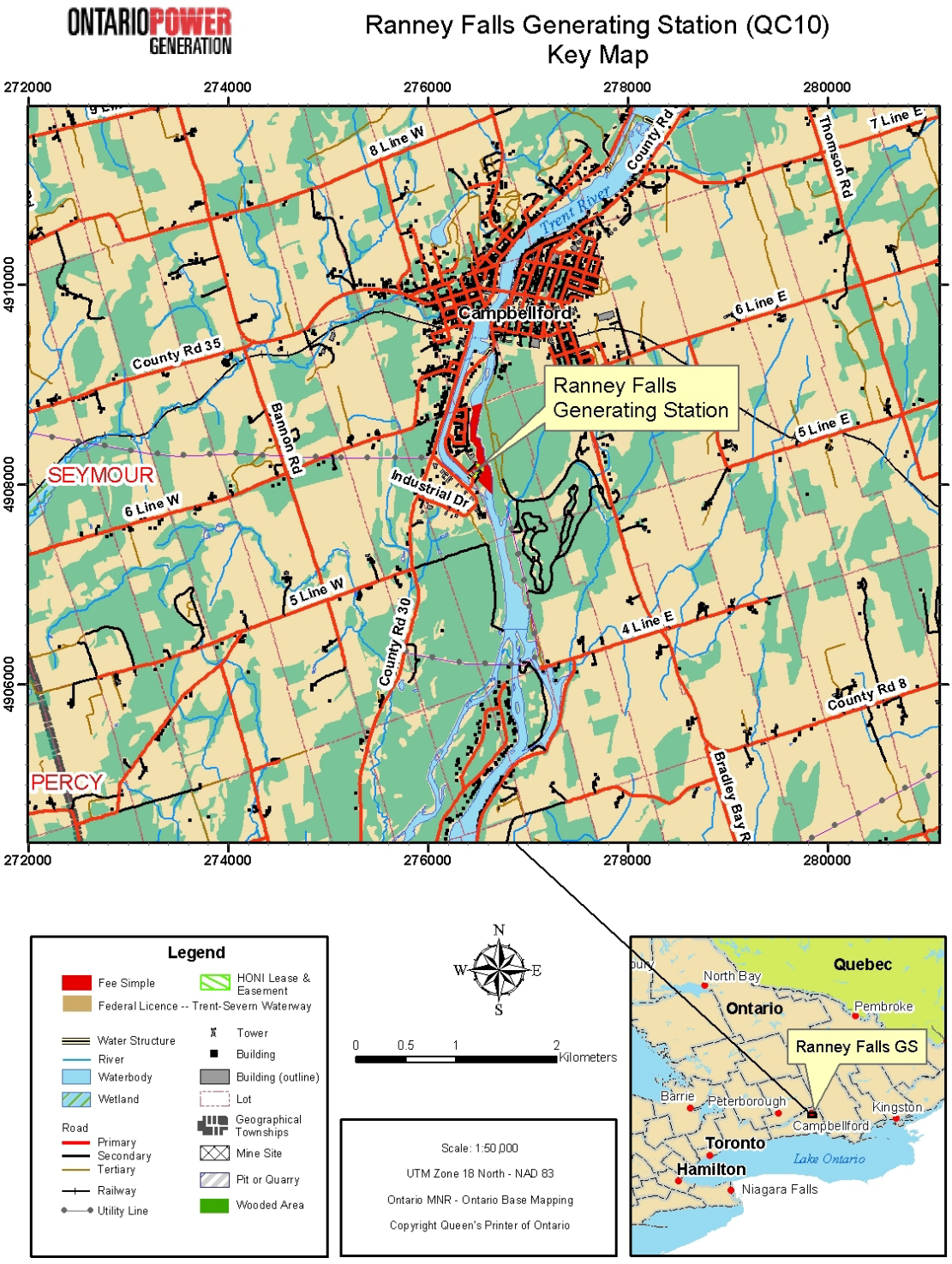


Figure 1.2 Aerial Photo of Ranney Falls GS Setting

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

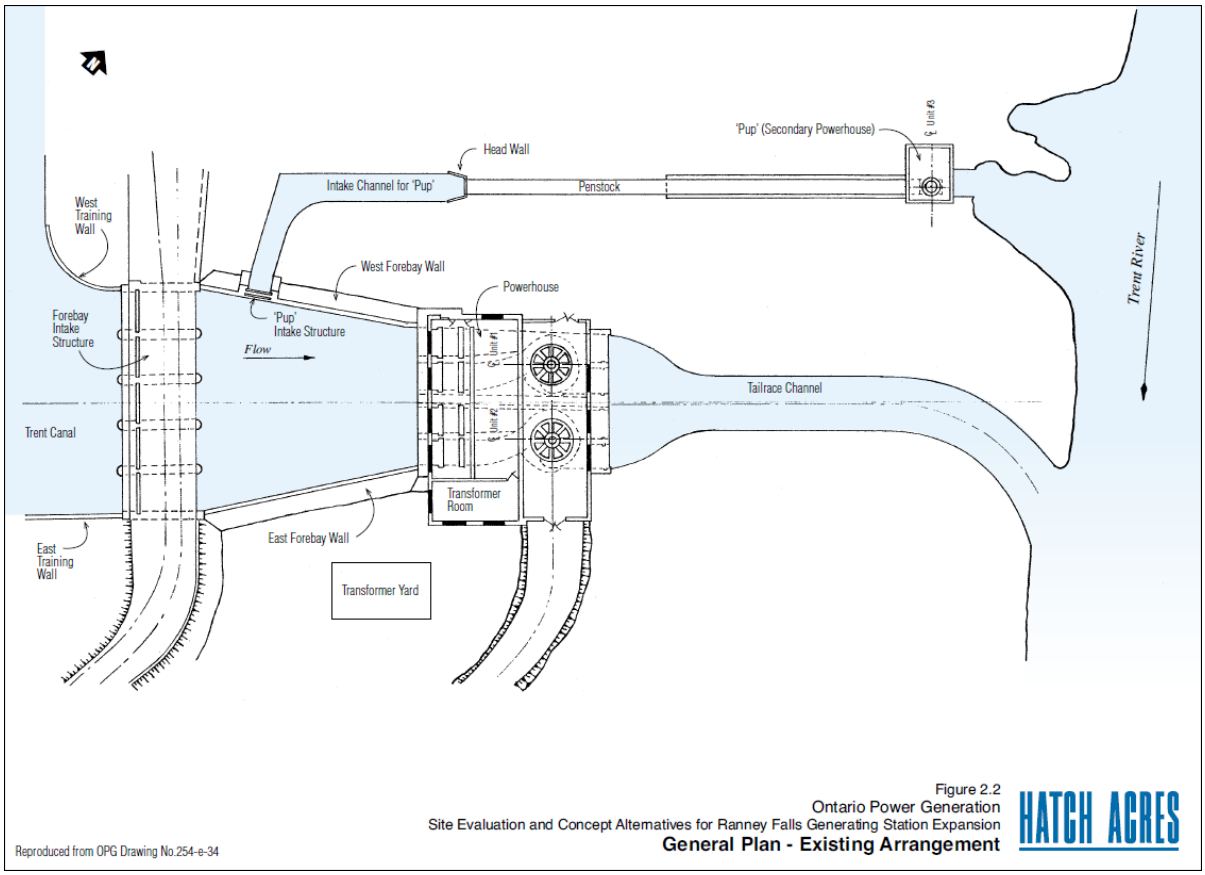
Maintenance of the "status quo" would result in the loss of hydroelectricity production capacity of 0.72 MW due to the decommissioning of the "Pup". It would also preclude the opportunity to expand the capacity of the Ranney Falls GS by replacing the "Pup" with a new unit having an incremental capacity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

