



TECHNICAL SUPPORTING DOCUMENT

SOCIO-ECONOMICS AND LAND USE

PROPOSED NEW POST CREEK HYDROELECTRIC PROJECT

Submitted To:

**Coral Rapids Power Inc.
and Ontario Power Generation Inc.**

Prepared By:

SENES Consultants


November 2013

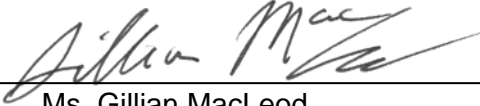
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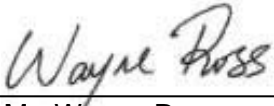
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EXECUTIVE SUMMARY

Ontario Power Generation Inc. (OPG) and its partner Coral Rapids Power Inc. (CRP), a wholly owned corporation of the Taykwa Tagamou Nation (TTN), are proposing the development of the New Post Creek Hydroelectric Project (New Post Creek Project or Project). The proposed Project is located in the District of Cochrane within the Geographic Township of Pinard, approximately 75 km north of the Town of Smooth Rock Falls and 15 km north of the former small community of Fraserdale.

The proposed New Post Creek Project was identified by the Ontario Ministry of Energy (2010) as being under consideration as a clean, renewable, cost-effective hydroelectric generation project in “Ontario’s Long-Term Energy Plan”.

In 1963, Ontario Hydro constructed the New Post Creek Diversion Dam on the Little Abitibi River in order to supply additional generating capacity at its Otter Rapids Generating Station (GS). The Otter Rapids GS is now owned and operated by OPG under the authority of a Water Power Lease. The dam allows flows to be diverted along the constructed New Post Creek Diversion Channel and New Post Creek to the Abitibi River upstream of Otter Rapids GS. The New Post Creek Project would take advantage of a portion of this diverted flow descending approximately 66 m between New Post Creek and the Abitibi River, all within TTN Traditional Territory to generate approximately 25 MW of electricity. At full capacity this will meet the needs of approximately 25,000 homes in Ontario.

The proposed New Post Creek Project is subject to the “Class Environmental Assessment for Waterpower Projects” (OWA, 2012) under the Ontario *Environmental Assessment Act*. This Socio-Economics and Land Use Technical Support Document (TSD) was prepared as part of this Class Environmental Assessment process.

This TSD assesses the potential social and economic effects of the proposed Project, as well as effects on local land use and resource policy.

The proposed Project is expected to result in the creation of 150 to 200 person years of work over an approximately two year construction period. This employment will be distributed across a wide variety of professions and trades typically associated with a remote heavy construction project. Recent OPG experience on the Lower Mattagami Re-Development Project (Lower Mattagami Project) indicates that approximately 60% of the total labour requirement for the on-site work would be met by the labour market in northern Ontario. It is likely that many of the workers currently working on the Lower Mattagami Project from northeastern Ontario communities could be employed on the proposed Project as they are qualified, local and have direct relevant experience.

Economic and business activity effects are associated with sub-contracting opportunities to the Design Build Contractor. It also includes the indirect and induced economic effects associated with the proposed Project on existing local businesses and the regional economy. These

opportunities will develop via contracting work, as well as local project purchasing and expenditures by workers in the local and regional economy.

The proposed New Post Creek Project provides some unique opportunities for economic and social development of TTN and its members. TTN's equity share in the proposed Project will provide a steady flow of revenue to use as a source on which to build future development within TTN Traditional Territory.

The proposed Project will also have a positive economic benefit for TTN through partnership/ownership, employment and contracting opportunities. Employment and contracting opportunities will also be available for other First Nation and Métis communities.

The proposed Project is consistent with the existing Crown Land Use Direction for the area but required the deregulation of a small area of Little Abitibi Provincial Park. However, regulated Replacement Lands, identified by TTN, Ontario Ministry of Natural Resources and Ontario Parks, will result in an overall increase in Park area and improvement in ecological integrity.

Two traplines utilized by TTN members will be affected by the proposed Project, with the intake, penstocks, powerhouse, a portion of the headpond and most of the transmission line located in one trapline, whereas a portion of the headpond and the Replacement Lands are located within the other trapline. A third trapline utilized by a Moose Cree First Nation citizen also overlaps the proposed transmission line. Discussions with the three Trappers are ongoing with respect to mitigation.

For the most part the proposed Project will have minimal effect on other land and resource uses with the exception of two small outfitting businesses which occasionally visit the New Post Creek waterfalls with clients. Minimum flows of 7.5 and 5 m³/s in New Post Creek have been proposed for July/August and September, respectively, that will be less than that current flows (mean summer flow of ~34 m³/s). Reduction of flows over the waterfalls may possibly diminish visitor experience appreciation value, particularly with respect to mist generation. However, this reduction would result in flows more typical of natural conditions as recalled by TTN Elders prior to the diversion of the Little Abitibi River (estimated mean historic summer flow of 3.6 m³/s). As described by Bell (1904), "an interesting fall is that on the Blue Water river or New Post brook just behind New Post. At this point, the small stream enters the Abitibi with an almost vertical fall of ninety feet, flowing directly over the edge of the plateau in a veritable hanging valley." It is anticipated that the minimum flows of 7.5 and 5 m³/s over the New Post Creek waterfalls will continue to generate appreciable mist and provide a rewarding experience for visitors. Maintaining the current summer flows would make this proposed Project not viable and therefore should the Project not be constructed, the positive benefits noted above, including those potentially accruing to TTN and the local, regional and provincial economy would not materialize.

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1.0 INTRODUCTION

In April 2006, a Memorandum of Understanding (MoU) was signed between Ontario Power Generation Inc. (OPG) and the Taykwa Tagamou Nation (TTN) to jointly explore hydroelectric development opportunities within the Abitibi River drainage basin, north of Highway 11. As a result of this initiative, a potential waterpower generation location was identified on New Post Creek, a tributary of the Abitibi River.

In 1963, Ontario Hydro constructed the New Post Creek Diversion Dam on the Little Abitibi River in order to supply additional generating capacity at its Otter Rapids Generating Station (GS). The Otter Rapids GS is now owned and operated by OPG under the authority of a Water Power Lease. The dam allows flows to be diverted from the Little Abitibi River along the constructed New Post Creek Diversion Channel and New Post Creek to the Abitibi River upstream of Otter Rapids GS. With a drainage area increase of approximately 9.5 times (from 319 to 3,025 km²), mean flow in New Post Creek has increased from approximately 4.4 to 42 m³/s (based on 1975-2012 data), with a 1:100 year flood event flow of 296 m³/s. The New Post Creek Hydroelectric Project (New Post Creek Project or Project), proposed by OPG with its partner Coral Rapids Power Inc. (CRP), a corporation wholly owned by the TTN, would take advantage of a portion of this diverted flow descending approximately 66 m between New Post Creek and the Abitibi River, all within TTN Traditional Territory, to generate approximately 25 MW of electricity, or about 125 GWh annually.

The proposed New Post Creek Project was identified by the Ontario Ministry of Energy (2010) as being under consideration as a clean, renewable, cost-effective hydroelectric generation project in “Ontario’s Long-Term Energy Plan”.

The proposed New Post Creek Project provides some unique opportunities for economic and social development for TTN and its members. TTN’s equity share in the proposed Project will provide a steady flow of revenue to use as a source on which to build future development within TTN Traditional Territory. There will also be opportunities for employment during the Construction Phase of the proposed Project.

The utilization of water resources and the establishment of a GS in an area already manipulated by human influence represent a preferred option over a project proposed on an unaffected watercourse.

The proposed Project is located in the District of Cochrane within the Geographic Township of Pinard, approximately 75 km north of the Town of Smooth Rock Falls and 13 km northeast of Abitibi Canyon GS (Figure 1.1). The proposed New Post Creek Hydroelectric GS tailrace would be located on Abitibi River shore lands with the intake at New Post Creek approximately 3 km southwest of its outlet to the Abitibi River (Figure 1.2). The actual creek channel length between its outlet and the proposed intake location is approximately 5.7 km.

Figure 1.1 Proposed Project Location

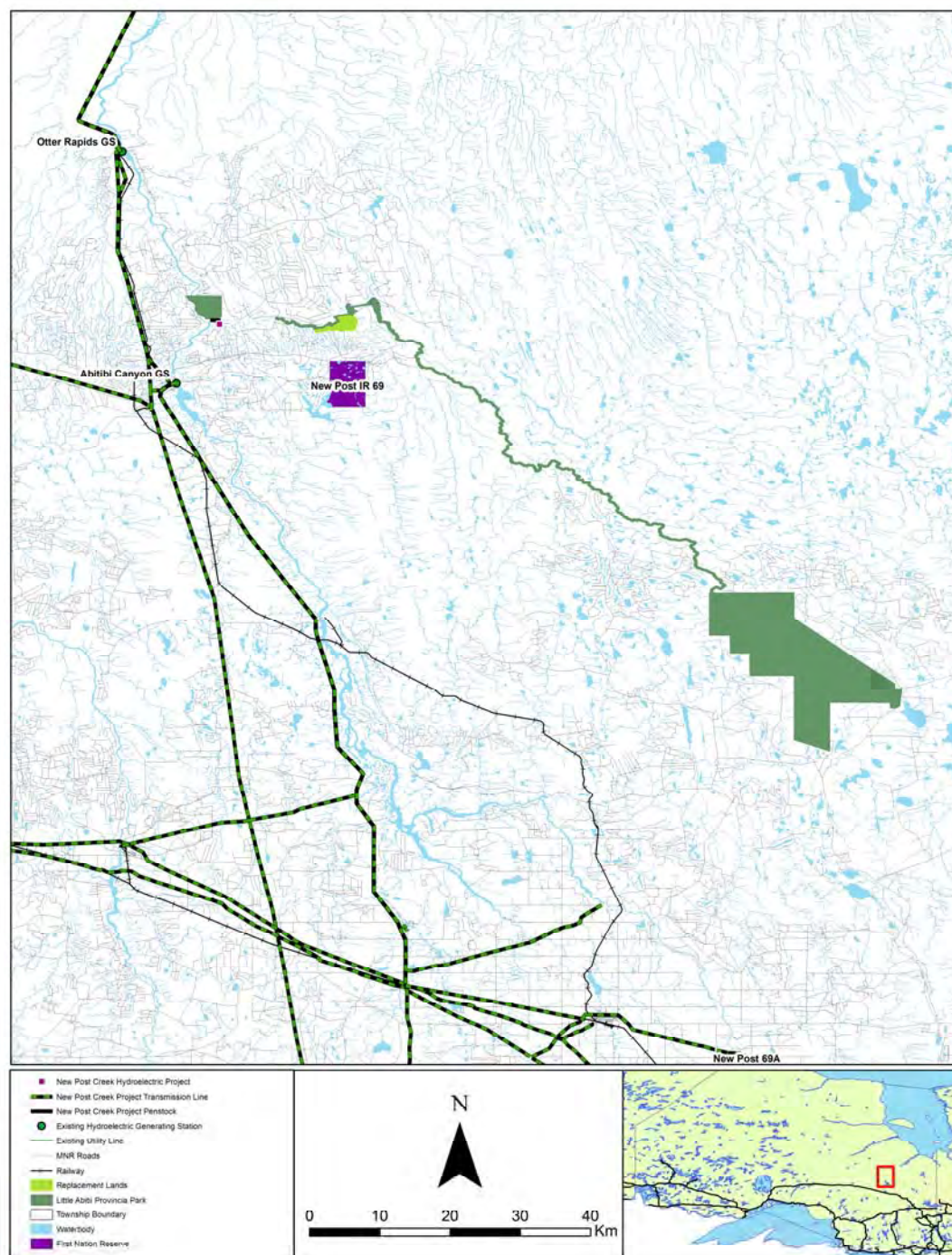
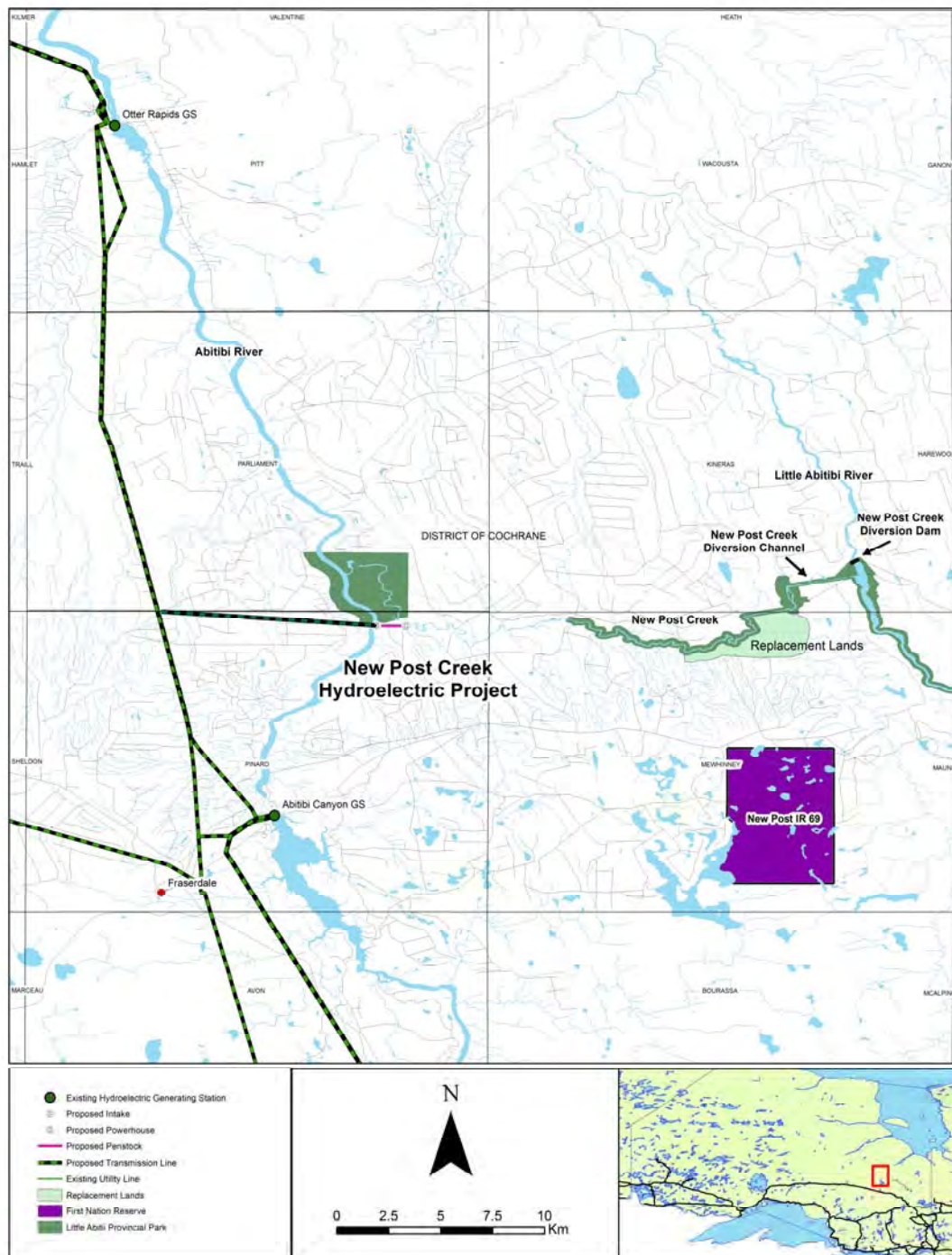


Figure 1.2 Proposed Project Site Location



This Technical Support Document (TSD) addresses the socio-economic environment affected by the construction and operation of the proposed New Post Creek Project. It provides a description of the proposed Project, the affected socio-economic environment, and the effects that may result from the proposed Project, along with proposed mitigation. Other TSDs address the aquatic environment, terrestrial environment, cultural heritage, First Nations and Métis interests and consultation, and public/agency consultation.

This report was prepared by SENES Consultants as a TSD to the Environmental Report (ER) according to the requirements of the Ontario Waterpower Association (OWA, 2012) Class Environmental Assessment for Waterpower Projects (OWA Class EA) under the Ontario *Environmental Assessment Act (EA Act)*. The ER provides a description of the proposed Project, summarizes the overall baseline environmental setting and anticipated environmental effects, recommends appropriate mitigation measures to minimize or obviate these effects, and describes agency, public, and First Nation and Métis consultation.

This Socio-Economics and Land Use TSD is organized into four main sections:

- Chapter 1.0 **Introduction** – this section;
- Chapter 2.0 **Regulatory Framework, Project Description and Project Activities** – outlines the Environmental Assessment (EA) process and describes the proposed Project in detail;
- Chapter 3.0 **Baseline Socio-Economic Conditions** – describes the baseline socio-economic environment and land use conditions in the study areas; and
- Chapter 4.0 **Effects Assessment and Mitigation Measures** – details the assessment of socio-economic and land use effects, presents mitigation measures to minimize or obviate these effects and delineates the net effects.

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

2.0 REGULATORY FRAMEWORK, PROJECT DESCRIPTION AND PROJECT ACTIVITIES

2.1 REGULATORY FRAMEWORK

In Ontario, proposed waterpower facilities are subject to the *EA Act*. The OWA (2012) developed the OWA Class EA process which was approved by the Ontario Minister of the Environment and the Lieutenant Governor in Council in 2008. The *EA Act* formally recognizes the OWA Class EA process which outlines the requirements for EA approval.

Under the OWA Class EA, the proposed New Post Creek Project is classified as a “New Project on Managed River System”. Provided the requirements of the OWA Class EA planning process are met and a Part II Order request for a “bump-up” to an Individual EA is not made (or denied), a project is considered approved under the *EA Act*.

This Socio-Economics and Land Use TSD for the proposed Project ER was prepared as part of this OWA Class EA process.

Prior to July 2012, projects like the proposed New Post Creek Project that were subject to the Ontario *EA Act* may also have been subject to the federal EA process under the *Canadian Environmental Assessment Act (CEAA)* if they required federal funding, were located on federal lands and/or required any federal authorization, permit or approval (“triggers” of the federal EA process) enabling the project to be carried out in whole or in part. A “Project Description for Federal Agency Review – New Post Creek Hydroelectric Project” (SENES, 2011) was submitted to the Canadian Environmental Assessment Agency in July 2011 for determination of the applicability of the federal EA process. 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 *Canadian Environmental Assessment Act, 2012 (CEAA 2012)* came into force. The permit as “trigger”-based approach under *CEAA* has been replaced with a project list approach set out in regulation. As the proposed New Post Creek Project has not been listed under *CEAA 2012*, a federal EA is not required. All other applicable federal legislative, regulatory and constitutional requirements must still be fulfilled.

The generation of electricity is not permitted within a Provincial Park as stipulated by the *Provincial Parks and Conservation Reserves Act (PPCRA)*. Since part of the proposed New Post Creek Project was located within Little Abitibi Provincial Park (LAPP), a deregulation of a small area of the specific Project site from LAPP accompanied by a concurrent regulation of suitable “Replacement Lands” was proposed and accepted in accordance with section 9(5)(c) of the *PPCRA*, and the agreed to Ontario Ministry of Natural Resources (MNR) processes for the deregulation. Section 9(5)(c) of the *PPCRA* enables the Lieutenant Governor in Council to dispose of an area in a provincial park that is 50 ha or more if the disposition is being made as part of a transaction that increases the size of the provincial park and enhances ecological integrity. MNR and TTN participated in the identification of Replacement Lands that compensated for the removal of the small portion of land related to the proposed Project. OPG,

CRP and TTN had been working with MNR and Ontario Parks since 2006 to (i) discuss mechanisms for allowing the hydroelectric facility to be built on lands currently within LAPP, and (ii) discuss the required site release process since the existing MNR Site Release Process does not allow for this. OPG, CRP and TTN came to an agreement with MNR and Ontario Parks for a coordinated process to deregulate a small portion out of LAPP and regulate the proposed Replacement Lands into LAPP. This required that the OWA Class EA for the proposed New Post Creek Project be coordinated with the MNR (2005) "Class Environmental Assessment for Provincial Parks and Conservation Reserves" (MNR Class EA). Figure 2.1 shows the location of the Replacement Lands.

Through consultations between MNR, Ontario Parks and the TTN Community, an approximately 440 ha area, immediately south of LAPP in the vicinity of the New Post Creek Diversion Dam, was proposed as the Replacement Lands (Figure 2.1). The transaction was consistent with the provisions of the *PPCRA* that would allow for the deregulation of land to facilitate the proposed New Post Creek Project. The approximately 228 ha of land along New Post Creek within LAPP that was deregulated represents approximately 1.1% of the total LAPP area (20,296 ha). Basically, approximately 228 ha of land (including the creek bed and 120 m on either side of the high water mark) has been removed from LAPP and exchanged for an approximately 440 ha parcel of land referred to as the Replacement Lands. An Ecological Integrity Assessment was undertaken by Beacon (2010) which compared the land removed from LAPP and the Replacement Lands proposed by the TTN Community. Beacon (2010) concluded that the land exchange would increase the size of LAPP and enhance its ecological integrity. However, land deregulation resulted in the disjunction of LAPP as the waterway class portion is no longer a continuous system.

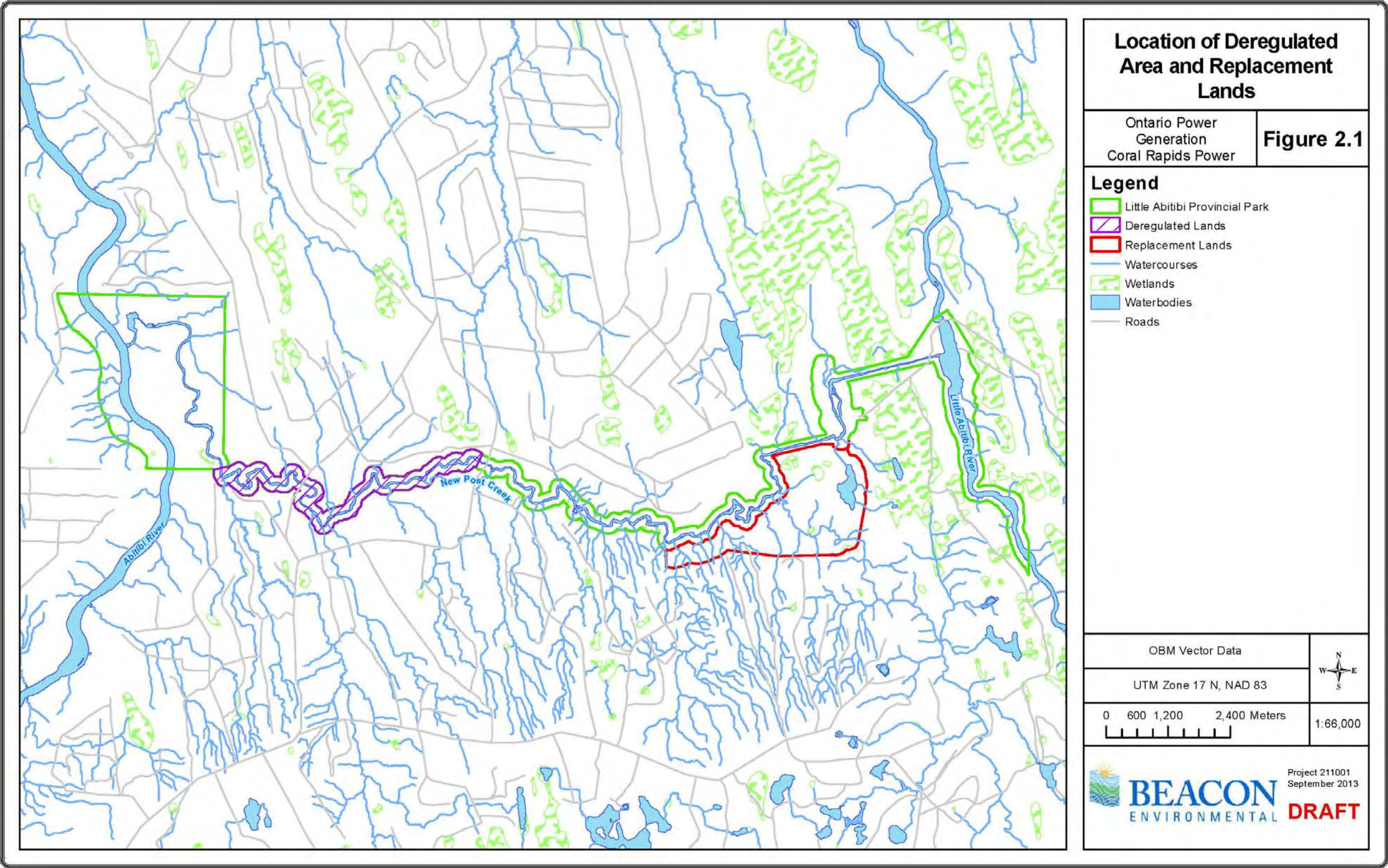
On November 21, 2011, MNR posted a policy proposal on the Environmental Registry for a major land use amendment to re-designate portions of LAPP and the adjacent Northern Resource and Commercial Recreation General Use Area to enable a boundary regulation change. Provincial, regional and local stakeholders were notified by mail of this policy proposal. No comments were received during this involvement opportunity. The land use amendment was approved on April 13th, 2013 and a decision has been posted on the Environmental Registry to reconfigure the park boundary that will increase the overall size and enhance ecological integrity of the park. The MNR boundary amendment process is proceeding internally with an expected date for regulation early in 2014.

2.2 PROJECT DESCRIPTION

2.2.1 Alternatives Analysis

In 1982, Ontario Hydro carried out an assessment of the hydroelectric potential of the diverted flows on New Post Creek. The study focussed on two sections of the creek below the diversion dam, one of which was similar to that presently proposed.

Figure 2.1 Location of Deregulated Area and Replacement Lands



In 1996, Ontario Hydro revisited the site and conducted another review. This study used a head of 68 m, with a plant capacity of 26.4 MW and annual energy production of 175.8 GWh. The location is believed to have been near the New Post Creek waterfalls, located approximately 4.5 km downstream of the proposed Project intake weir location and 1.2 km upstream of the creek outlet to the Abitibi River, but few supporting details are currently available.

In 2006, following the signing of the MoU between OPG and TTN to jointly explore hydroelectric development opportunities within the Abitibi River drainage basin, a concept study was performed for four potential hydroelectric development options (alternatives) on New Post Creek near the waterfalls and within LAPP (KGS Group, 2006). The previous studies maximized the available head by going to local topographic maximums using dykes up to 8 m in height, altering a portion ($<1 \text{ km}^2$) of the watershed and shoreline. The 2006 concept study reduced the proposed forebay elevation to minimize flooding of the existing creek shoreline and the flooded shore area within LAPP, thereby also reducing potential impacts on those portions of the creek with erodible silt and sand banks. The locations of the four alternatives assessed by KGS Group (2006) are presented in Figure 2.2.

A summary description for each alternative is provided below:

- **Alternative 1:** Most of this option is located south of LAPP with only the intake and a small section of penstock located in the Park. The in-stream spillway and intake are located at a bedrock outcrop extending across the creek approximately 4.4 km upstream from the waterfalls.
- **Alternative 2:** Farther north of Alternative 1, Alternative 2 is entirely within LAPP. Compared to Alternatives 3 and 4, a smaller area of the Park would require deregulation. The spillway and intake for Alternative 2 are conceptually identical to Alternative 1. However, there is no exposed bedrock and the presence of an old river meander and oxbow indicates the bank and channel are erodible at this location.
- **Alternative 3:** This option required a smaller length of penstock; however, its location in the middle of LAPP and its proximity to the culturally significant Hudson's Bay Company (HBC) New Post site made it unattractive. The spillway and intake for Alternative 3 are conceptually identical to Alternative 1 and would be located on exposed bedrock.
- **Alternative 4:** This option is located at the northernmost section of the Park, adjacent to the New Post Creek waterfalls. This option had the smallest footprint, but was eliminated due to adverse impact to waterfalls aesthetics. In addition, this option would have required the deregulation of the largest area of LAPP. The spillway and intake for Alternative 4 are conceptually similar to that of Alternative 1.

Figure 2.2 Alternative Hydroelectric Development Locations on New Post Creek



The gross head available for each alternative decreases as one proceeds north along New Post Creek, with the riverbed at Alternative 1 being +59 m above the Abitibi River, while the riverbed at Alternative 4 is in the order of 53 m above the Abitibi River. Based on the technical and environmental data collected and presented in the KGS Group (2006) concept study, preliminary ranking indicated that constructing a project at or just south of the Park (Alternative 1) was the preferred development alternative, with a transmission line built to the west of the proposed powerhouse to connect with the Otter Rapids GS to Abitibi Canyon GS transmission line.