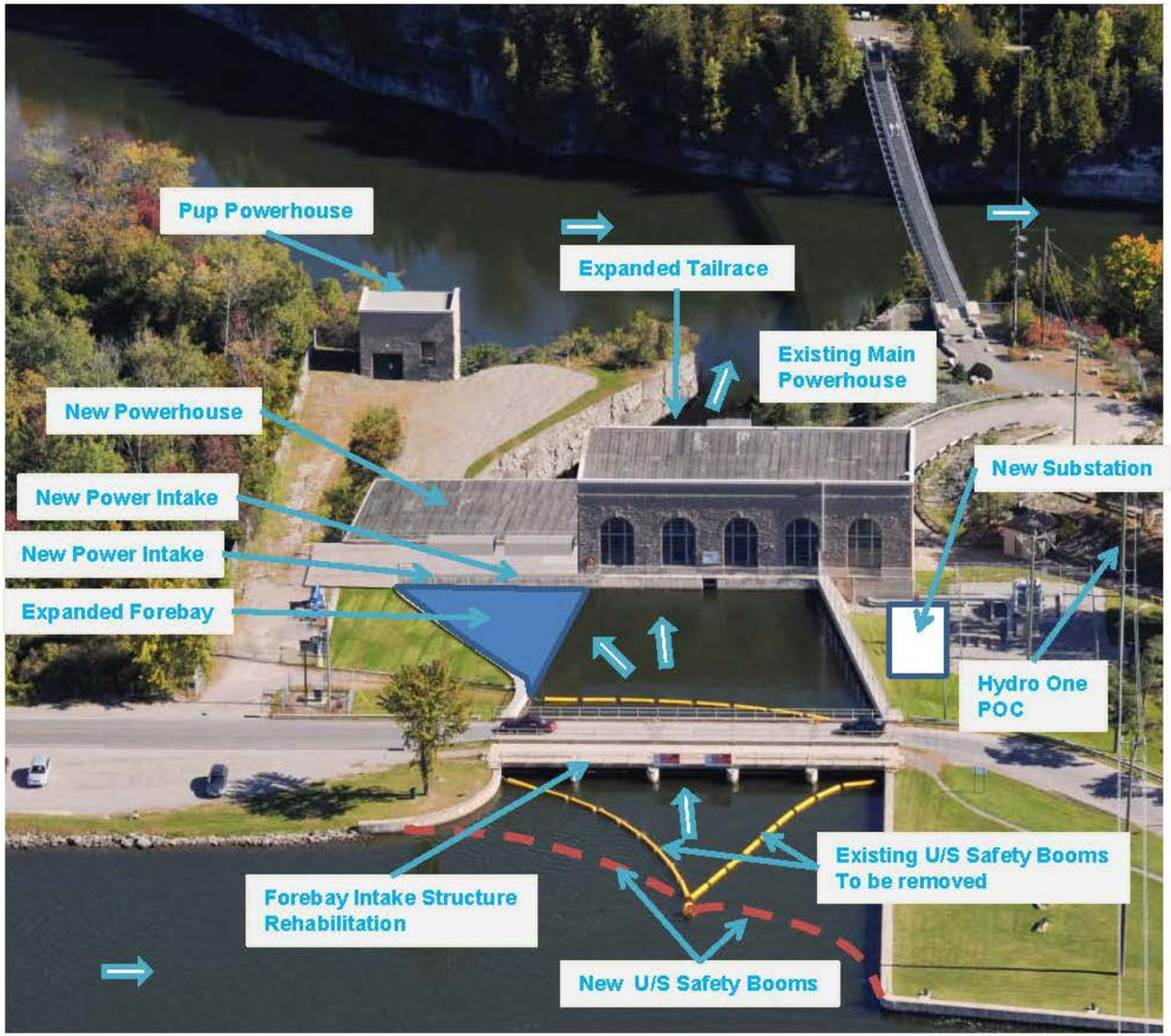
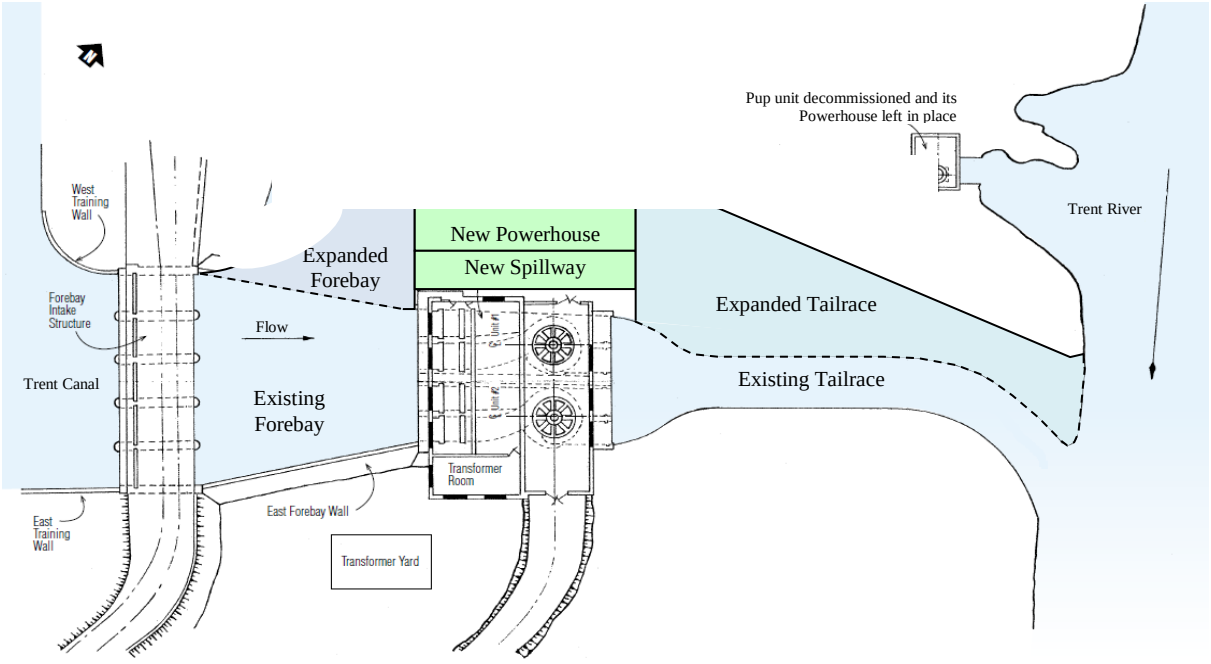


Figure 1.6 Schematic of Proposed Ranney Falls G3 Project Infrastructure Layout



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

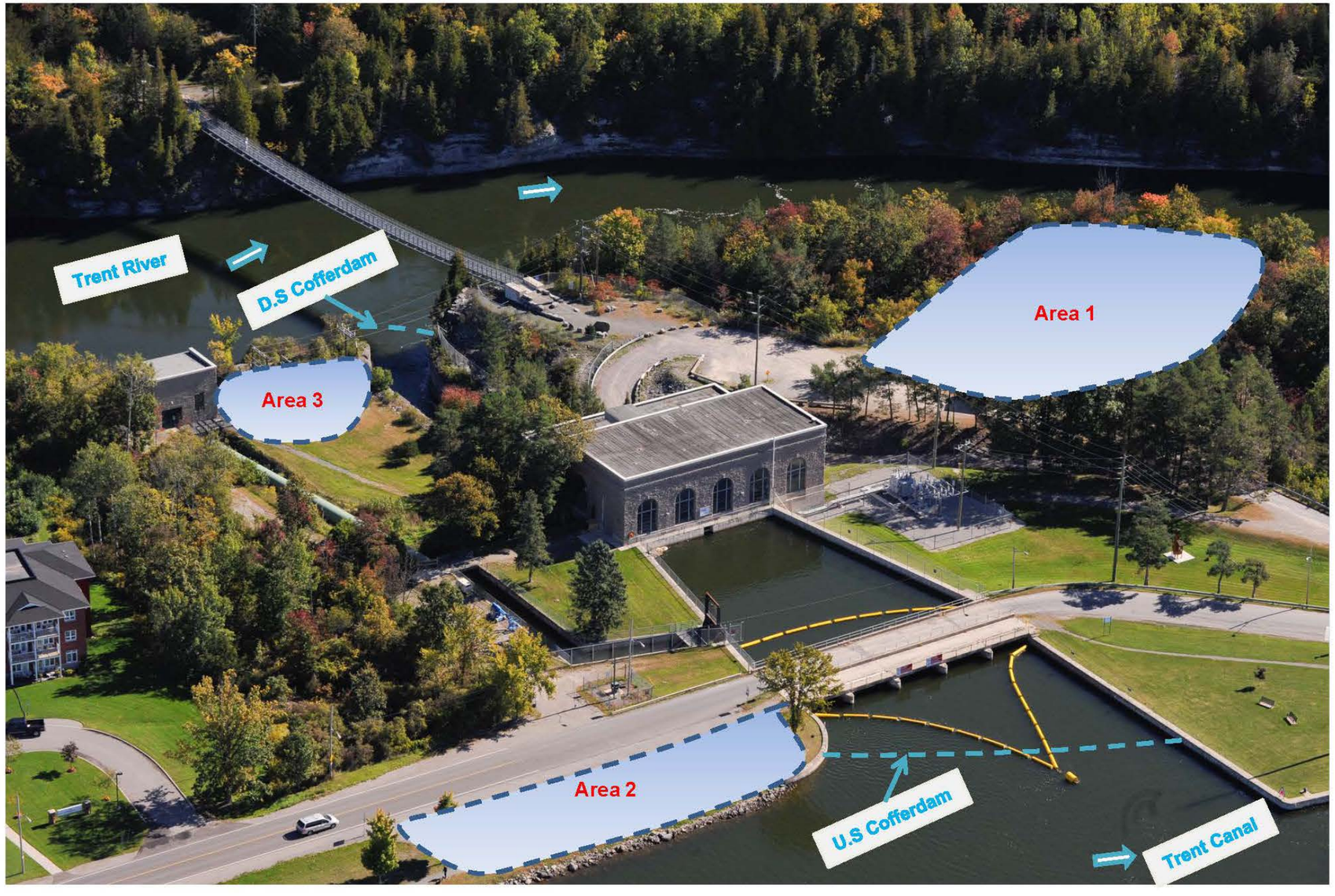
expanded forebay and tailrace, and return the existing G1 and G2 into service. Then the stage 2 starts. The W2W Contractor will install, test and commission the turbine, generator and ancillary electrical and mechanical equipment and systems, and place the new G3 into service. The OPG project team including 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

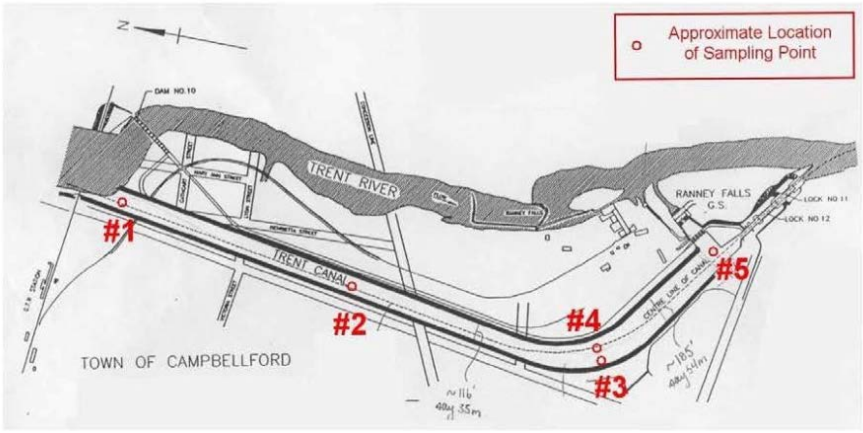
Photograph 1.2 Trent River Hydraulic Regime During Dam #10 Leakage