In 2009, a study was performed to update and refine the technical feasibility of the Alternative 1 option based on updated topography and surveys, field exploration and reconnaissance of the proposed site, updated project costs, and updated energy production estimates (KGS Group, 2010). On the basis of the 2009 geotechnical investigation (KGS Group, 2013a, b), as well as the feasibility update and review, the project layout was revised and updated. It confirmed that the hydroelectric development potential of New Post Creek at the preferred alternative location (the current proposed New Post Creek Project) appears technically and economically feasible. In addition to technical benefits, this preferred option (Alternative 1) required the least amount of footprint to be located in LAPP, therefore having the least impact on the Park when compared to the other alternatives.

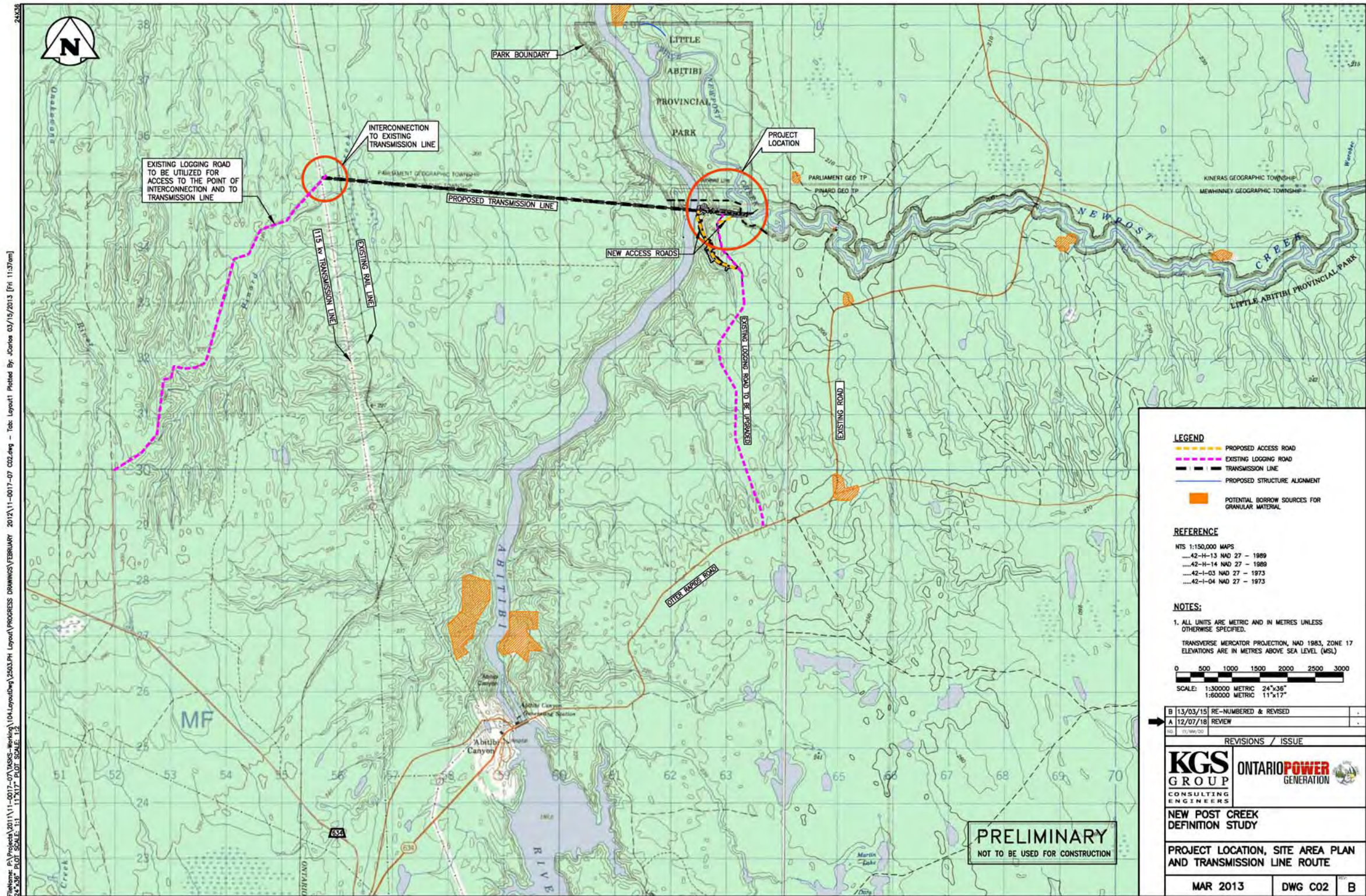
2.2.2 Preferred Alternative

As indicated in Section 2.2.1, Alternative 1 is the preferred alternative. The proposed New Post Creek Project is a 25 MW facility utilizing historic flows diverted from the Little Abitibi River into New Post Creek by the New Post Creek Diversion Dam constructed in 1963 to augment hydroelectric generation at Otter Rapids GS, as well as the natural inflow originating within the New Post Creek catchment area. A small portion of the proposed Project was located within LAPP; however, with subsequent land deregulation and incorporation of the Replacement Lands, all of the proposed Project is located outside of LAPP (see Section 2.1) with the remainder near the southern boundary of the Park. A transmission line approximately 7 km long will be constructed to the west of the proposed powerhouse to connect to the existing Hydro One Networks Inc. (Hydro One) 115 kV transmission line extending from Otter Rapids GS to Abitibi Canyon GS. The proposed transmission line is also located outside of LAPP.

2.2.3 Proposed General Layout

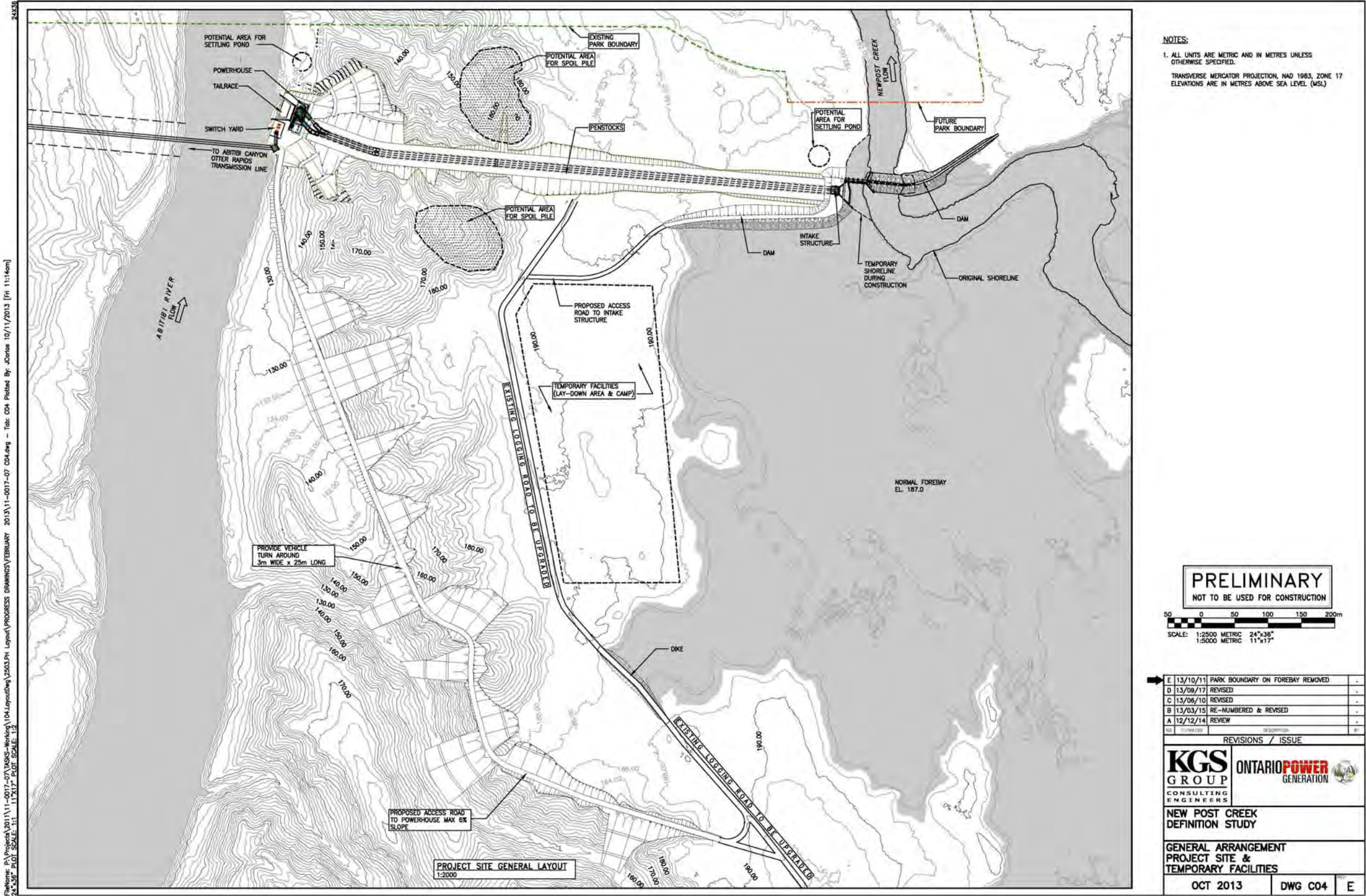
The location of and general arrangement for the proposed Project are shown in Figures 2.3 and 2.4, respectively. However, it should be noted that the final layout of the proposed Project would be selected by the successful Design Build Contractor (DBC), who is chosen based on a competitive bidding process.

Figure 2.3 Project Location, Site Area Plan and Transmission Line Route¹



¹ It should be noted that Figure 2.3 shows the previous LAPP boundary prior to land deregulation and replacement (see Section 2.1).

Figure 2.4 General Arrangement Project Site and Temporary Facilities



The layout will consist of the following primary Project components/structures:

- intake headworks, spillway structures and earth embankments;
- water conveyance system that includes two shallow buried penstocks and potentially a portion of open water canal;
- powerhouse structures equipped with two Francis turbine units;
- tailrace between the powerhouse and the Abitibi River;
- cofferdams at the intake and tailrace during construction;
- substation adjacent to the powerhouse;
- transmission line; and
- interconnection switchyard.

The proposed Project general arrangement, i.e., from the intake structure to the powerhouse, and penstock profile are presented in Figure 2.5.

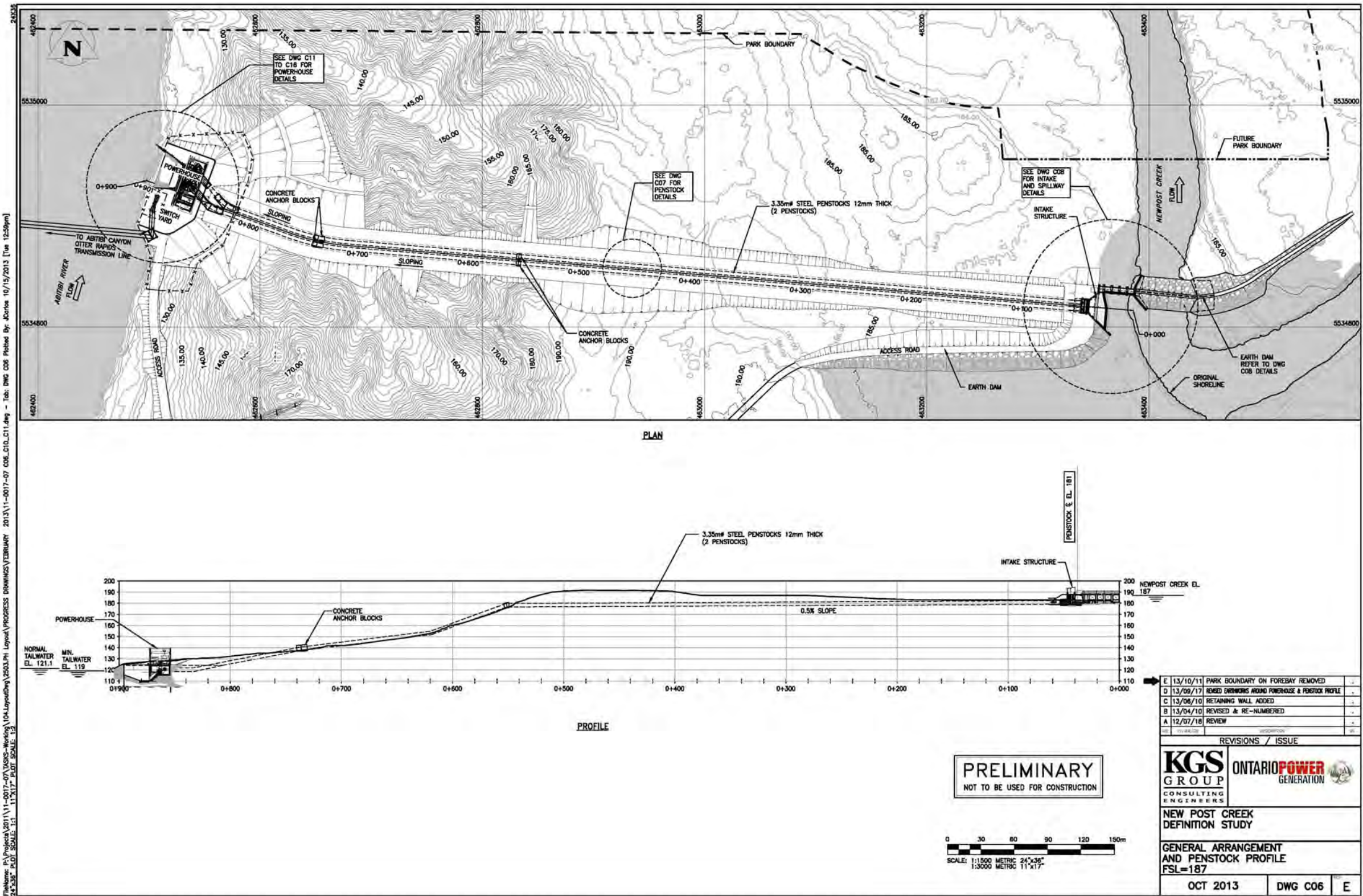
From the intake the flow will be carried by underground penstocks, or with a combination of a power canal and underground penstocks, and discharged through the powerhouse located on the east side of the Abitibi River. The anticipated powerhouse location is approximately 850 m west of the intake and just south of the Park boundary. Over 80% of the penstocks length (and potential power canal), the powerhouse and tailrace will be founded on sands, gravels and till, with bedrock located +15 m below the powerhouse draft tubes and tailrace.