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

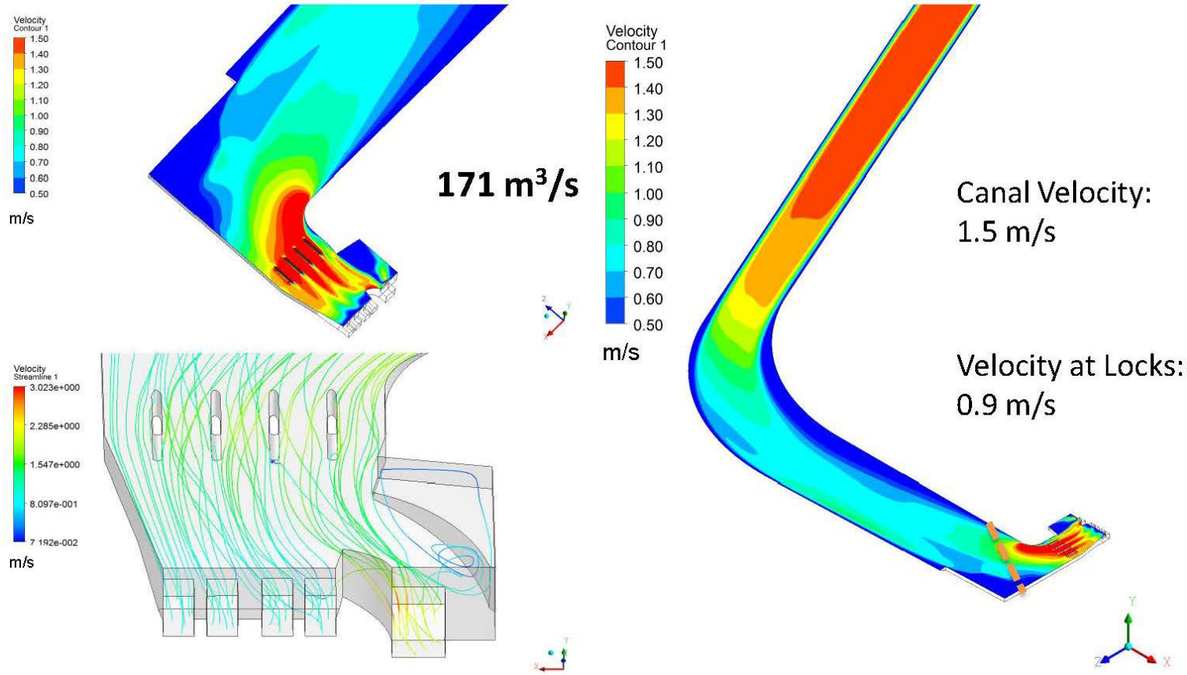
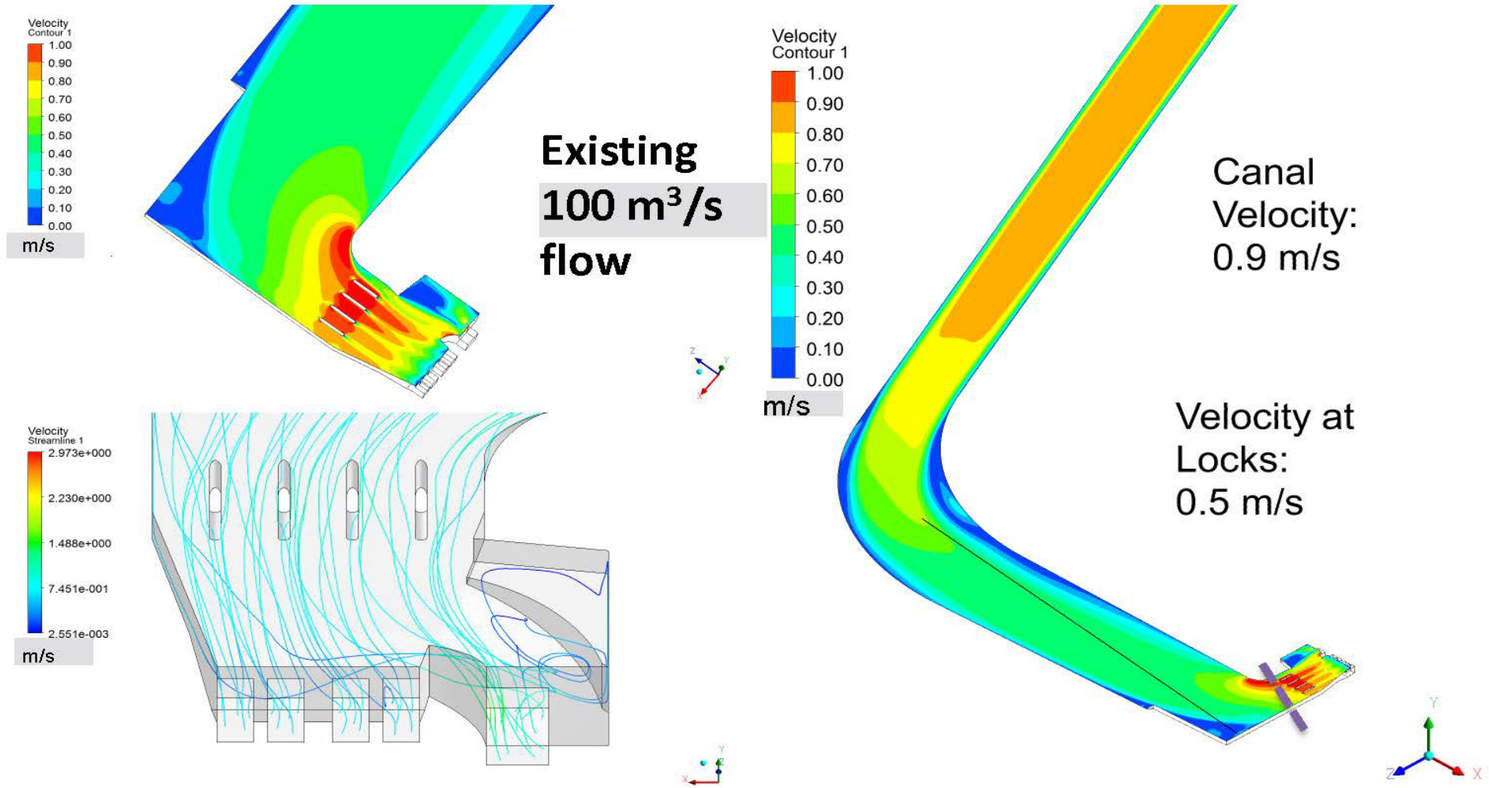


Figure 1.11 Flow Velocities in the Straight Canal Reach and at the Locks Based on Current Navigation Flow



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**

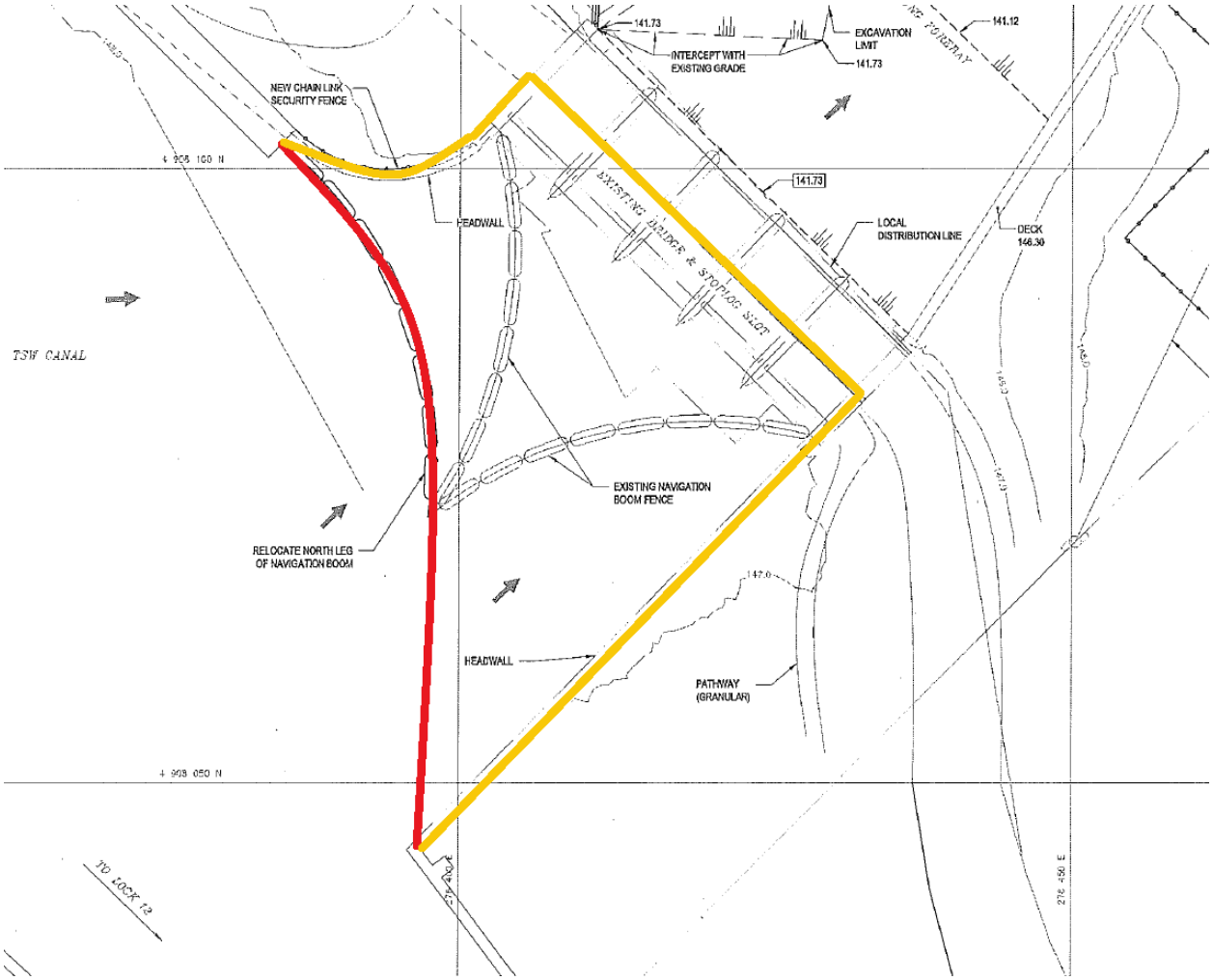
Based on a maximum flow of 171 m^3/s, velocities in the straight section of the canal and near the forebay intake structure were expected to increase from 0.9 to 1.5 m/s and from 0.5 to 0.9 m/s, respectively (see Figure 1.10). However, during the navigation season from mid-May to mid-October with flow 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 DESCRIPTION OF THE STUDY AREAS