Flow that is not utilized for power production will be discharged over the proposed spillway, taking into account prescribed minimum flow commitments downstream (see Section 2.3.2.2 and Aquatic Environment TSD for a full discussion), particularly at the base of the waterfalls. The proposed Project would utilize the flows and the head drop of approximately 66 m between the forebay elevation upstream of the spillway and the Abitibi River to generate sustainable power in the order of 125 GWh annually.

As presented in Figure 2.3, there are existing access roads south and east of the site that would be upgraded and extended (approximately 2,500 m) to the powerhouse and intake site. The access road to the intake will also serve as a water retaining dyke under high flood flow conditions.

As shown on Figure 2.4, the site will require some areas to be used for construction purposes. This includes settling ponds in the vicinity of the proposed powerhouse and intake for the dewatering of the excavations, an area to be used for lay down, trailers, equipment maintenance and possibly the batch plant, space to accumulate the extra excavated material, and new and upgraded access roads.

Figure 2.5 General Arrangement and Penstock Profile



Intake and Spillway Structures

The proposed intake and spillway structures are located approximately 4.5 km upstream of the New Post Creek waterfalls near a bedrock (granitic gneiss) outcrop that extends across New Post Creek (Photograph 2.1). Due to its competence and good quality, the bedrock will provide an excellent foundation for the intake and spillway, with no settlement concerns.

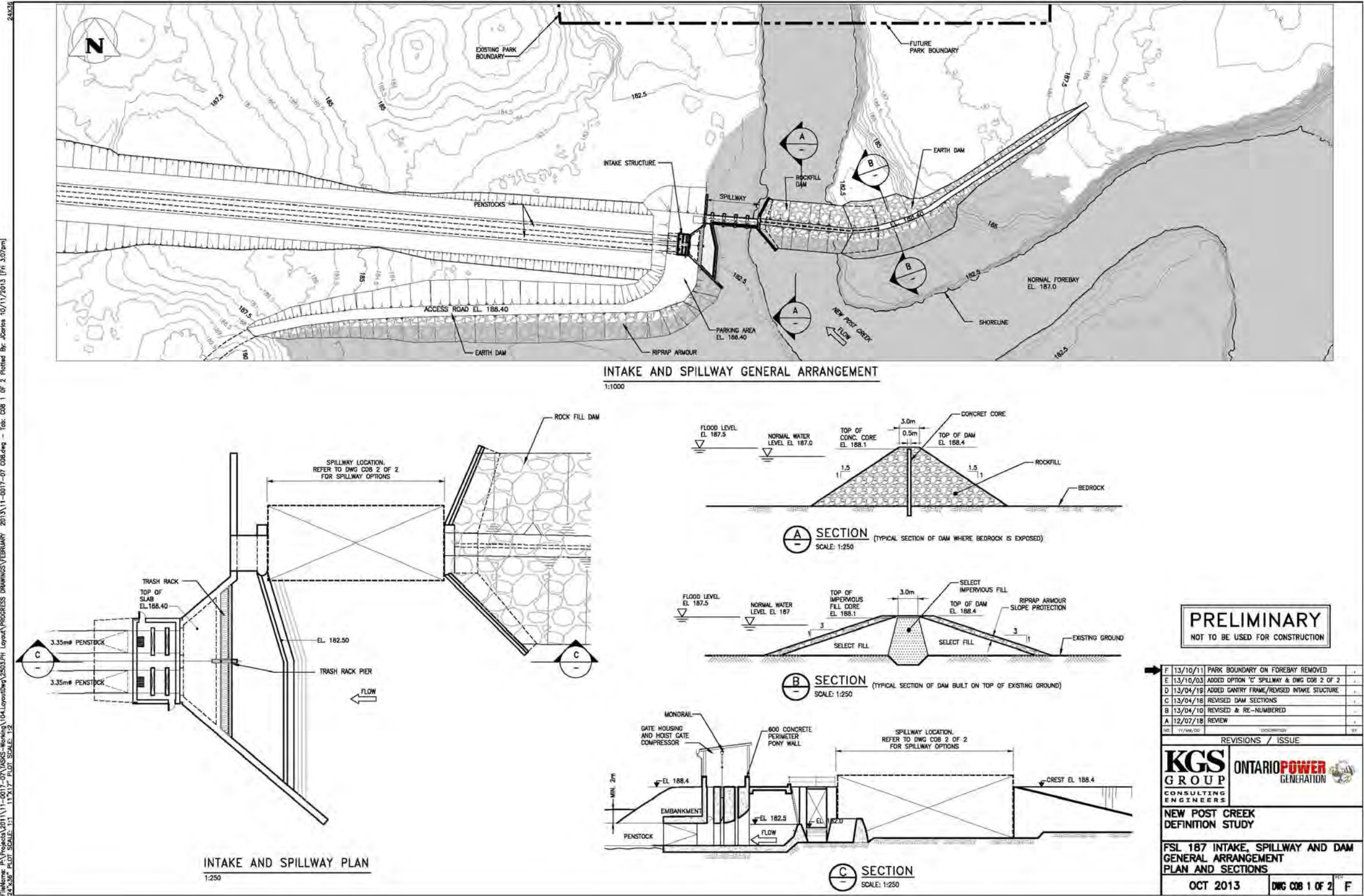
The proposed intake and spillway structures are separate but immediately adjacent to each other. The general arrangement of the spillway and intake structures is presented in Figure 2.6. The intent of the spillway and intake layout selected is to minimize inundation upstream while still ensuring flow withdrawals during all flow periods.

Photograph 2.1 Bedrock Outcrop



The spillway structure consists of gates to maintain minimum flow requirements, gates or devices to manage high flow periods and maintain forebay levels and possibly an additional gate to provide means to evacuate sediment accumulation. The final choice of the type of equipment used will be determined by the DBC but the current concepts consist of either a series of stop logs (see Figure 2.6) or of an in-stream low (3.7 m high) steel crest gate section and an uncontrolled (fixed) concrete weir. The steel crest gate would be an Obermeyer type, which is operated by a pneumatic bladder. The combination of a gated or rubber dam section with a fixed concrete weir results in minimal incremental inundation upstream.

Figure 2.6 Intake, Spillway and Dam General Arrangements



Control of the forebay water level is somewhat different when different types of spillways are considered. In the case of inflatable weirs (Obermeyer style equipment) the forebay water level is maintained automatically by the station controller by establishing a defined water level setpoint. The operator does have access to override the automatic control if necessary from a remote location. The water level is controlled by instrumentation which monitors the elevation of the weir crest and forebay water levels with the relative difference maintained by the operator by adjusting the inflation of the bladders. This difference controls the flows over the spillway to maintain the forebay level.

In case of stop logs the forebay level is maintained by the manual addition and removal of stop logs as required. In this approach the water levels are monitored remotely by the operator and instructions are issued when flows change sufficiently to warrant an adjustment in order to remain within the operating range of the forebay.

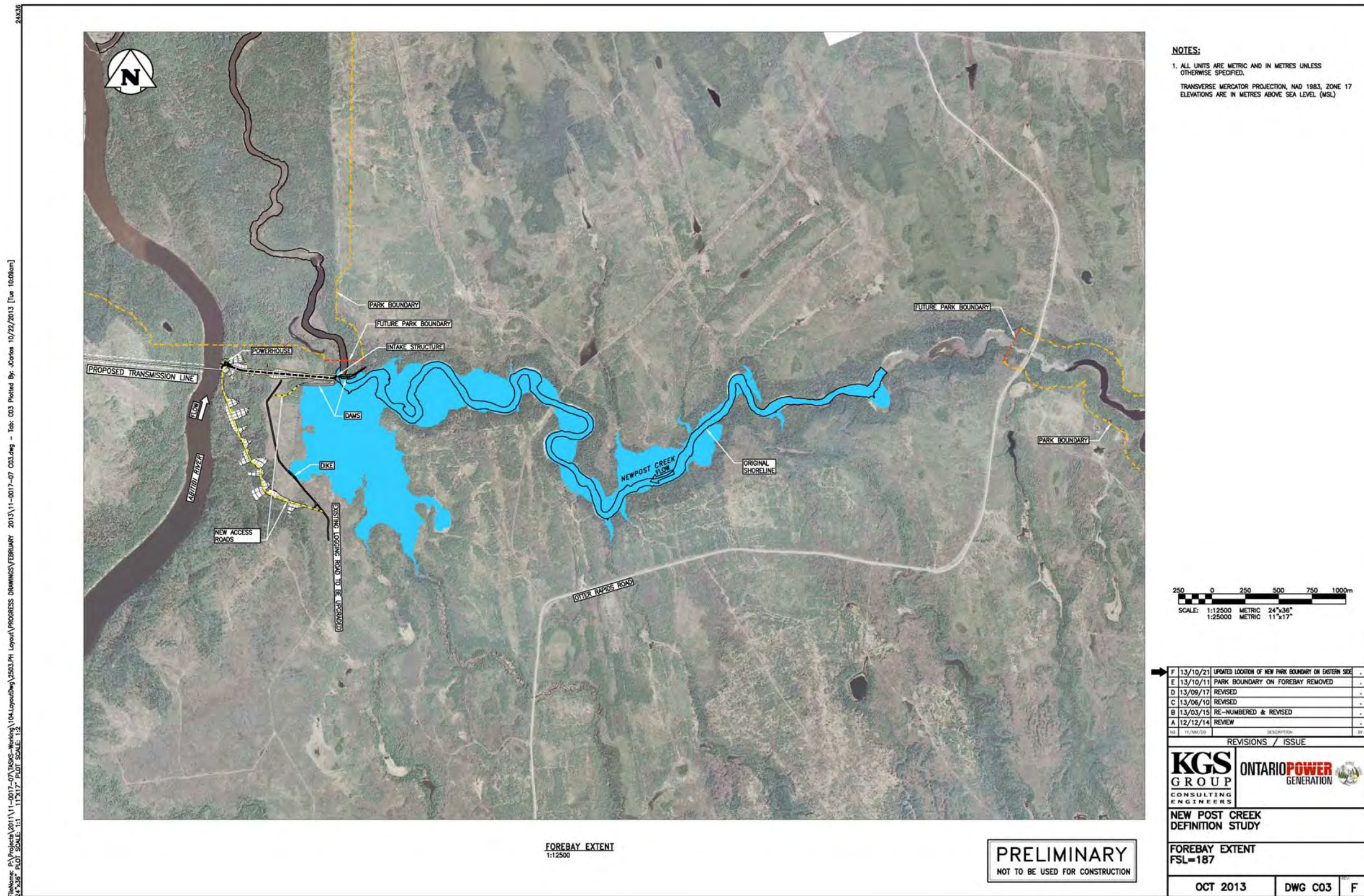
Normal operation of the proposed Project will increase the water level in New Post Creek by 5 m at the intake to a Full Supply Level (FSL) of 187.00 metres above sea level (m.a.s.l.), resulting in a total inundated area of approximately 170 ha (KGS Group, 2012). The upstream extent of the inundated area (approximately 7,166 m from the proposed intake weir location) is limited by the rather steep gradient at the rapids (see Figure 2.7). Under normal operating conditions, the inundated area will occur within the deregulated park area of approximately 228 ha upstream of the proposed Project spillway (Figure 2.1). Most of the flooding outside of the deregulated park area within Crown lands will encompass the unnamed tributary (MNR ID# 523) that discharges to New Post Creek approximately 150 m upstream of the proposed Project intake location (Figure 2.7).

Considering the planned dimensions of the spillway the 1:100 year flood levels would be expected to rise by 0.5 m to 187.50 m.a.s.l. The corresponding discharge to the 1:100 year event is 296 m³/s.

A low head earth dam will be constructed on the eastern shore adjacent to the fixed concrete weir to contain flow within the creek channel. The access road and parking areas at the intake and at a location approximately 800 m south of the penstock will also serve as water-retaining dykes under high flow flood conditions. The western edge of the excavation downstream of the spillway will be in rock and not susceptible to erosion. Grouting of the bedrock may be required in areas where the tie-ins for the proposed low head earth dams and spillway structures are on bedrock to minimize the potential of groundwater seepage through the abutments.

The proposed spillway structure will include a gravel trap and a sluice consisting of either a set of stop logs or an Obermeyer style crest gate. In addition, another gate may be required as a sediment sluice and outlet for continued minimum flow requirements downstream to the waterfalls (see Section 1.3.2.2).

Figure 2.7 Forebay Extent for FSL = 187 m.a.s.l.



The intake structure to the two shallow buried penstocks will be protected by trash racks and set to submerge the intake to the penstocks to minimize potential vortex problems. A sediment trap and a low level sluice gate may be included in the design to reduce the potential for suspended sediment and bedload entrainment in the diverted flow to the powerhouse. The sluice gate will allow for flushing of any sediment deposits at the intake during high flows downstream into the existing creek channel with appropriate permits and approvals.

The operation of the sediment gate will consist of opening the gate, likely manually. The actual need to clear the sediment trap would be with a frequency in the order of years if not decades. However, CRP/OPG has considered this issue and is suggesting that a yearly flushing occur during near the start of the freshet. A yearly flushing would reduce the effect of a larger less frequent (e.g., every 10 years) flushing event and may also help in providing sediment bank stabilization for the by-pass reach that otherwise may be starved of sediment.

Water Conveyance System

The proposed water conveyance system includes two buried penstocks with the potential of a portion of open water canal. The two side by side buried steel penstocks, each 3.35 m in diameter, would extend approximately 820 m from the intake structure to the powerhouse. The twin penstock will extend from the intake area sloping very gently for about 650 m with minimal submergence below the forebay level and then drop approximately 61 m over 290 m down to the powerhouse at the Abitibi River shore. A head drop of just over 66 m occurs from the intake on New Post Creek to the Abitibi River. Figure 2.8 shows the penstock profile.

Due to shallow overburden, the penstock would be founded on competent bedrock along its first 150 m length from the intake structure with the remaining portion constructed within overburden. As the overburden sands and silts are erosion prone, the penstock system will be provided with granular drainage layers and drains that can be monitored for leak detection.

The proposed penstocks may be equipped with manhole access along the route near the end of the shallow sloping section and above the steeper portion. Impressed current or sacrificial anode cathodic protection will be provided along the penstock.