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

The regional study area has been defined as Northumberland County, whereas the local and site-specific study areas have been defined as Trent Hills and the community of Campbellford, respectively.

1.5 STUDY APPROACH

Desk-top socio-economics and land use information was used to prepare a draft Project Description (Coker, 2007) and 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 updated and expanded during the preparation of this TSD for the proposed Ranney Falls G3 Project.

1.6 STRUCTURE OF THE REPORT

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.).

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. 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 Socio-economics and Land Use 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 Socio-economics and Land Use 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 Socio-economic and Land Use Conditions** – describes the baseline socio-economics and land use conditions in the study areas;
- Chapter 3.0 **Effects Assessment and Mitigation Measures** – details the assessment of socio-economics and land use 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 SOCIO-ECONOMICS AND LAND USE CONDITIONS

As indicated in Section 1.1, Ranney Falls GS is located on OPG land on the Trent River and adjacent to Lock #12 on the TSW within the community of Campbellford in Trent Hills, Northumberland County (see Figure 1.1). Ranney Falls GS is also located on Parks Canada – TSW National Historic Site of Canada. Site access is via Trent Drive from Grand Road (County Road 30) in Campbellford.

2.1 NORTHUMBERLAND COUNTY

Northumberland County borders the Region of Durham to the west, the County of Peterborough to the west and north, the County of Hastings to the east and Lake Ontario to the south. With an area of 1,905.34 km^2, Northumberland County is composed of seven local municipalities: the Town of Cobourg, the Municipalities of Brighton, Port Hope and Trent Hills, and the Townships of Ainwick/Haldimand, Cramahe and Hamilton.

As an upper-tier level of municipal government, Northumberland County is responsible for community and social services, emergency medical services (EMS), emergency planning, financial services, county roads and transportation, long-term care, waste collection and disposal, economic development and tourism (Northumberland County, 2012). The Northumberland County municipal offices are located in Cobourg.

The population of Northumberland County increased from 80,963 in 2006 to 82,126 in 2011 (+1.4%) (see Table 2.1). Population density in 2011 was 43.1 persons/km^2. Based on the Northumberland County (2014) Official Plan (OP), the population is expected to increase from 84,482 in 2011 to 102,517 by 2034.

Table 2.1 Population, Income and Employment Statistics[1]

Parameter	Northumberland County	Municipality of Trent Hills	Province of Ontario
2011 Census Population	82,126	12,604	12,851,821
2006 Census Population	80,963	12,247	12,160,282
Population Change 2001-2006 (%)	+1.4	+2.9	+5.7
Median Age (2011)	48.3	51.0	40.4
% of Population Aged 15 and Over (2011)	86.0	86.8	83.0
Population Density/km^2 (2011)	43.1	24.6	14.1
Total Private Households (2011)	33,315	5,335	4,887,505
Average Number of Persons/Household (2011)	2.4	2.3	2.6
Median Private Household Income in 2005 ($)	63,778	44,437	60,455
Total Population Aged 15 and Over (2011)	70,585	10,950	10,671,050
Total Population in the Labour Force (2006)	40,575	5,700	6,587,580
Total Population Employed (2006)	38,135	5,360	6,164,245
Total Population Unemployed (2006)	2,440	340	423,335
Participation Rate (%) (2006)	61.4	55.1	67.1
Employment Rate (%) (2006)	57.7	51.8	62.8
Unemployment Rate (%) (2006)	6.0	6.0	6.4

[1] Source: Statistics Canada (2007a,b; 2012a,b).

A Strategic Plan for 2011 – 2014 has recently been developed that focuses on four areas: economic renewal and prosperity, sustainable infrastructure and services, supportive communities and employer/workplace of choice. A Growth Management Strategy for Northumberland County and its member municipalities has also been developed (Meridian *et al*., 2009).

The Northumberland Detachment of the Ontario Provincial Police (OPP) based in Brighton, Campbellford and Cobourg provides law enforcement and crime prevention throughout the County, with the exception of Cobourg and Port Hope.

The headquarters of the Northumberland County EMS is located within the municipal office building in Cobourg, with six ambulance stations in Brighton, Campbellford, Cobourg, Colborne, Port Hope and Roseneath.

Medical services are provided by the 137-bed Northumberland Hills Hospital in Cobourg and the 34-bed Campbellford Memorial Hospital in Campbellford.

The Kawartha Pine Ridge District School Board (KPRDSB) operates 23 elementary and five secondary public schools, whereas the Peterborough Victoria Northumberland & Clarington Catholic District School Board (PVNCCDSB) operates six elementary and one secondary separate schools within Northumberland County. Elementary and secondary education is also provided by Trinity College, a private school located in Port Hope. Post-secondary education is available at Trent University and Sir Sanford Fleming College (with a satellite campus in Cobourg) in Peterborough, the University of Ontario Institute of Technology and Durham College (with a satellite campus in Port Hope) in Oshawa, Trillium College in Cobourg and Loyalist College in Belleville.

Northumberland County supports a diverse industrial, commercial and agricultural economic base. Table 2.2 presents the major employers in the County.

Table 2.2 Major Employers[1]

Company	Service	No. of Employees
CpK Interior Products	Auto Parts	1,000-4,999
Cameco Corp.	Non-metal Refining	500-999
Northumberland Hills Hospital	Health Care Services	250-499
Northumberland County	Government	250-499
Belden (Canada) Inc.	Communications & Energy Wire	250-499
Horizon Plastics Company Ltd.	Plastic & Synthetic Resin	250-499
Canada Service Correctionnel	Federal Corrections	250-499
Cam Tran Co.	Electric Wiring/Construction Supplies	100-249
Arclin Surfaces LLC	Paper Bag & Paper Manufacturing	100-249
Esco Ltd.	Alloy & Stainless Steel Casings	100-249
Weetabix of Canada Ltd.	Food Processing	100-249
Ste. Anne's County Inn & Spa	Traveller Accommodation	100-249
Campbellford Memorial Hospital	Health Care Services	100-249
Viceroy Homes Ltd.	Wood Product Manufacturing	100-249
Weston Bakeries Ltd.	Bakery Product Manufacturing	100-249
SABIC Innovative Plastics	Thermal Plastics Resin Manufacturing	100-249

[1] Source: Northumberland County website: http://www.investnorthumberland.ca/en/siteselectors/leadingemployers.asp

In addition, approximately 3,500 and 2,100 persons are employed by the KPRDSB and the PVNCCDSB, respectively.

Table 2.3 presents the 2010 agricultural land use statistics for Northumberland County. Between 2001 and 2006, the County experienced a 6.6% drop in farm numbers (Northumberland County, 2008). Since 1991, the number of farms has decreased by 32%, much greater than the provincial average decrease of 16.6%. The decrease between 2006 and 2010 in Northumberland County was 5.5% compared to 9.2% in Ontario (Statistics Canada, 2006, 2011).

Table 2.3 2010 Agricultural Land Use Statistics[1]

Parameter	Northumberland County	Municipality of Trent Hills	Province of Ontario
Total Population in 2011	82,126	12,604	12,851,821
Total Number of Farm Operators	1,445	460	74,840
Average Age of Operators	56.5	56.1	54.5
Total Number of Farms	974	305	51,950
Land Area (km^2)	1,905	511	907,574
Total Area of Farms (ha)	97,481	30,833	5,126,653
Average Area of Farms (ha)	100	101	99
Total Gross Farm Receipts ($)[2]	155,037,929	31,860,392	11,890,835,395
Total Farm Capital (Market Value in $)	844,167,837	235,199,712	75,917,763,880
Land in Crops (ha)	62,463	18,553	3,613,821

[1] Source: Statistics Canada (2011).
[2] Excluding forest products sold.