Powerhouse Structures

The proposed powerhouse will have a concrete substructure for the turbine draft tubes, with potentially the two identical horizontal Francis turbine/generator sets (approximately 12.5 MW each) and all required ancillary equipment mounted on the powerhouse floor. Each turbine is expected to have Francis type runners with 13 blades operating at nominal speeds between 277 to 360 rpm depending on the final runner dimensions. The turbine units may be mounted near or below the normal tailwater level. The turbine shutoff valves will have gravity trip counterweights located within the powerhouse. The layout and details of the powerhouse facility are presented in Figure 2.9.

Figure 2.8 Penstock Profile

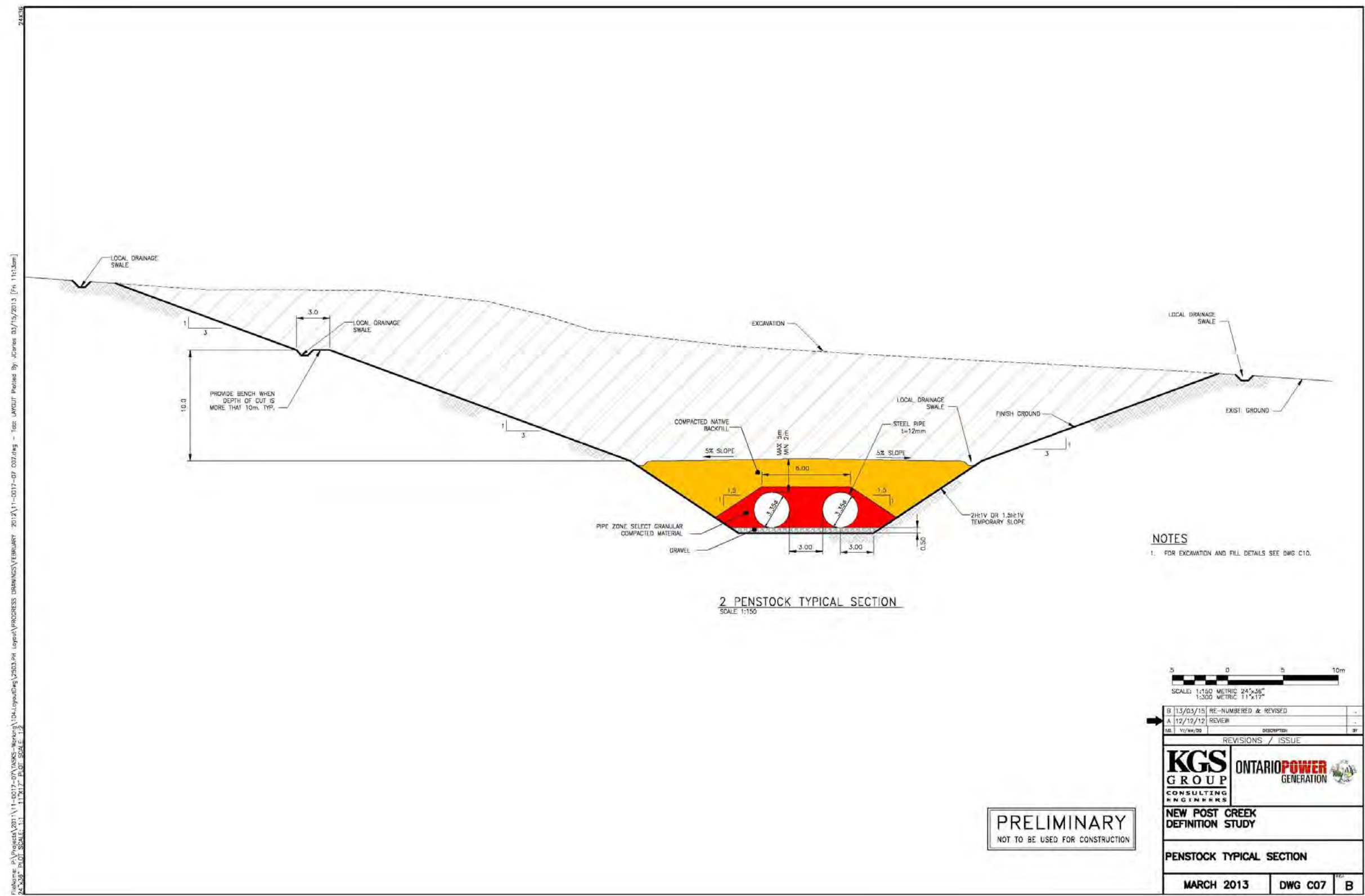
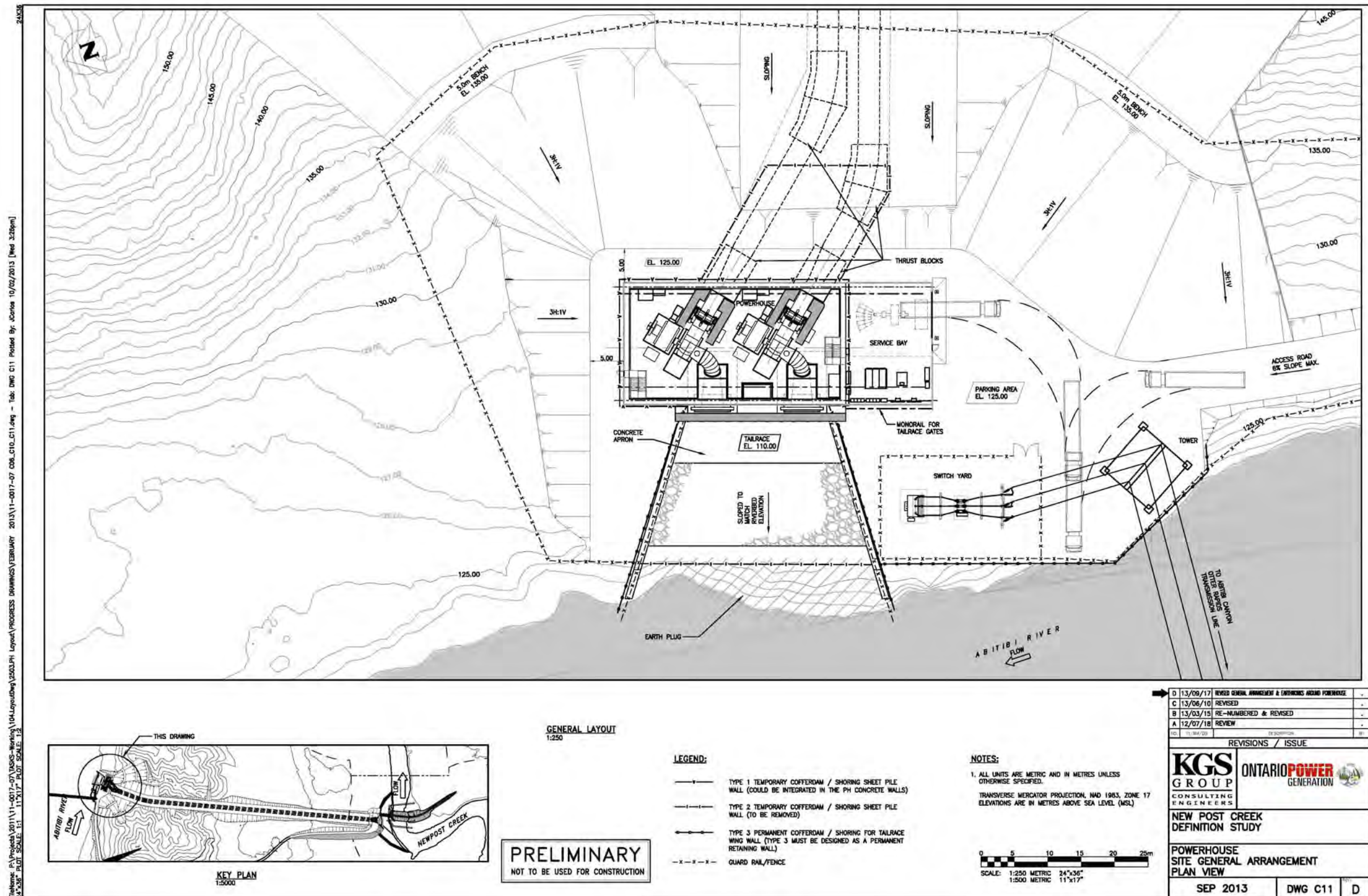


Figure 2.9 Powerhouse General Arrangement



The powerhouse foundation structure will be constructed on a dense sand deposit with sufficient load bearing capacity. The powerhouse and tailrace area will be excavated and founded on dense sands and gravels (Photograph 2.2), with bedrock located more than 15 m below the powerhouse draft tubes and tailrace. The surficial overburden material above the water table is relatively firm and can be excavated and temporarily sloped back at a 2H:1V slope angle, or 3H:1V for slope height higher than 10 m (KGS Group, 2013a). The firm sand deposit will be saturated below the water table reflecting the proximity to the Abitibi River. Therefore, it will be necessary to dewater the area prior to excavating below the water table. Temporary construction shoring will be required due to the depth of the required excavation and groundwater condition, and to minimize the footprint that would be disturbed. The sand deposit can be excavated using standard soil excavation equipment such as bucket excavators, bulldozers and similar equipment, in combination with an appropriate and effective dewatering procedure. A properly designed sheet pile wall, diaphragm wall and/or contiguous bored pile wall can be used to support and dewater the excavation. Groundwater depressurization/dewatering will be required for powerhouse foundation excavation below the river water level. In addition, long-term seepage control, if necessary, can be provided by the use of cut-off walls, low maintenance gravity drains and relief wells.

Photograph 2.2 View Along the Abitibi River Shoreline in the Vicinity of the Proposed Tailrace



Cofferdams

A series of cofferdams will be required during construction at both the intake/spillway structure and at the powerhouse tailrace.

The cofferdams will generally be low structures (1.5 to 2 m) and will be constructed utilizing several methods. The tailrace and powerhouse excavation is expected to be done behind a cofferdam consisting of an earth plug or a section of unexcavated shoreline with sheet piling to improve the water barrier given the existing soil conditions.

At the intake the cofferdams will also be low structures consisting of either rock plugs of unexcavated shoreline on the west side of the creek or rock fill berms that may include some membranes or grouting to improve imperviousness.

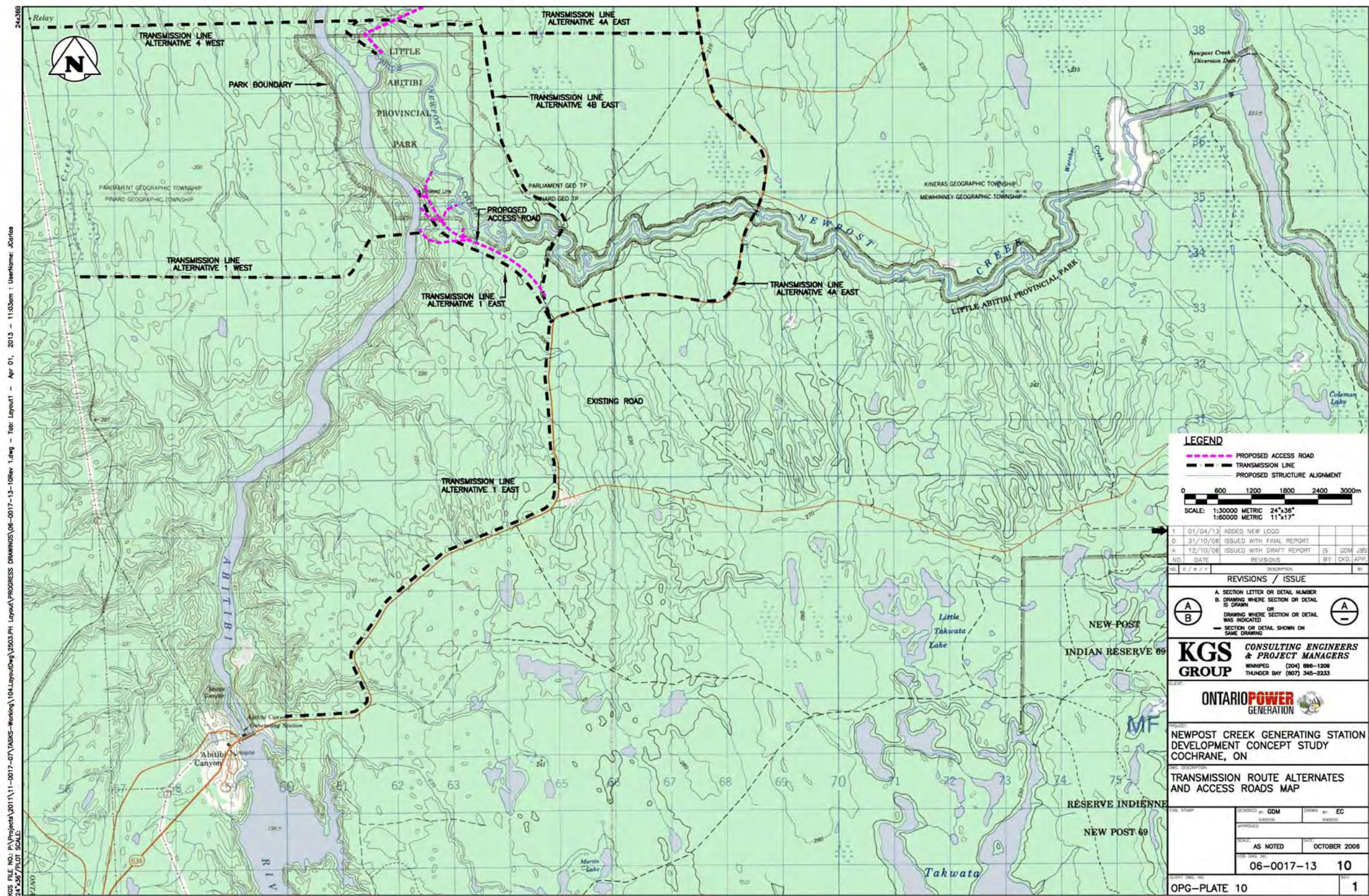
Transmission Line

A number of alternative transmission routes were assessed before selecting the preferred route (see Figure 2.10). The alternate routes shown correspond to the alternative powerhouse locations assessed in 2006 (see Section 2.2.1 and Figure 2.2). Both alternative “east” and “west” routes were considered. The “east” routes would follow access roads back to Abitibi Canyon GS, whereas the “west” routes would cross the Abitibi River and mainly recently harvested forest areas to the existing Hydro One 115 kV transmission line between Abitibi Canyon GS and Otter Rapids GS.

Once Alternative 1 had been selected for the powerhouse location (see Section 2.2.1), a “west” route was selected on the basis that it was the shortest route with fewer bends. The route of this alternative, designated as “Transmission Line Alternative 1 West” in Figure 2.10, was later modified to locate the point of interconnection with the existing Hydro One transmission line at an existing road (see Figure 2.11). The proposed transmission line right-of-way (ROW) is located outside of LAPP.

The proposed single-circuit 115 kV transmission line extending from the powerhouse switchyard directly west over a distance of approximately 7 km to the existing 115 kV Otter Rapids GS/Abitibi Canyon GS transmission line is the technically preferred connection option (see Figure 2.11). Based on available information, the preferred interconnection would involve a T-tap direct with protection provided by a circuit breaker at the new switchyard outside the powerhouse. Based on a System Impact Assessment (SIA) by the IESO (2010), the proposed connection to the existing 115 kV transmission line is acceptable conditional on a number of requirements that have been incorporated by KGS Group (2013c). Based on the Customer Impact Assessment, Hydro One (2010) concluded that the proposed New Post Creek Project can be incorporated with minor impact to Hydro One customers conditional on adherence to the requirements identified in the IESO (2010) SIA.

Figure 2.10 Alternative Transmission Line Routes¹



¹ It should be noted that Figure 2.10 shows the previous LAPP boundary prior to land deregulation and replacement (see Section 2.1).

Figure 2.11 Proposed Transmission Line Route



The proposed transmission line begins at the substation located adjacent to the powerhouse on the east bank of the Abitibi River (see Figure 2.12). The proposed transmission line will cross the Abitibi River and extend in a direct route to a point near the intersection of the existing Hydro One transmission line and access road. The western shoreline of the Abitibi River has a fairly rapid rise in elevation with few changes in elevation to the interconnection point. The proposed transmission line will cross over land that has been subject to previous forest harvesting, some wet areas and the Ontario Northland Railway (ONR) rail line.

The proposed transmission line will be constructed within a minimum 30.5 m (100 feet) wide ROW (KGS Group, 2013d). Any non-compatible trees outside of the 30.5 m ROW will also be removed to prevent their fall over the transmission line conductors. The remaining vegetation (compatible trees, shrubs, understory) will remain intact. The transmission line will consist of untreated wood (likely cedar) poles, aluminum conductor steel reinforced cables, polymer insulators, and optical ground wire, as well as guy-wire and anchors, as necessary. The aerial cable crossing of the Abitibi River is approximately 150 m wide.

Access for transmission line construction is provided by an existing road network between the interconnection point and the west bank of the Abitibi River (see Figure 2.11) considered to be adequate for construction equipment use.

A small switchyard is to be constructed at the point of interconnection which will require the construction of a small access area from the existing road (see Figure 2.12). No permanent roads will be constructed to or along the remainder of the proposed transmission line route. It is expected that the DBC selected for this work will execute the construction of the transmission line in the same manner as other such work in this region with the work likely being done in the winter to minimize the impact on the natural environment, particularly wet areas.

A fibre optic cable will be installed by trenching directly west from the point of interconnection switchyard (see Figure 2.12) to the Ontera-owned fibre optic communications trunk, located within the existing Hydro One transmission line ROW.

The selected DBC will be responsible to secure the necessary licences and permits including those for timber removal along the ROW, watercourse crossing installations and overhead crossing of the ONR rail line. Amendments to the *Navigable Waters Protection Act* under Bill C-38 has resulted in the exemption of construction of any works in, on, over, through or across of water bodies from the provisions of the new *Navigation Protection Act* with the exception of those listed in Schedule 2 of the new Act. The Abitibi River is not listed in Schedule 2.

Proposed New Post Creek Project Technical Summary

The technical details of the proposed New Post Creek Project are summarized in Tables 2.1 and 2.2.

Figure 2.12 Transmission Line Plan and Profile/Interconnection General Arrangement

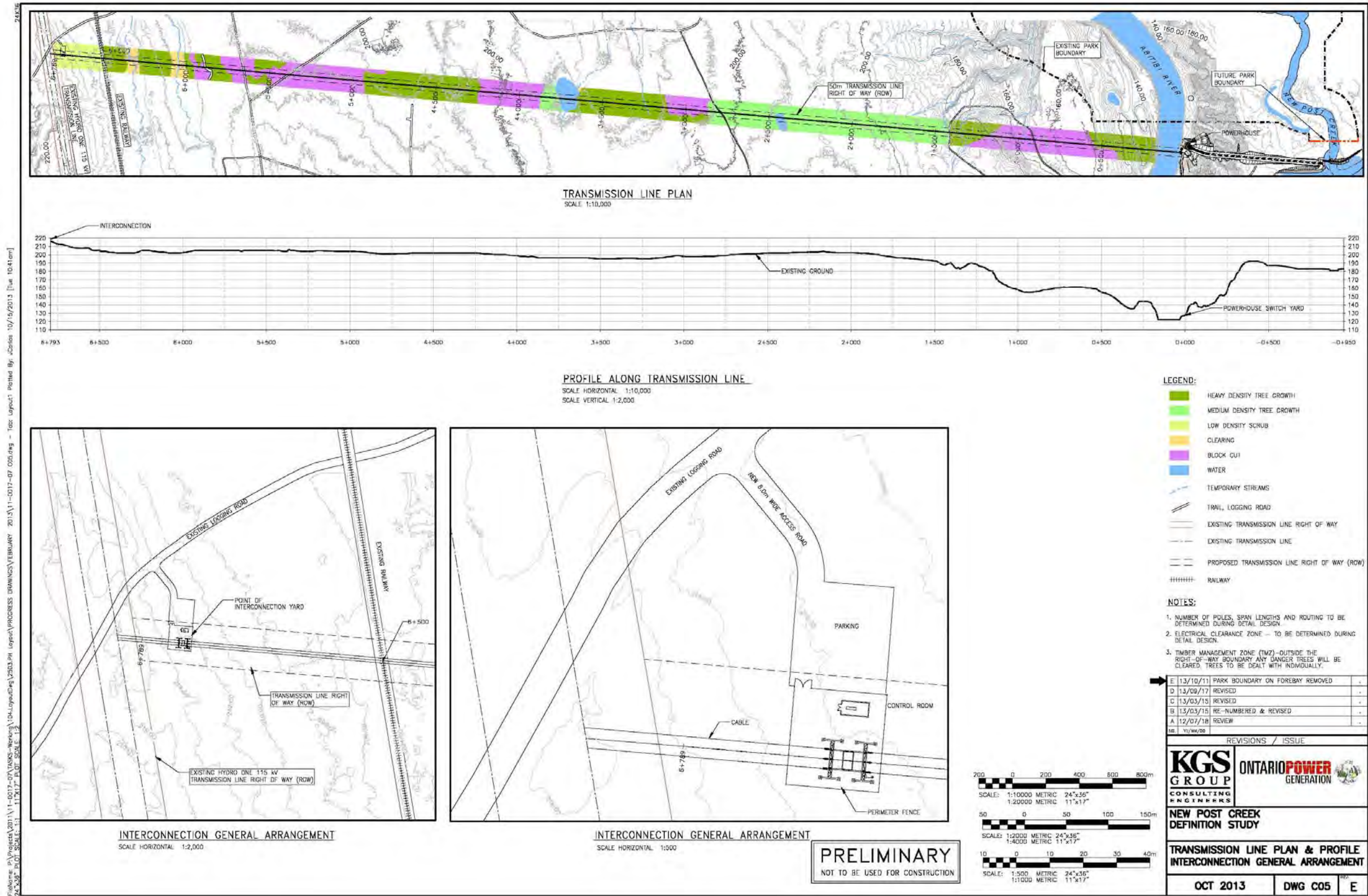


Table 2.1 Proposed New Post Creek Project Hydraulic Characteristics

Gross Head	66 m
Average Annual Flow	~42 m ³ /s (based on 1975-2012 data)
Rated Plant Flow	50 m ³ /s
Minimum Flow: ¹	
<i>May 1 to mid-June</i>	15 m ³ /s
<i>Mid-June to August 31</i>	7.5 m ³ /s
<i>September 1 to 30</i>	5 m ³ /s
<i>October 1 to April 30</i>	2 m ³ /s
Installed Capacity	25 MW
Average Annual Energy Output	125 GWh
Inundation	170 ha

¹ See Section 2.3.2.2 for more details.

Table 2.2 Proposed New Post Creek Project Components¹

<u>Earth Dam</u>	
Type	Earthfill
Crest height	Approximately 7.1 m (varies)
Crest length	Approximately 500 m
Base width	Approximately 76 m
Crest width	3.0 m
Core height	Approximately 6.8 m (varies)
<u>Headpond</u>	
New inundation area	170 ha (extending 7,166 m upstream of dam)
<u>Spillway Structure</u>	
Type	Steel crest gate section with an uncontrolled (fixed) concrete weir or stop logs
Crest height	3.7 m
Length	32 m
<u>Intake</u>	
Number of intakes	Dual
Type	Concrete
Gates/intakes	2
<u>Penstock</u>	
Number of penstocks	2
Type	Steel
Diameter	3.35 m
Length of each penstock	Approximately 820 m
<u>Powerhouse</u>	
Type	Surface
Turbine-generator units	2 x 12.5 MW
<u>Tailrace</u>	
Type	Cut in overburden
Length	30 m

¹ Note: All dimensions provided are approximate and will be finalized during the detailed design of the proposed Project.

The spillway structure will facilitate year-round minimum flow requirements downstream of the spillway to the waterfalls (see Section 2.3.2.2).

Safety devices, such as booms and buoys, will be placed in the water upstream and downstream of the spillway, and downstream of the tailrace. A risk assessment exercise will be undertaken to identify requirements and locations for signs, booms and buoys prior to operations. Figure 2.13 provides preliminary fencing, signage and safety boom locations, but is subject to change based on the risk assessment results.

2.3 PROJECT ACTIVITIES

2.3.1 Construction

It is assumed that a temporary construction camp will be needed to accommodate the workers for the approximate 2 to 3 year construction period. It is anticipated that this construction camp could house up to 100 workers depending on the particular phase of the proposed Project. Workers at the construction camp will not be permitted to fish, hunt or use ATVs while they are working at the camp. A concrete batch plant is also likely to be required in the vicinity of the proposed Project.

Work areas will be cleared of trees and the camp, construction, laydown and concrete batch plant areas would be grubbed and levelled. After construction, the temporary work areas would be re-planted with native tree species and allowed to re-vegetate naturally.

As indicated in Section 2.1, the proposed intake and spillway structures will be constructed adjacent to each other on competent bedrock. At the intake and spillway location, New Post Creek is currently 1 to 4 m deep and approximately 50 m wide.

An initial perspective on what might be the intake and spillway construction method that would be employed by the DBC is presented below. However, it should be noted that the final sequencing of excavations, cofferdams, construction and dewatering methods used would be defined by the successful DBC on the basis of environmental requirements and constraints outlined in the tender documents.

The intake and spillway are integrated, and consequently construction of the two works requires close coordination. The initial intake and west portion of the spillway could be excavated in “dry” conditions behind a rock plug serving as a cofferdam (Figure 2.14a). This rock plug may be topped with a low level berm to achieve the desired freeboard. The access road will form a permanent berm along the west creek edge when completed.

Figure 2.13 Preliminary Fencing, Signage and Safety Boom Locations

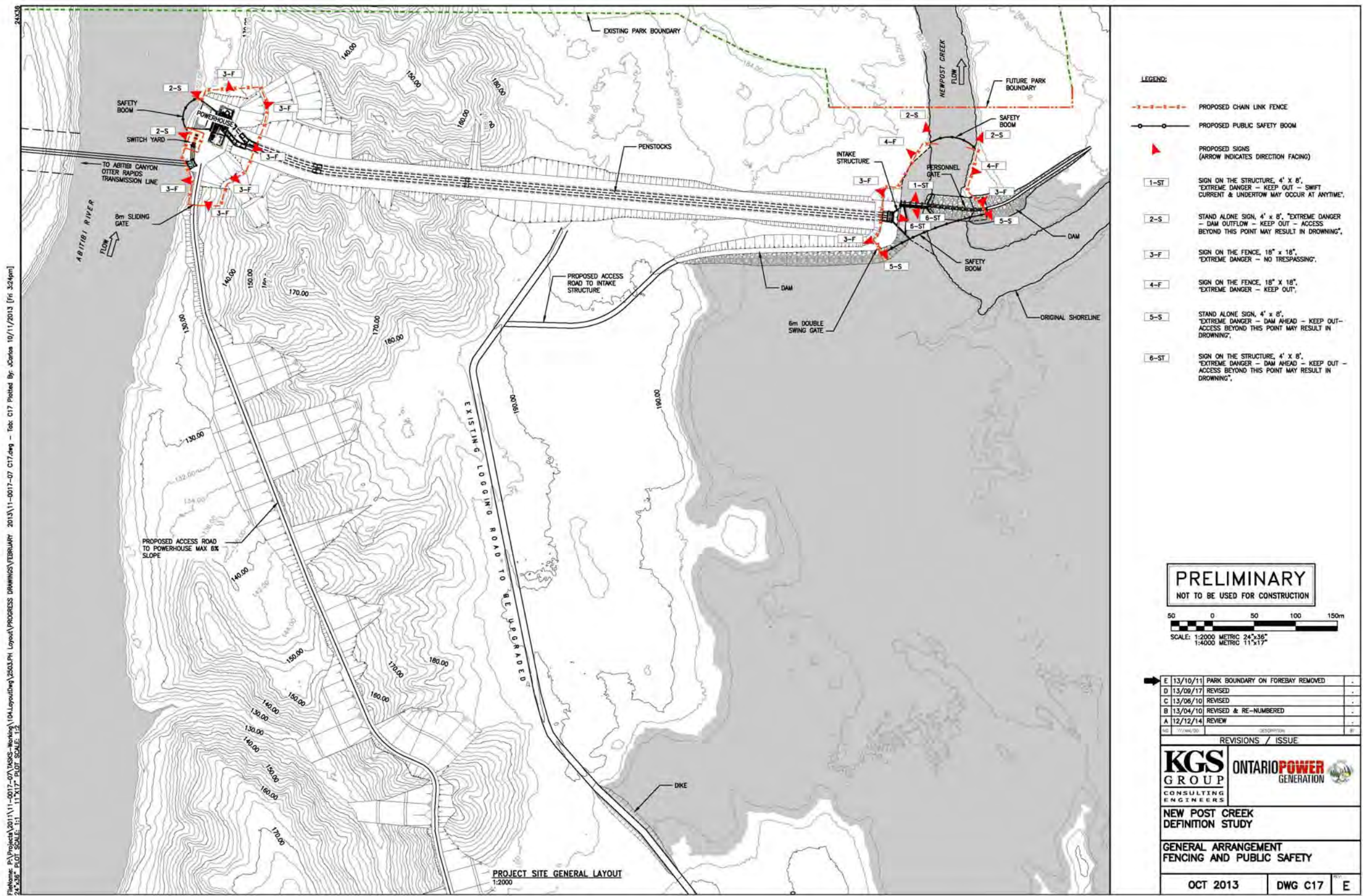
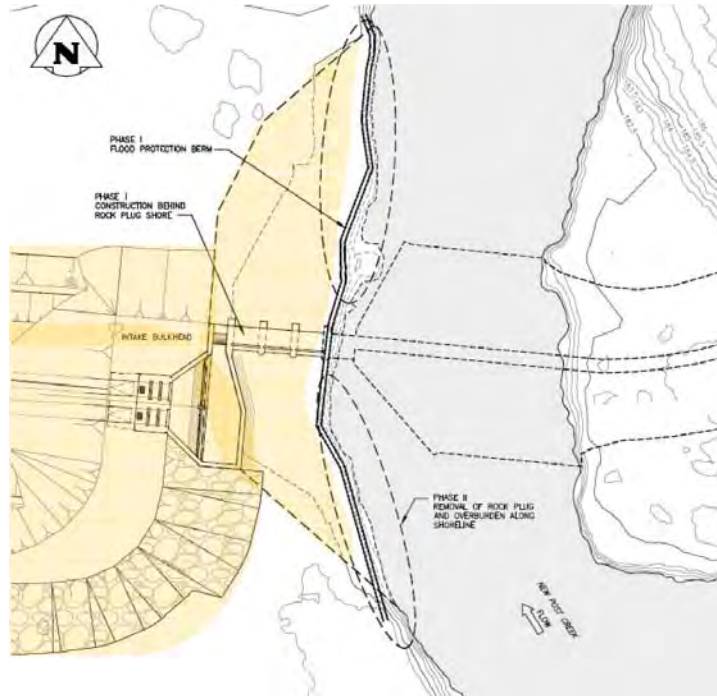