Over the past ten years, Northumberland County has undertaken a number of initiatives to assess its economic situation (McSweeney and GHK, 2005) and opportunities for economic development (Northumberland County, 2005, 2013a), and more specifically, opportunities in the agricultural (Northumberland County, 2008) and tourism (Northumberland County, 2009) sectors.

Northumberland County is served by provincial Highway 401 and a number of County Roads (Northumberland County, 2007). Rail service is provided by CN North America, Canadian Pacific Railway and VIA. Air service is provided by three nearby airports: Peterborough Airport, Oshawa Municipal Airport and Lester B. Pearson International Airport. The Port of Oshawa is capable of servicing ships of all sizes.

County Road (CR) 30 will be the primary thoroughfare for construction-related traffic to access Trent Road and the construction site. Traffic statistics for CR 30 and the two other county roads which traverse the community of Campbellford are presented in Table 2.4. Annual average daily two-way traffic at county road locations surveyed nearest to downtown Campbellford is provided below:

- 6,200 vehicles on CR 30 east of CR 35 approximately 3 km west of downtown;
- 4,400 vehicles on CR 30 approximately 6 km south of downtown;
- 3,200 vehicles on CR 8 approximately 2 km south of downtown; and
- 2,000 vehicles on CR 50 1.4 km north of downtown.

Table 2.4 County Road Traffic Statistics[1]

	2013			2008			2003			1998		
Location	**AADT**	**SADT**	**WADT**	**AADT[1]**	**SADT[2]**	**WADT[3]**	**AADT**	**SADT**	**WADT**	**AADT**	**SADT**	**WADT**
CR 8												
0.8 km North of Ferris Provincial Park Entrance	3,200	3,200	3,300	3,300	3,300	3,300	3,000	3,600	2,800	3,400	4,200	2,900
4.3 km West of Hastings County Boundary	2,500	2,500	2,400	2,400	2,100	2,500	2,000	2,400	1,800	1,900	2,100	1,700
CR 30												
1.0 km North of Highway 401	4,100	4,000	4,500	4,000	4,300	3,900	-	-	-	-	-	-
6.0 km North of Highway 401	3,400	3,200	3,800	3,200	3,400	3,100	-	-	-	-	-	-
7.2 km North of Highway 401	4,300	4,000	4,800	4,300	4,300	4,300	4,100	4,500	4,000	3,200	3,600	2,900
1.0 km South of CR 29	4,300	4,100	4,600	4,000	4,100	3,900	-	-	-	-	-	-
2.0 km North of CR 29	4,400	4,200	4,800	4,200	4,300	4,200	-	-	-	-	-	-
East of CR 35	6,200	6,000	6,600	6,100	6,200	6,000	6,800	6,900	6,700	5,300	5,900	4,800
3.7 km North of CR 35	3,300	3,200	3,700	3,400	3,700	3,300	3,600	4,000	3,400	2,700	3,000	2,400
CR 50												
1.4 km North of CR 30	2,000	1,800	2,200	1,900	2,000	1,900	2,000	2,200	1,900	2,100	2,600	1,800
0.8 km south of Peterborough/ Northumberland Boundary	1,300	1,200	1,500	1,400	1,300	1,400	1,200	1,600	1,000	1,100	1,600	800

[1] Source: Northumberland County (2013b).

[2] AADT – Annual Average Daily Traffic; the average 24 hour, two-way traffic for the period January 1 to December 31.

[3] SADT – Summer Average Daily Traffic; the average 24 hour, two-way traffic for the period July 1 to August 31.

[4] WADT – Winter Average Daily Traffic; the average 24 hour, two-way traffic for the period January 1 to March 31, plus December 1 to December 31.

2.2 MUNICIPALITY OF TRENT HILLS

Trent Hills, located in the northeasternmost portion of Northumberland County, is bordered by the Townships of Asphodel-Norwood and Havelock-Belmont-Methuen in Peterborough County to the north, the Township of Alnwick-Haldimand in Northumberland County to the west, the Township of Cramahe and Municipality of Brighton in Northumberland County and the City of Quinte West in Hastings County to the south, and the Township of Stirling-Rawdon in Hastings County to the east.

Trent Hills was incorporated on January 1, 2001 (initially named the Municipality of Campbellford, Seymour, Percy & Hastings) with the amalgamation of the Municipality of Campbell-Seymour (incorporated in January 1, 1998 with the amalgamation of the Town of Campbellford and the Township of Seymour), the Township of Percy and the Village of Hastings. The name change to Trent Hills occurred on April 3, 2001.

The population of Trent Hills increased from 12,247 in 2006 to 12,604 in 2011 (+2.9%) (see Table 2.1). With a land area of 510.83 km^2, population density in 2006 was 24.6 persons/km^2. The median age is above and well above those for Northumberland County and Ontario, respectively, likely reflecting greater retiree settlement. Based on the draft OP (Trent Hills, 2012), the population is expected to increase to 13,890 by 2031.

Trent Hills is responsible for municipal planning and development, the administration of the Ontario Building Code and various municipal by-laws and programs, economic development, the municipal road system, solid waste management services, water and wastewater services and stormwater management. The municipality is also responsible for the development and delivery of recreation facilities, programs and leisure services. It operates a number of recreation facilities, including an outdoor swimming pool, two arenas, four sports fields and parkland/leisure areas. The Trent Hills Public Library has three branches: Campbellford, Hastings and Warkworth.

The three major population centres in Trent Hills are the former town of Campbellford, the former village of Hastings and the community of Warkworth, formerly the municipal seat of the Township of Percy.

The three urban centres are serviced with municipal water supply systems and municipal sanitary sewage facilities. The rural areas are dependent on individual water supply and sanitary sewage disposal facilities.

Medical services are provided by the 34-bed Campbellford Memorial Hospital in Campbellford. A Northumberland County EMS ambulance station is also located in Campbellford.

The OPP Northumberland Detachment has a station in Campbellford. Trent Hills (2011) operates three fire departments: Campbellford/Seymour, Hastings and Warkworth Fire Departments, with a compliment of 57 volunteer firefighters.

Educational facilities include four elementary and one secondary public schools operated by the KPRDSB, as well as one elementary and one secondary separate schools operated by the PVNCCDSB.

Based on Official Plan mapping (Trent Hills, 2001), 35% of lands within the municipality are designated as prime farm land, 30% rural lands, 20% greenlands, 10% urban areas and 5% aggregate resources (J. Peters, Trent Hills, 2011, pers. comm.).

Agriculture is important to the local economy and agricultural activities are expected to remain as the predominant land use in the municipality (Trent Hills, 2001). Table 2.3 presents agricultural land use statistics for Trent Hills. The predominant agricultural operations are cash crops, beef farming and dairy farming (J. Peters, Trent Hills, 2011, pers. comm.). The predominant cash crops are alfalfa and alfalfa mixtures (7,063 ha), corn for grain (3,016 ha), soybeans (2,984 ha), all other tame hay and fodder crops (1,484 ha), and mixed grains (966 ha) (Statistics Canada, 2011).

There are 34 manufacturing industries with the major products being food products, chemical wood products, vehicle body manufacturing and metal fabrication (Trent Hills, 2011). Major employers are Campbellford Memorial Hospital, Campbellford District High School, Blommer Chocolate Canada, Dart Cup Ltd., Canadian Tire and Trent Hills. Trent Hills offers 1 to 15 acre lots for development within Campbellford Business Park located on County Road 30 within 15 minutes of Highway 401. A market feasibility study for Trent Hills has been prepared by McSweeney and TD Gordon (2006) which provided:

- an analysis of the current composition of the economy and changes that have taken place since 1996 or later;
- an analysis of the growth or decline in industry sectors when compared to the larger economy to identify those industries for which Trent Hills has a competitive advantage; and
- Trent Hills with a strategy to focus attraction efforts for the development of Campbellford Business Park.

Northumberland News, Community Press and *Northwest EMC* provide local news reporting.

2.3 COMMUNITY OF CAMPBELLFORD

The Ranney Falls GS is located approximately 1.8 km south of the Campbellford community centre and is zoned “Development” (Trent Hills, 2010) (see Figure 2.1). There are a number of commercial operations to the south and a residential area to the north.

Situated on the TSW and Trans Canada Trail, the population of the community swells with tourists during the summer.

Downtown Campbellford is the service and retail centre of Trent Hills. Trent Hills (2007) has undertaken a commercial study of downtown Campbellford to identify local market conditions and new business opportunities as a basis for the development of effective strategies for its revivification.

Police protection and fire prevention services are provided by the OPP Northumberland Detachment and the Campbellford/Seymour Fire Department, respectively, with stations in Campbellford. Northumberland County EMS also has an ambulance station in Campbellford. Medical services are provided by the 34-bed Campbellford Memorial Hospital, the largest employer in the community.

The Campbellford Water Treatment Plant, operated by Trent Hills, is a conventional water treatment system which draws all of its raw water supply from the Trent River. A 5,230 m^3 off-site storage reservoir provides for peak hour demands. There are no municipal water intakes in the vicinity of the Ranney Falls G3 GS (Peters, 2016).

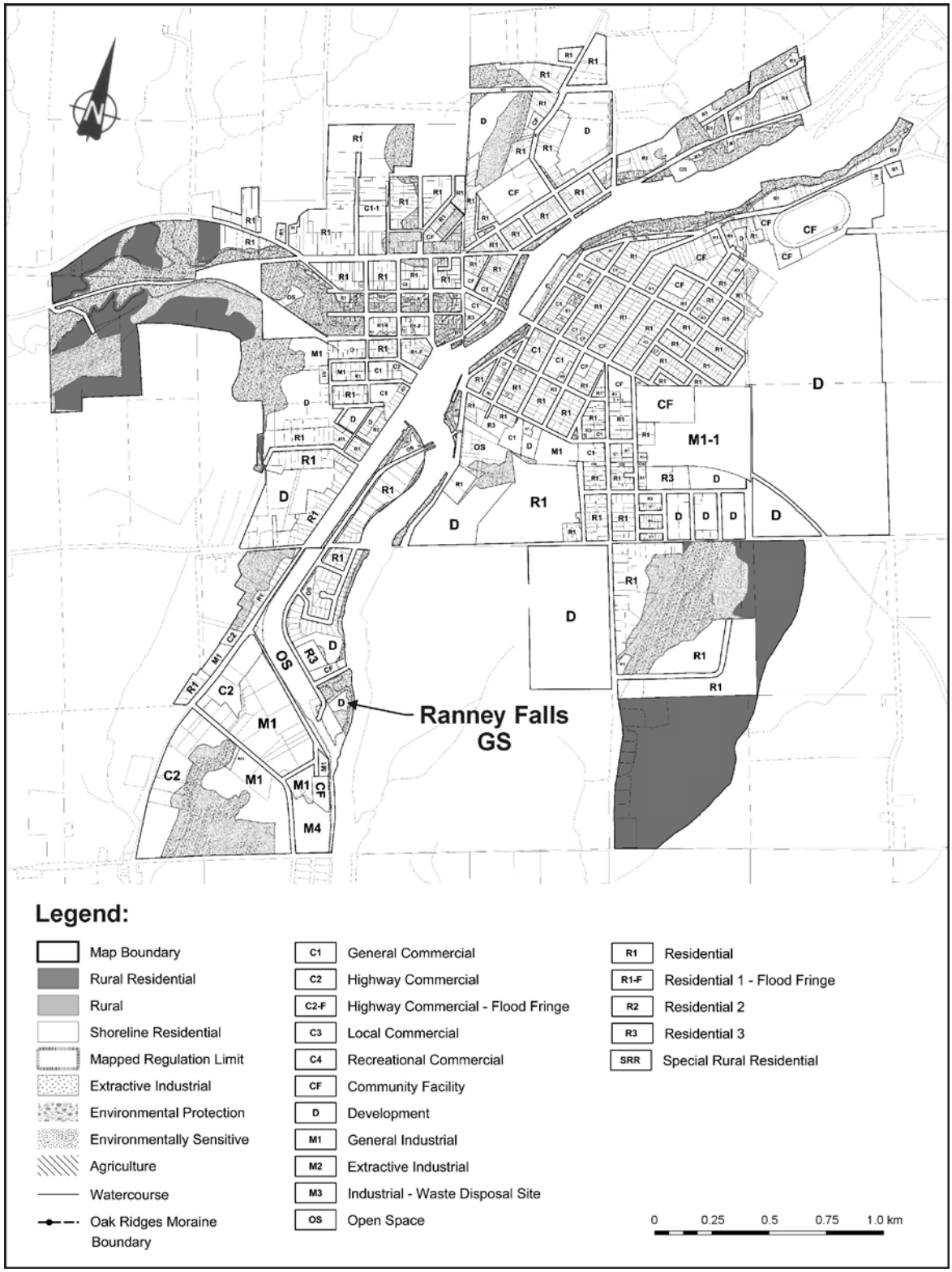
Trent Hills has a contract with the Ontario Clean Water Agency to operate the Campbellford Wastewater Plant for the management and disposal of solid wastes.

In addition to Campbellford Memorial Hospital, other employers include Campbellford District High School, Blommer Chocolate Canada, Dart Cup Ltd., Canadian Tire, Trent Hills, Empire Cheese and Butter Cooperative. Church Key Brewing Company and the OPG Campbellford Service Centre. As indicated in Section 2.2, development opportunities are available in Campbellford Business Park.

Educational facilities include two elementary and one secondary public schools operated by the KPRDSB, and one elementary separate school operated by the PVNCCDSB. A branch of the Trent Hills Public Library is located in Campbellford.

A full range of recreational, cultural, entertainment and restaurant facilities are available in Campbellford. Recreational facilities include an arena, a seniors centre, lawn bowling club, curling and racquet club, outdoor pool, bowling lanes, sports field, tennis courts, six parkland/leisure areas, including a skateboard park, and three golf courses within 15 minutes of the community. Local attractions include the TSW, Ferris Provincial Park, Ranney Gorge Suspension Bridge, Trans Canada Trail, Giant Toonie Statue in Old Mill Park, Aron Theatre,

Figure 2.1 Campbellford Land-use Zoning[1]



[1] Source: Trent Hills (2010).

Westben Arts Festival Theatre, Campbellford Waterfront Festival, Indian Bike Museum, Memorial Military Museum, Campbellford Fair, Antique Motorbike and Car Show, Meyersburg Flea Market and Farmer's Market. Seymour Conservation Area is accessed via County Road 30 about 1 km south of the Campbellford community limit.

Accommodation is provided by two motels with a total of 30 rooms, four bed & breakfasts, one resort and trailer park, and three campgrounds.

The Island Park Retirement Community property, owned by Specialty Living Island Park Inc., is located adjacent to the northwest of the Ranney Falls GS property, with the retirement home approximately 50 m from the property boundary. This retirement home has 85 units and a capacity of 152 residents (with an average age of 80 years).

A disused industrial building is located north of the Island Park Retirement Community property. The industrial building was initially occupied in the late 1800's by the Northumberland Pulp and Electric Company (Crothers *et al*., 2000). In 1904, the "The Paper Mill", as it was known, went bankrupt. After two changes of ownership, the mill burned down in 1910, but was rebuilt in 1915 with new additions (houses, blacksmith shop, pumping station). Due to external competition, the operation closed in 1939. In 1946, the property was purchased by Breithaupt Leather Company and renovated for a leather tannery and finishing factory. In 1983, the Healey family purchased the property on which they built a home. The outlying buildings were rented until 1994 when the Healeys opened a flea market which has since closed. Currently, the Healeys are operating an antique home décor and furniture shop, called "Cottage White Antiques".

There are a number of general industrial operations to the south and a residential area further to the north of Island Park Retirement Community (see Figure 2.1).

The Ranney Gorge Suspension Bridge provides public access from the Ranney Falls GS property to Ferris Provincial Park on the opposite side of the Trent River. A public parking area is available on the east side of the Ranney Falls GS property with a trail available to the Ranney Gorge Suspension Bridge. The Park, 1.98 km^2 in area, was operated by the Province from 1962 to 1994. Subsequently, based on a Memorandum of Understanding (MOU), the Park was operated by the Trent Hills Recreation Department with the support of the Friends of Ferris Park, a non-profit charitable organization dedicated to the promotion and preservation of the Park. With the termination of the MOU, Ontario Parks resumed the operation of Ferris Provincial Park in 2009. Ferris Provincial Park is open year round for visitors to enjoy its trails for hiking, jogging and cross-country skiing. The Park drumlins, Ranney Gorge Suspension Bridge and Ranney Falls provide panoramic viewsights.

The Canada Land Inventory (CLI, 1971) categorizes the lands encompassing the Ranney Falls GS property as Class 4 with moderate capability for outdoor recreation, providing access to water affording opportunity for angling or viewing of sport fish, shoreland fronting water

accommodating yachting and boat tripping, and major, permanent, non-urban, man-made structures of recreational interest, i.e., the TSW.

2.4 FIRST NATIONS

The Ranney Falls GS is located in an area of central-eastern Ontario that is covered under what have been collectively known as the Williams Treaties. According to Surtees (1986), two distinct Aboriginal peoples were involved in signing the Williams Treaty of 1923:

- the Mississauga Indians of Rice Lake (Hiawatha First Nation), Mud Lake (Curve Lake First Nation), Scugog Lake (Mississaugas of Scugog First Nation) and Alderville (Alderville First Nation); and
- the Chippewas of Christian Island and Georgina Island (Chippewas of Georgina Island First Nation) and Rama (Chippewas of Rama Mnjikaning First Nation).

The Williams Treaties were actually a series of treaties that were replaced in 1923 by a new Treaty that was designed to address Indian claims of concerns at that point in time. The new Williams Treaty then provided for the surrender of the last large outstanding land parcel in southern Ontario. The Williams Treaty was unique in Canada in that there was no inclusion of traditional fishing, hunting and trapping rights. The surrender of rights in the Williams Treaty area was challenged in 1984 before the Supreme Court of Canada. The Court determined that all rights were surrendered.

The nearest First Nation reserve is that of the Alderville First Nation, located south of Rice Lake, approximately 26 km southwest of Campbellford. Additional information on the Alderville First Nation and other First Nations and Aboriginal groups is provided in the Aboriginal Consultation Technical Support Document.

3.0 EFFECTS ASSESSMENT AND MITIGATION MEASURES

The available baseline information provided the basis for an assessment of potential construction and operational effects on socio-economics and land use, e.g., due to nuisance impacts such as dust, noise (including blasting), traffic and aesthetic impairment.

Recommended mitigation measures for these effects on the terrestrial environment are based on the OWA (2012) "Best Management Practices Guide for the Mitigation of Impacts of Waterpower Facility Construction", standard environmental construction guidelines (e.g., Cheminfo, 2005), relevant government guidelines for proposed hydroelectric power plant development (e.g., Trent Hills, 2005), as well as government agency and other organization consultation.

The significance of potential impacts is based on their magnitude, duration and extent after the implementation of recommended mitigation measures.