Figure 2.14a Phase I – Excavations



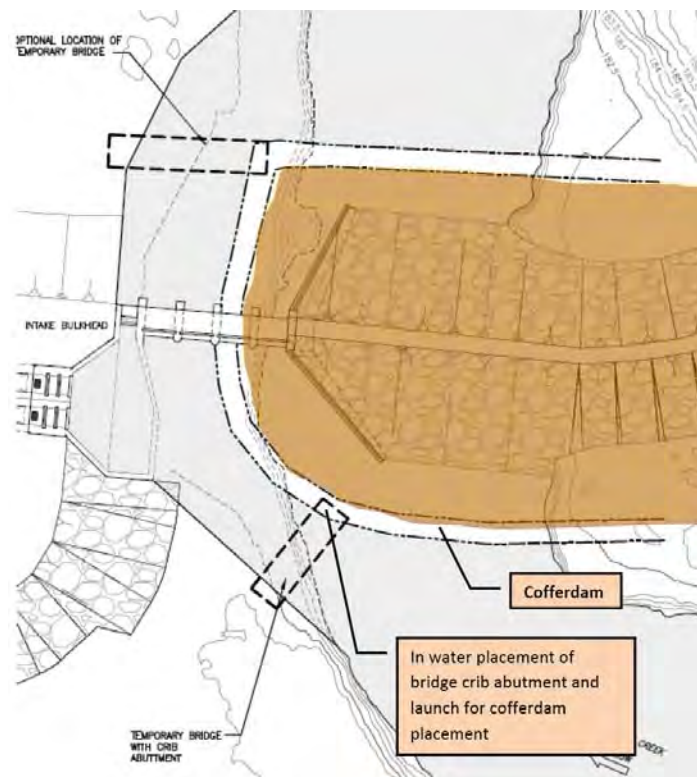
Upon completion of the intake and the concrete spillway work, the cofferdam and remaining rock plug would be removed and the new spillway bay on the west side will be used to pass creek flows downstream (Figure 2.14b).

Figure 2.14b Phase II – Removal of Rock Plug



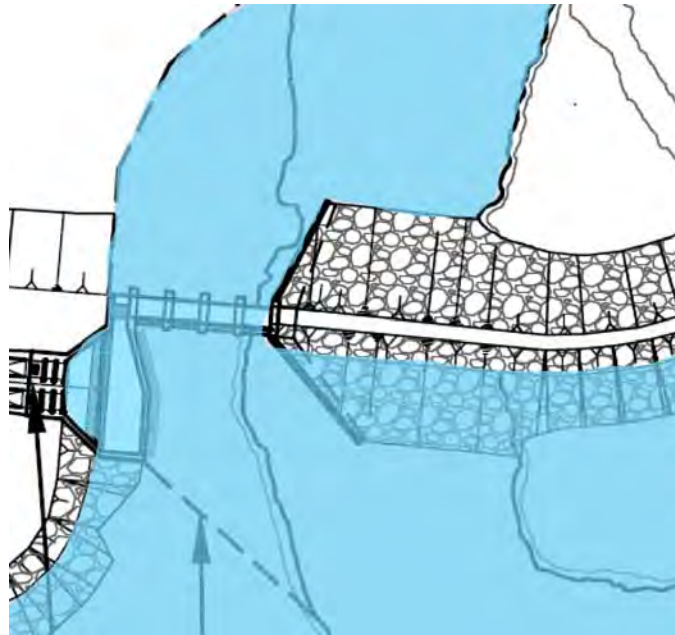
A small cofferdam for the construction of the earth dam could be constructed from the eastern shoreline (Figure 2.14c). It is anticipated that an access trail from Parliament Loop Road to the east abutment could be enhanced to facilitate construction (see Section 2.3.1.2). Alternatively, a temporary bridge could be used to cross the open portion of diverted flow, in combination with limited in-stream work for timber crib abutments. In either case the cofferdam would be quite small, with a dewatered river channel area in the order of 150 m by 50 m using a cofferdam in the order of 1.5 to 2 m high. The cofferdam selected by the DBC is anticipated to be either an in-stream water tight barrier (e.g., aquadam), or constructed of granular fill with a water retaining core (membrane or silty sand). In this phase of construction the spillway concrete components would be completed and the earth dam would be put in place.

Figure 2.14c Phase III – Construction of Earth Dam



In the final phase the cofferdam would be removed and the forebay eventually flooded as shown in Figure 2.14d. The material from the cofferdam may be used as part of the earth dam, or placed in designated spoil piles.

Figure 2.14d Phase IV – Removal of Cofferdam



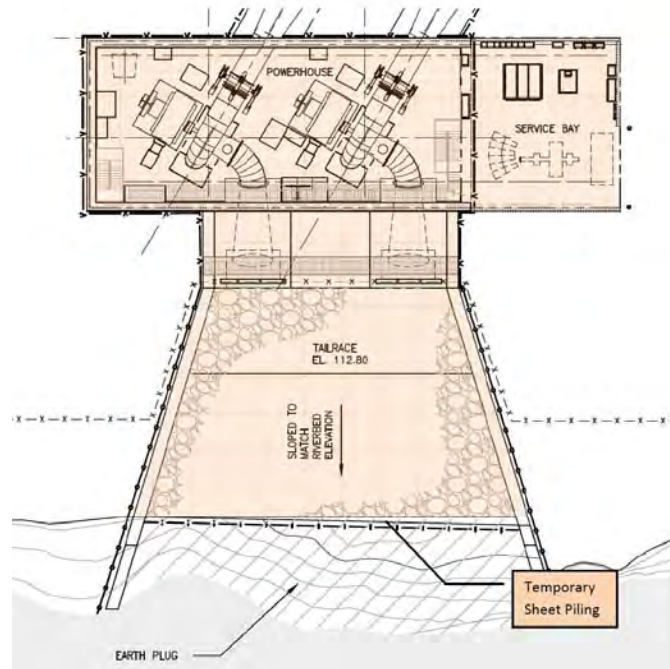
Existing slopes along the Abitibi River and inland at the proposed Project site are relatively steep. Some slope angles were near 1V:1H locally, with overall slopes of 1V:3H, reflecting fairly high strength materials in the *in-situ* sands, silts and tills and limited groundwater pressure influence. There was no evidence of deep-seated slumping or slides occurring at the proposed Project site. For preliminary design purposes, a slope angle of 1V:2H could be used for temporary construction excavations above the groundwater table. As the native soils are highly erodible, extensive stabilization works may be required to prevent vegetation removal, drainage pattern alteration and slope destabilization by heavy loads. Freshly exposed surfaces due to construction activities will require erosion control measures such as granular material placement over exposed surfaces, surface water diversion from slopes and French drain installation for water control in water-bearing granular areas.

The proposed penstocks will extend approximately 820 m from the intake to the powerhouse and will be buried with a minimum 2 m cover to provide thermal insulation during winter operation. Blasting of surface and near-surface bedrock along the initial 150 m distance from the intake will be required to facilitate penstock burial.

Groundwater depressurization/dewatering will be required for powerhouse foundation excavation. This may be achieved by installation of a pump well system or a low permeability seepage barrier such as sheet pile walls or slurry trench to reduce seepage gradients at the downstream face of the natural cofferdam (dyke) around the powerhouse foundation excavation.

Construction of the proposed powerhouse and a portion of the tailrace will be set back from the Abitibi River shoreline (see Figure 2.9). Due to the presence of sand, it is anticipated that a pumped dewatering system possibly combined with a trench cut-off and/or sheet pile cut-off will be required during excavation and construction (Figure 2.15).

Figure 2.15 Powerhouse Excavation Behind Earth Plug and Sheet Piling Cofferdam



It is anticipated that tailrace construction in the channel involving overburden excavation would be undertaken after completion of the powerhouse substructure. Once the cofferdam is constructed, the area enclosed by the cofferdam will be pumped dry to facilitate nearshore sediment excavation and extension of the tailrace. The tailrace area will require rip-rap lining to protect against erosion and sloughing of the overburden. Portions of the Abitibi River bank in the immediate vicinity of the tailrace area may also require shoreline rip-rap protection to minimize toe erosion due to scouring and lower bank sloughing along the river bank. A retaining wall or a tied steel sheet pile wall will extend out from the powerhouse draft tube piers to assist in reducing the excavated quantities. After construction completion the final shoreline plug/sheet pile will be removed in the wet.

The final site grading and elevations will be designed to minimize erosion and manage stormwater in accordance with the Stormwater Management Plan prepared by the DBC based on the Ontario Ministry of the Environment (MOE, 2003) report "Stormwater Management Planning and Design Manual" and the conditions of the Environmental Compliance Approval under the *Ontario Water Resources Act*.

Upon construction completion, the site will be restored and re-vegetated based on the Site Rehabilitation Plan.

CRP/OPG currently envisions hiring a DBC that will be responsible for the detailed design and construction of the proposed New Post Creek Project. The DBC would also be responsible for obtaining construction-related permits and approvals that would be required for the proposed Project dependent on the final designs prepared by the DBC. The ER provides a list of anticipated permits and approvals required during construction and operation phases.

Construction is anticipated to last up to 30 months.

2.3.1.1 Inundation and Total Cleared Areas

As indicated in Table 2.2, the proposed Project is projected to result in an estimated inundated area of 170 ha. The inundation is limited to the portion of waterway and land upstream of the proposed spillway structures. The inundated areas associated with the proposed Project are a combination of riparian shoreline and moist forest-covered areas (see Figure 2.7). The total area affected by the proposed Project has been calculated from mapping and by adding up the areas of the various proposed Project components. The total area affected was apportioned into three categories:

1. Permanent Loss of Area – this is a permanent loss of existing habitat to facilities and structures such as a road, dam, powerhouse and transmission line ROW.
2. Temporary Loss of Area – this is a temporary loss of existing habitat associated with land required for the construction period of the proposed Project.
3. New Water Area – is the total loss of terrestrial habitat due to the reservoir inundation and creation of aquatic habitat.

The areas affected by the proposed Project components are presented in Table 2.3.

Table 2.3 Quantification of Areas Affected by Proposed Project Components

Project Component	Permanent Loss of Area (ha)¹	Temporary Loss of Terrestrial Area (ha)¹	Creation of New Water Area (ha)
Camps (maximum)	NA ²	8	NA
Borrow Areas (maximum)	NA	NA	NA
Access Roads	15	9	NA
Intake and Spillway Structures	<1	<1	
Power Canal, Penstocks, Powerhouse and Tailrace	7	7	NA
Switchyards and Substations	<1	<1	NA
Inundation	170 ³	NA	131
Transmission Line ROW (maximum) ⁴	34	NA	NA
Total	225	24	131

¹ Includes New Post Creek, associated tributaries and land base.

² NA=not applicable.

³ Including permanent conversion of riverine habitat to lacustrine habitat.

⁴ Based on 50 m width.

The final total area to be cleared will be refined as detailed design of the proposed Project progresses. It is assumed that all temporary construction roads will be included in the footprint identified in Table 2.3. It also assumes that borrow areas would not be a permanent loss from the land base, since once the resources are depleted, site restoration will be undertaken by the borrow operators.

Vegetation clearing will involve a combination of manual and mechanical approaches. Based on commitments made to the Aboriginal communities, no chemical methods will be utilized for vegetation clearing.

2.3.1.2 Requirements for Off-site Land Use and Other Ancillary Features

A number of ancillary facilities will be required for the proposed Project, including roads, camps for construction workers, lay-down/construction areas and borrow areas for construction materials.

Existing road access leading to the proposed GS Site is provided by Provincial Highway 634 to the Abitibi Canyon GS and a short section of the Otter Rapids Road (private road) which ends at the Otter Rapids GS (see Figure 2.3).

Further access to the proposed GS Site would be via a disused clay-topped forestry road, approximately 6.1 km in length, that would have to be substantially expanded and reinforced (see Figures 2.3 and 2.16). This is a single-lane road that was constructed by grubbing and heaping the clay soil to create a sub-grade, with portions topped with sand and/or gravel. This road is assumed to have been constructed in 1980 to provide access for harvesting and has subsequently not received maintenance. The existing road would have to be upgraded and extended approximately 530 m and 1,450 m to the proposed intake and powerhouse locations, respectively. This road traverses two permanent unnamed watercourses. In addition, there are six cross-drainage culverts along the operational road to facilitate seasonal water flows and avoid pooling along the road. Culvert replacement will require a permit from the MNR.