3.1 CONSTRUCTION PHASE

The greatest potential for negative socio-economic effects is during the construction phase of a project. In general, the magnitude and significance of the effects that will be experienced by a community will be directly related to the following:

- the number of residents disturbed by the construction activities;
- number of community facilities or resource areas disturbed by the construction activities;
- the need for additional infrastructure;
- the ability of the community to supply the project with required goods and services;
- the size of the construction work force requiring local accommodation, supplies and services;
- the length of time members of the work force are resident in the community; and
- the time of year.

The smaller the community the more susceptible it will be to possible effects, particularly if there is a significant number of in-migrant workers. The retail service infrastructure may be overtaxed by the demands of the project and may inconvenience local residents who can no longer obtain their customary goods and services at local outlets in a normal manner.

The time of year when a construction work force is in a community may also have a bearing on the degree of potential negative effect. This is particularly true of communities that depend on tourism. Communities and tourist operators that suddenly find their facilities and services occupied by construction workers may find that they are unable to accommodate tourists and vacationers in their usual manner. This can potentially lead to market loss in the construction year and possibly over a longer term if tourists do not return to the area because of a "bad experience".

On the positive side, the project construction phase can also result in substantial benefits to local communities. Direct economic benefits can be realized if local residents are employed on the project. Other economic benefits will result through project purchases and expenditures in the local area. These expenditures will be a boon to local businesses and will, in turn, generate indirect and induced economic benefits.

It is important to maximize the benefits of the proposed Ranney Falls G3 Project while reducing any negative aspects. Generic mitigation measures related to potential socio-economic issues will include the following:

- identify a contact person should the public have questions or concerns;
- promptly respond to concerns raised by local officials or the public;
- encourage the contractors to buy materials and services for the proposed Project in the local area (see Section 3.1.2); and
- ensure proper construction and mitigation procedures are followed to minimize nuisance impacts associated with dust, noise (including blasting), aesthetic disturbance and traffic (see Sections 3.1.3, 3.1.4, 3.1.5 and 3.1.6).

Any more recent information on the proposed Ranney Falls G3 Project can be found at: http://www.ranneyfallsg3.com/.

3.1.1 Municipal Services and Facilities

There will be no need for additional municipal services and facilities. Potable water and portable toilet facilities will be provided by the contractor. The contractor may also rent available office space in the area and/or use construction trailers on site. No increased demands on fire or police services are anticipated.

Local and regional government will not be burdened by any project-related increase in planning and administrative activities during the construction period, with the exception of consultation input during the development of relevant components of the Environmental Management Plan, e.g., Access Management Plan, Traffic Management Plan and Site Rehabilitation Plan.

3.1.2 Economy

It is anticipated that there will be little, if any, in-migration of workers to the local area due to the presence of a regional workforce and the relative short-term nature of the proposed Project. The construction work force will be 60 to 80 workers based on projects of similar size and scope.

The distribution of construction employment will be influenced by labour agreements, hiring practices and available skill sets. These include the provisions and requirements of the Electrical Power Systems Construction Association (EPSCA), the Ontario Allied Construction Trades Council (OACTC), and other trades not within the EPSCA and OACTC.

Supervisory staff may move to the local area for short periods of time, and it is expected that they would find temporary accommodation in the area.

It is expected that Campbellford and the nearby Cities of Peterborough, Quinte West (Trenton) and Belleville will provide the majority of the required accommodation for the few in-migrant workers and supervisory staff.

The majority, if not all, of the proposed Project construction worker needs (e.g., fuel, food, sundries) can be accommodated by Campbellford and the nearby communities. These communities should benefit positively from construction-related expenditures.

Additional economic benefits to businesses in the region as a result of construction activities may include common construction material purchases such as concrete from a ready-made plant in the area. Moreover, local contractors may be asked to bid on some or all of the site preparation and restoration work.

OPG estimates that the contribution of the proposed Project construction phase to the local economy will be over $10 million.

3.1.3 Air Quality

The construction of the proposed Ranney Falls G3 Project has the potential to affect the air quality in the vicinity of the site. Emissions which are associated with construction activities are primarily dust and typical combustion emissions from construction equipment such as carbon monoxide, nitrogen oxides, sulphur dioxide and volatile organic compounds. As with any construction site, these emissions will be intermittent and of relatively short duration and unlikely to have an effect on the surrounding area.

The contractor and subcontractors will be required to maintain equipment in good working condition to minimize combustion emissions to the extent practicable. To reduce particulate emissions, effective dust suppression techniques will be used, such as on-site watering, limiting the speed of vehicles travelling on Trent Drive and cleaning of vehicles and road surfaces during rainy/muddy periods. During construction, the practices and procedures outlined in the Cheminfo (2005) document “Best Practices for the Reduction of Air Emissions from Construction and Demolition Activities”, prepared in conjunction with the Construction and Demolition Multi-stakeholder Working Group for Environment Canada, will be followed, including:

- proper planning during the design stage to reduce emissions generated during construction;
- reduction of fugitive dust emissions from the construction site with respect to site preparation, covering of storage piles, material handling and transfer systems, road surfaces and fabrication processes;
- use of water and/or chemical dust suppressants at the construction site; and
- reduction of emissions from engines by use of well-maintained vehicles and equipment.

A Permit-To-Take-Water will be sought from the Ontario Ministry of the Environment and Climate Change (MOECC) if more than 50,000 L/day is withdrawn from the Trent River or groundwater source for dust suppression. Alternatively, commercial water trucks may be used. Reseeding will be undertaken as soon as conditions permit after construction to reduce fugitive dust emissions.

The application of the recommended mitigation measures should minimize combustion emissions and limit fugitive dust emissions to the Ranney Falls GS property. Any net-effects are expected to be short-term in duration and highly localized. Therefore, no other mitigation measures are required.

3.1.4 Environmental Noise

The proposed Ranney Falls G3 Project will be a potential source of local noise during its construction phase. All work is expected to be completed using common construction methods. The noise associated with the construction would most likely be a result of activities such as general site grading, foundation work, expanded forebay and tailrace excavation, and site servicing. All of these activities, which are expected to take approximately 30 months, will require the use of various pieces of heavy equipment, e.g., dozers, front-end loaders, small trucks, backhoes, bobcats, dump trucks, compactors, cement trucks and/or cranes. Blasting will be required for expanded tailrace excavation. Other construction activities, such as those related to the placement of the facility components (e.g., turbine), are expected to generate less noise. The movement of delivery and worker vehicles will also add to the sound levels during the 16-month equipment delivery and construction period.

Sound emission standards for construction equipment are set according to the date of manufacture of the equipment as defined by the MOECC in the NPC-115 publication, listed in the MOE (1978) Model Municipal Noise Control By-Law. This document stipulates specific sound emission standards for various pieces of construction equipment. This Model By-Law also suggests a restriction on the operation of any equipment in connection with construction from 19:00 h one day to 07:00 h the next day, and all day Sunday and statutory holidays.

As indicated in Section 2.3, the closest residential receptor is approximately 50 m northwest of the proposed Ranney Falls G3 Project site. Construction activities will abide with the specific Trent Hills (2005) Municipal Noise By-Law and will be limited to between 6 a.m. and 9 p.m. No construction activities will occur on Sundays and holidays except in the case of urgent necessity.

As indicated in Section 1.3.1, 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., 2011).

Drilling activities to facilitate blasting will generate noise and vibration similar to any general construction operation. Potential effects due to noise and vibration will be minimized by proper maintenance and operation of drill rig equipment. In addition, noise baffling equipment can be provided, as appropriate.

A notice of blasting schedule will be circulated in advance to the local community and posted at the adjacent locks and along the trails to Ranney Gorge Suspension Bridge.

3.1.5 Public Access

As indicated in Section 2.3, the Ranney Gorge Suspension Bridge provides public access from the Ranney Falls GS property to Ferris Provincial Park on the opposite side of the Trent River. A public parking area is available on the east side of the Ranney Falls GS property with a trail available to the Ranney Gorge Suspension Bridge.

The primary access for vehicles to the construction site from Trent Drive would be the road that parallels the “Pup” powerhouse penstock to the west of the main powerhouse.

However, the lawn area between the public access road and the forebay will be used for laydown/assembly during construction with access to this area from Trent Drive and/or the public access road. OPG is also pursuing approval from Parks Canada – TSW for use of the lawn area on both sides of Trent Drive to the east and west of the forebay.

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. As indicated above, construction will not occur on Sundays and public holidays, likely the time of peak public access activities. OPG will consult with Ontario Parks to obtain input on the development of the Access Management Plan.

3.1.6 Traffic

As indicated in Section 2.1, CR 30 will be the primary thoroughfare for construction-related traffic to access Trent Drive and the construction site. During construction, as many as 80 workers could be on the site at one time. As a result, there will be increased traffic due to worker and construction-related delivery vehicles primarily along CR 30 and Trent Road and, to a lesser extent, along CR 8 and CR 50, during construction.

Mitigation measures that can be implemented to minimize potential adverse effects associated with increased traffic during the construction period include discussions with Trent Hills regarding road restrictions, haul routes and traffic safety. Occasional disruptions at construction access locations can be minimized by providing advance notice to the OPP, posting construction signs to alert oncoming motorists of construction activities, and/or assigning a

traffic control duty officer(s) to assist vehicle entry and exit, as required. A Traffic Management Plan will be prepared in consultation with the Northumberland County and/or Trent Hills Public Works Departments addressing these mitigation measures for implementation during the construction phase of the proposed Project.

3.2 OPERATION PHASE

When the proposed Ranney Falls G3 Project is operational, the local socio-economic environment will be very similar to that prior to construction. No additional jobs will be created; noise levels are not expected to increase; access to the property will remain the same; and no additional municipal government services will be required.

Most significantly, as indicated in Section 1.3, the proposed Ranney Falls G3 Project includes a new spillway to by-pass full station flow to the expanded tailrace channel for emergency situations. The operation of the new spillway will preclude the potential for flooding along the Trent Canal upstream of Locks #11 and #12.

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.

During the proposed Ranney Falls G3 Project construction, potential effects on the socio-economics and land use may occur due to disturbance of area residents through nuisance impacts such as dust, noise (including blasting), traffic and aesthetic impairment. Based on an assessment of the available baseline information and potential effects, as well as the implementation of the recommended mitigation measures, it is concluded that any negative effects due to construction activities 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 supply of required goods and services during the construction phase.

It should also be recognized that the Municipality of Trent Hills has also provided a Council Support Resolution in support of the Project dated September 27, 2012 (Appendix A).

Based on assessment of the baseline information and potential effects, it is concluded that the operation of the proposed Ranney Falls G3 Project will have negligible effects on socio-economics and land use. However, the operation of the new spillway will preclude the potential for flooding along the Trent Canal upstream of Locks #11 and #12.

Environmental protection during proposed Project construction and operation will be ensured by adherence to the Environmental Management Plan, as well as compliance with regulatory standards and guidelines.

The Environmental Management Plan, with oversight by the Environmental Monitor, will ensure that environmental protection will be achieved by addressing government agency requirements, OPG policy, proposed Project commitments and recommended mitigation measures to be undertaken. The Environmental Management Plan will include the Erosion and Sediment Control Plan, Spills Emergency Preparedness and Response Plan, Hazardous Materials Management Plan, Waste Management Plan and Site Rehabilitation Plan (see Aquatic and Terrestrial TSDs), as well as the Access Management Plan and Traffic Management Plan.

Table 4.1 summarizes potential construction and operation effects on socio-economics and land use, the recommended mitigation/remedial measures to minimize or obviate these effects and the net residual effects.

Table 4.1 Summary of Potential Effects on Socio-economics and Land Use and Recommended Mitigation/ Remedial Measures

Effect	Recommended Mitigation/Remedial Measure	Net Residual Effect
Construction		
Community	• Identification of a contact person should the public have questions or concerns. • Prompt response to concerns raised by local officials or the public.	Negligible effect
Accommodation	• None: few in-migrant workers and supervisory staff requiring accommodation.	Negligible effect
Economy	• Encourage contractors to buy materials and services in the local area. • Contribution to the local economy estimated to be over $10 million.	Net benefit
Fugitive Dust and Air Quality	• Use of water trucks and/or sprinklers (Cheminfo, 2005). • Proper equipment maintenance (Cheminfo, 2005).	Negligible effect
Blasting	• Adherence to blasting engineer recommendations and DFO Guidelines (Wright and Hopky, 1998). • Circulation of notice of blasting schedule in advance to the local community and postings at the adjacent locks and along the trails to Ranney Gorge Suspension Bridge.	Negligible effect
Noise/Vibration	• Proper maintenance and operation of equipment, with use of noise baffling, as appropriate. • Adherence to Trent Hills (2005) Municipal Noise By-Law.	Negligible effect
Public Access	• Development of an Access Management Plan in consultation with Trent Hills Recreation Department and Friends of Ferris Park.	Negligible effect
Traffic	• Development of a Traffic Management Plan in consultation with Northumberland County and/or Trent Hills Public Works Departments.	Negligible effect
Operation		
Noise	• Ambient noise levels to remain unchanged.	Negligible effect
Flooding	• Operation of new spillway will preclude potential for flooding along the Trent Canal upstream of Locks #11 and #12.	Net benefit

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6.0 ACRONYMS/ABBREVIATIONS

Acronyms

&	And
$	Dollar
-	Minus
#	Number
+	Plus
AADT	Annual Average Daily Traffic
a.m.	Before noon (ante meridiem)
c.	Chapter
CAT	Compact Axial Turbine
CEAA	*Canadian Environmental Assessment Act*
CEAA 2012	*Canadian Environmental Assessment Act, 2012*
CFD	Computational Fluid Dynamics
Cheminfo	Cheminfo Services Inc.
CHPG	Central Hydro Plant Group
CLI	Canada Land Inventory
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CR	County Road
DFO	Department of Fisheries and Oceans
EA	Environmental Assessment
e.g.	For example (exempli gratia)
EIA	Environmental Impact Analysis
EMS	Emergency Medical Services
et al.	And others (et alia)
GHK	GHK International
GS	Generating Station
H	Horizontal
HEC	Hydrologic Engineering Centre
Hydro One	Hydro One Networks Inc.
i.e.	That is (id est)
Inc.	Incorporated
KPRDSB	Kawartha Pine Ridge District School Board
KST	KST Hydroelectric Engineers
LLC	Limited Liability Company
LTC	Lower Trent Conservation
Ltd.	Limited
McSweeney	McSweeney & Associates
MNR	Ontario Ministry of Natural Resources
MNRF	Ontario Ministry of Natural Resources and Forestry
MOE	Ontario Ministry of the Environment

MOECC	Ontario Ministry of the Environment and Climate Change
MOU	Memorandum of Understanding
MPP	Member of Provincial Parliament
N	North
No.	Number
OMMAH	Ontario Ministry of Municipal Affairs and Housing
OP	Official Plan
OPG	Ontario Power Generation Inc.
OPP	Ontario Provincial Police
OWA	Ontario Waterpower Association
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
p.m.	After noon (post meridiem)
PPS	Provincial Policy Statement
Project	Ranney Falls Generating Station G3 Expansion Project or Ranney Falls G3 Project
PVNCCDSB	Peterborough Victoria Northumberland & Clarington Catholic District School Board
SADT	Summer Average Daily Traffic
S.C.	Statutes of Canada
SENES	SENES Consultants Limited
SHARP	Small Hydroelectric Assessment and Retrofit Program
3D	Three-dimensional
TD Gordon	TD Gordon & Associates
Trent Hills	Municipality of Trent Hills
TSD	Technical Support Document
TSW	Trent-Severn Waterway
U.S.	United States
V	Vertical
W	West
WADT	Winter Average Daily Traffic

Measurement Units

^{o}	degree
‘	minute
“	second
GWh	gigawatt-hour
h	hour
ha	hectare
km	kilometre
km^2	square kilometre
kV	kilovolt
L	litre
L/s	litre per second
m	metre
m/s	metre per second
m^3	cubic metre
m^3/s	cubic metre per second
MW	megawatt
Pa	pascal (unit of pressure)
%	percent

7.0 GLOSSARY

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.
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.

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.
Trashrack	Bar screen with larger space openings installed to prevent logs, stumps and other large solids from penetrating the intake.
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 – Municipality of Trent Hills Council Support Resolution

MUNICIPALITY OF TRENT HILLS
P.O. Box 1030,
66 Front Street South,
Campbellford, ON K0L 1L0
t 705.653.1900 f 705.653.5203
www.trenthills.ca

September 27, 2012

Ontario Power Generation
700 University Ave.,
TOROTNO, ON M5G 1X6

Attention: Iskander Boulos (H18-F16)

Re: Ontario Power Energy – Municipal Council Support Resolution

At the regular meeting of Council held on Tuesday, September 18, 2012, an application was endorsed by Council and approved for Ontario Power Generation Inc. to operate a waterpower generation project on their subject lands.

Enclosed, please find your application, which have been signed and the corporate seal affixed.

Should you have any questions, please do not hesitate to contact me.

Sincerely,

Susan Noonan, A.M.C.T.
Administrative Assistant

Enclosure

ONTARIO POWER AUTHORITY

120 Adelaide Street West, Suite 1600
Toronto, Ontario M5H 1T1
T 416-967-7474
F 416-967-1947
www.powerauthority.on.ca

PRESCRIBED FORM/TEMPLATE: MUNICIPAL COUNCIL SUPPORT RESOLUTION

Section 6.1(d)(i) - FIT Rules, Version 2.0 OPARP/f-FIT-015r1

Capitalized terms not defined herein have the meanings ascribed thereto in the FIT Rules, Version 2.0.

Resolution NO: 563 **Date:** September 18, 2012

WHEREAS Ontario Power Generation Inc. (the "Applicant") proposes to construct and operate a waterpower generation project (the "Project") on the Applicant's property at 17 Trent Drive, Campbellford, Ontario (the "Lands") in the Municipality of Trent Hills under the Province's FIT Program;

AND WHEREAS the Applicant has requested that Council of the Municipality of Trent Hills indicate by resolution Council's support for the construction and operation of the Project on the Property;

AND WHEREAS, pursuant to the rules governing the FIT Program (the "FIT Rules"), Applications whose Projects receive the formal support of Local Municipalities will be awarded Priority Points, which may result in the Applicant being offered a FIT Contract prior to other persons applying for FIT Contracts;

NOW THEREFORE BE IT RESOLVED THAT:

Council of the the Municipality of Trent Hills supports without reservation the construction and operation of the Project on the Lands.

This resolution's sole purpose is to enable the Applicant to receive Priority Points under the FIT Program and may not be used for the purpose of any other form of municipal approval in relation to the Application or Project or any other purpose.

HECTOR MACMILLAN, MAYOR

MARGARET MONTGOMERY, CLERK

(Note: signature lines for councilors or other representatives, as appropriate)

FIT reference number: _____
(Note: Must be inserted by Applicant to complete Application)

Aug 2012

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