CRP/OPG presumes that access to the east bank of the New Post Creek, as may be necessary for the construction of the dam structures, will be provided with a temporary bridge across the creek at the intake area. Other old forestry roads north of the Otter Rapids Road bridge over New Post Creek such as Parliament Loop Road may also provide access to the east bank of the creek. Figure 2.16 shows the potential access route along Parliament Loop Road. These roads would require construction and environmental mitigation measures by the DBC prior to use, and would be upgraded in accordance with permit approvals from MNR.

Figure 2.16 Proposed Project Access



Access to the west bank of the Abitibi River for construction of the proposed transmission line is provided by an existing road network to the interconnection point with the existing Hydro One transmission line and is considered adequate for construction equipment traversal (see Figure 2.11). Proposed transmission line construction is expected to be carried out in winter with no additional access road creation. In any case, the DBC will have to secure permits and approvals regardless of the season of proposed transmission line construction.

The proposed interconnection point will be accessed using the Fraserdale Primary Road (#634), Branch Road #1 and an unnamed operational (logging) road (see Figures 2.3 and 2.16) that bisects the Pinard Moraine Conservation Reserve which was regulated by the MNR in 2005. Upon regulation, this road continues to be used by the forestry industry as per agreement with the MNR. An Area of Concern (AoC) prescription for use of this road during proposed Project construction may be required from the MNR.

A construction camp will likely be required to accommodate up to approximately 100 workers for the three-year duration of proposed Project construction. The DBC will decide the camp location and have responsibility for acquisition of relevant permits. It is anticipated that the camp would be constructed in the Abitibi Canyon GS area where OPG currently has a Water Power Lease and a Licence of Occupation (LO).

Construction staging or lay-down areas will be required and are expected to be close to the main construction sites, e.g., intake and spillway structures, penstocks and powerhouse. These areas will be used for vehicle and equipment parking, materials storage, construction facilities (e.g., site office, security buildings/cabins) and construction access provision. CRP/OPG has identified from a practical perspective a number of areas that will likely be used during construction (see Figure 2.4). In some cases, the DBC will use areas that will be permanently lost to infrastructure for temporary uses. These opportunities can occur during proposed Project staging. The DBC will be required to obtain any land use permits and licences for temporary construction activities.

Borrow areas will be required primarily for the earth fill dam and dykes and other aggregate use. CRP/OPG anticipates that aggregate from the excavations would be used and supplemented from several nearby existing borrow areas for which the DBC would have to secure permits or procurement from those already holding the permits. Figure 2.3 shows the locations of potential borrow areas.

CRP/OPG will provide as much information as possible regarding the locations of borrow areas which might be used during the construction phase. Confirmation of the specific borrow areas is not possible for CRP/OPG to provide at the EA stage, as the final selection and permitting for use of these areas will be the responsibility of the DBC.

Any waste generated by the proposed Project will be disposed of in accordance with federal and provincial requirements.

2.3.1.3 Construction Schedule and Strategy

The proposed New Post Creek Project is currently completing the Definition Phase, which includes:

- completion of the OWA Class EA process;
- selection of a DBC for construction; and
- procurement of a revenue agreement or contract with the Ontario government.

When all Definition Phase tasks are complete, CRP/OPG will complete a final review of the proposed Project and make a decision to proceed into the “Execution Phase”. This phase includes CRP and OPG obtaining respective board approval to proceed.

The earliest time frame in which construction would start is 2014 and it is expected that construction phase will last approximately 30 months.

In the Execution Phase, CRP/OPG currently envisions hiring a third party contractor, i.e., DBC, who will be responsible for the detailed design and construction of the proposed Project. The DBC would be responsible for completing detailed final stamped designs and obtaining all construction-related permits and approvals, e.g., Permits-to-Take-Water for cofferdams and construction-related activities, road use and watercrossing approvals, aggregate permits, etc.

CRP/OPG is committed to working with federal and provincial agencies to address information requirements related to construction and operation approvals or authorizations.

At this point, CRP/OPG does not know the specific equipment that will be required for the proposed Project; however, it is likely that it will include typical construction equipment associated with large-scale civil works.

CRP/OPG anticipates that explosives will be required during construction. All necessary permits will be obtained by the DBC, who will also comply with all legal requirements in connection with the use, storage and transportation of explosives, including, but not limited to, the *Canadian Explosives Act* and the *Transportation of Dangerous Goods Act*. Environmental monitoring during construction will also occur to ensure commitments in the ER and other permits are being followed as intended.

2.3.2 Operation

2.3.2.1 Proposed New Post Creek Hydroelectric GS

Operation of the New Post Creek Diversion Dam has been designed in a manner which requires minimal intervention by OPG personnel. Since 1974, the dam has been operated by leaving the stop logs set at elevation 218.80 m to maximize diversion flow while eliminating the need for ongoing log operations at the dam (OPG *et al.*, 2006). When the headwater exceeds this

elevation, water spills over the stop logs and flows downstream along the old channel of the Little Abitibi River.

Operation of the proposed New Post Creek Hydroelectric GS will be unmanned. No permanent staff will be stationed at the facility. Operating and maintenance personnel will visit the site only to perform specific periodic routine inspection and servicing tasks, or to deal with necessary investigations and repairs, when these are required.

Once placed into service, the proposed GS will be operated from the OPG North East Control Centre (NECC) in Timmins. The station will be monitored on a continuous basis by OPG operators from a control room where all North East Plant Group (NEPG) units are controlled. As well as monitoring the operation of the station, the NECC control room operators will initiate such operations as starting, synchronizing and stopping the turbine generators and adjusting their loads, opening and closing sluice gates as required to manage the forebay operations and downstream flows, and responding to malfunctions of the equipment brought to their attention.

Maintenance of the trash rack and intake, such as removal of timber debris, will be performed manually or with mobile equipment from the intake deck. There is an option to add automated equipment for this activity in the future.

The intake bay for each penstock will have self-closing vertical lift gates to ensure that the penstocks and powerhouse can be safely isolated and dewatered under all conditions.

Maintenance of the draft tubes or turbines will require the use of a draft tube bulkhead system. Consequently, the powerhouse will be equipped with one set of draft tube bulkhead gates (for one unit at a time), with the gates to be installed using a monorail hoist travelling across the tailrace deck. The gates will be stored in the gate slots above tailwater level.

The base case operating scheme, as outlined in the feasibility update report (KGS Group, 2010), involves the passage of minimum flows downstream to the New Post Creek waterfalls and the remaining flow diverted from the creek and passed through the turbine units to generate electricity. During high flow periods, flow diversion will meet the maximum flow capacity of the turbines. Plant capacity will be 50 m³/s. During spring, significant flows will continue downstream of the intake weir to the waterfalls, as the estimated average New Post Creek flows for May and June are 131 m³/s and 71 m³/s, respectively. During the rest of the year, the minimum flow will first be released downstream of the weir with the remaining flow diverted to the turbines to generate electricity.

When the diverted creek flow is less than the lowest plant operating flow of the smallest turbine unit (typically 40% of the unit capacity for a Francis turbine), pulsed operation would occur. It is expected to occur primarily during the low flow winter periods and would use the limited storage available in the forebay to provide additional generation. Using a FSL of 187.00 m.a.s.l., sufficient storage would be available to augment low creek inflow in order to operate one turbine unit for several hours. This operation could be repeated throughout the day as flow permits,

thereby generating additional energy during a period when the plant would otherwise be shut down. The plant will release flow in any day equal to the volume of inflow. This pulsing operation provides additional technical (and cost) benefits such as ensuring continued flow through the penstocks and station heating in the winter months. For example, for two equal sized turbine units with a capacity of 25 m³/s each, the plant would operate in pulsed mode at riparian flows between approximately 2 and 12 m³/s during parts of February and March (based on a 2 m³/s minimum flow for this period). Pulsing will be undertaken during other times of the year when there is not enough flow to provide the minimum flow and run the turbines.

Annual water levels in New Post Creek vary by approximately 3 m. With pulsing, water level fluctuations will be less, but occur more frequently over short periods of time. Water level fluctuations will be limited to 0.5 m below the usual full headpond water level. Pulsing will be permitted at any time during the year within this operating range of 0.5 m provided minimum flows are directed over the spillway and no negative effects due to pulsing, that can not otherwise be mitigated, are observed (G. Funnell, MNR, 2013, pers. comm.).

2.3.2.2 Operating Regime

The existing Abitibi River Water Management Plan (WMP) (OPG *et al.*, 2006) will need to be amended through an Administrative Amendment. Flows and levels for the proposed New Post Creek Hydroelectric GS will comply with the amended Abitibi River WMP.

Operation will be constrained by the minimum flow required in the existing channel mandated as required for the waterfalls downstream. This minimum flow was agreed to with MNR, Ontario Parks and Department of Fisheries and Oceans during the Definition Phase. All parties have been working towards the operating regime that:

- a) continues to provide important ecological functions;
- b) ensures that the proposed Project is economically viable;
- c) respects TTN's historic and modern day interests;
- d) ensures and enhances public safety; and
- e) ensures continual flow down New Post Creek and over the waterfalls to maintain aesthetic value.

As a pre-condition, it was agreed that the proposed Project will not change the total volume of water flowing into the Abitibi River, or the operating considerations for OPG's Abitibi Canyon GS and Otter Rapids GS. Total flows from New Post Creek into the Abitibi River will remain unchanged (except that there will now be two discharge locations, i.e., at the proposed GS tailrace and the existing New Post Creek outlet). As a result, flow magnitude, frequency, timing, duration and rate of change will be different than current flow conditions at the New Post Creek outlet.

The minimum flows that must be maintained downstream of the spillway structure at all times are provided below:

Period	Minimum Flow (m ³ /s)
Approximately May 1 to mid-June ¹ ; timing dependent on spring spawning and egg incubation period ²	15
Mid-June to August 31	7.5
September 1 to 30	5
October 1 to approximately April 30; timing dependent on Walleye (<i>Sander vitreus</i>) spawning initiation	2

¹ To be expanded to include Lake Sturgeon spawning and egg incubation period if spawning occurrence is demonstrated.

² Brief transition of flows from 15 to 7.5 m³/s from the end of egg incubation (based on thermal units accumulated) with the rampdown rate (m³/s per day) to be determined in consultation with the MNR and DFO.

The proposed Project will have a relatively small headpond (approximately 170 ha) and will hold approximately 8,000,000 m³ of water. However, all of the water within the headpond is not available to the proposed facility to use for generation since the facility is only permitted to vary the headpond water level by 0.5 m. Therefore, the headpond will have limited ability to store water and the intended operation of the facility is to utilize the water as it comes down New Post Creek, while maintaining a minimum flow through the downstream creek reach and over the waterfalls. For clarity, the proposed headpond will not be drained for generation and replenished.

The forebay fluctuations are intended to provide operation during low flow periods primarily in late winter and late summer. This pulsing will be an automatic process and will involve the following:

1. The turbines are expected to require a minimum of approximately 10 m³/s to operate. Any time the total flow in New Post Creek is less than 10 m³/s plus the minimum downstream flow requirement, the turbine units will not be able to operate.
2. In such situations, the proposed GS will be allowed to draw down the forebay within the prescribed range at a flow rate that will optimize efficiency.
3. When the water level reaches its lower limit, the units will shut down until the forebay returns to its high level. This will not be co-ordinated with the time of day for increasing revenue but will be an automatic process.
4. The fluctuation is expected to be lower in the winter to maintain an ice cover on the forebay.
5. This cycle will repeat most frequently in situations when flows are just below the required 10 m³/s plus the minimum downstream flow requirement. The situation that would cause the most frequent starts/stops would be during the winter. In such cases the cycle could be expected to repeat every 8 to 48 h, depending upon riparian flow.

6. In the prescribed period where a 50 cm band is achievable, the cycle would be expected to repeat every 48 to 150 h, depending upon riparian flow.
7. The flows downstream of the dam would not change during this process as they will remain as the defined minimum flow requirement.

The 7.5 m³/s requirement between mid-June and August 31 is used as an example to better illustrate the minimum flow operation. Depending on the available inflow, there are basically three scenarios:

1. When there is not enough flow to provide the minimum flow of 7.5 m³/s **and** run the turbines (requires approximately 10 m³/s), the minimum flow of 7.5 m³/s will continue to be provided down New Post Creek and over the waterfalls. Any remaining water will be held back within the headpond. The headpond has limited capacity to hold water within the 0.5 m band. Therefore, once enough water has collected in the headpond to run the station for a reasonable duration, it will restart and begin generation. When the lower limit of the band is reached, generation will stop. This cycle could happen several times a day during a low flow period; however, the 7.5 m³/s minimum flow will be maintained.
2. For the majority of the summer period, it is expected that there will be enough flow to provide the 7.5 m³/s and operate the proposed GS continuously. The proposed GS will be designed in a manner to run in low flow situations so that operations can continue as frequently as practical in order to minimize any stop/start cycles for the equipment. In this scenario, a constant flow of 7.5 m³/s is provided down New Post Creek.
3. In situations where the flow exceeds the amount required to provide the 7.5 m³/s minimum flow and the maximum flow that the proposed GS can utilize (approximately 50 m³/s), the additional water will be spilled through New Post Creek increasing the flow above 7.5 m³/s.

In all cases (other than a natural drought condition in which all available flow will be released down the creek), a minimum flow of 7.5 m³/s will be provided during the summer period downstream in New Post Creek and over the waterfalls.

With respect to water levels, it is proposed that the upper FSL of 187.00 m.a.s.l. be used as the normal maximum operating level with a minimum operating level of 182.00 m.a.s.l. The proposed headpond water levels are summarized below:

- Maximum Operating Level (flood conditions): 187.50 m.a.s.l.
- Normal Maximum Operating Level: 187.00 m.a.s.l.
- Normal Minimum Operating Level: 186.50 m.a.s.l.
- Absolute Minimum Level: 182.00 m.a.s.l.
- Minimum Level for Periodic Headpond Maintenance: 182.30 m.a.s.l.

2.3.2.3 Transmission Facilities

The proposed transmission facilities would be inspected on an annual basis using a combination of aerial and/or ground reconnaissance. Additional inspections may be required after the occurrence of any harsh weather conditions or upon occurrence of any line faults. Emergency repairs could occur at any point in the year.

Vegetation control on the ROW will be required, involving a combination of manual and mechanical approaches. Based on commitments made to the Aboriginal communities, no chemical treatment will be utilized for vegetation management.

2.3.3 Decommissioning

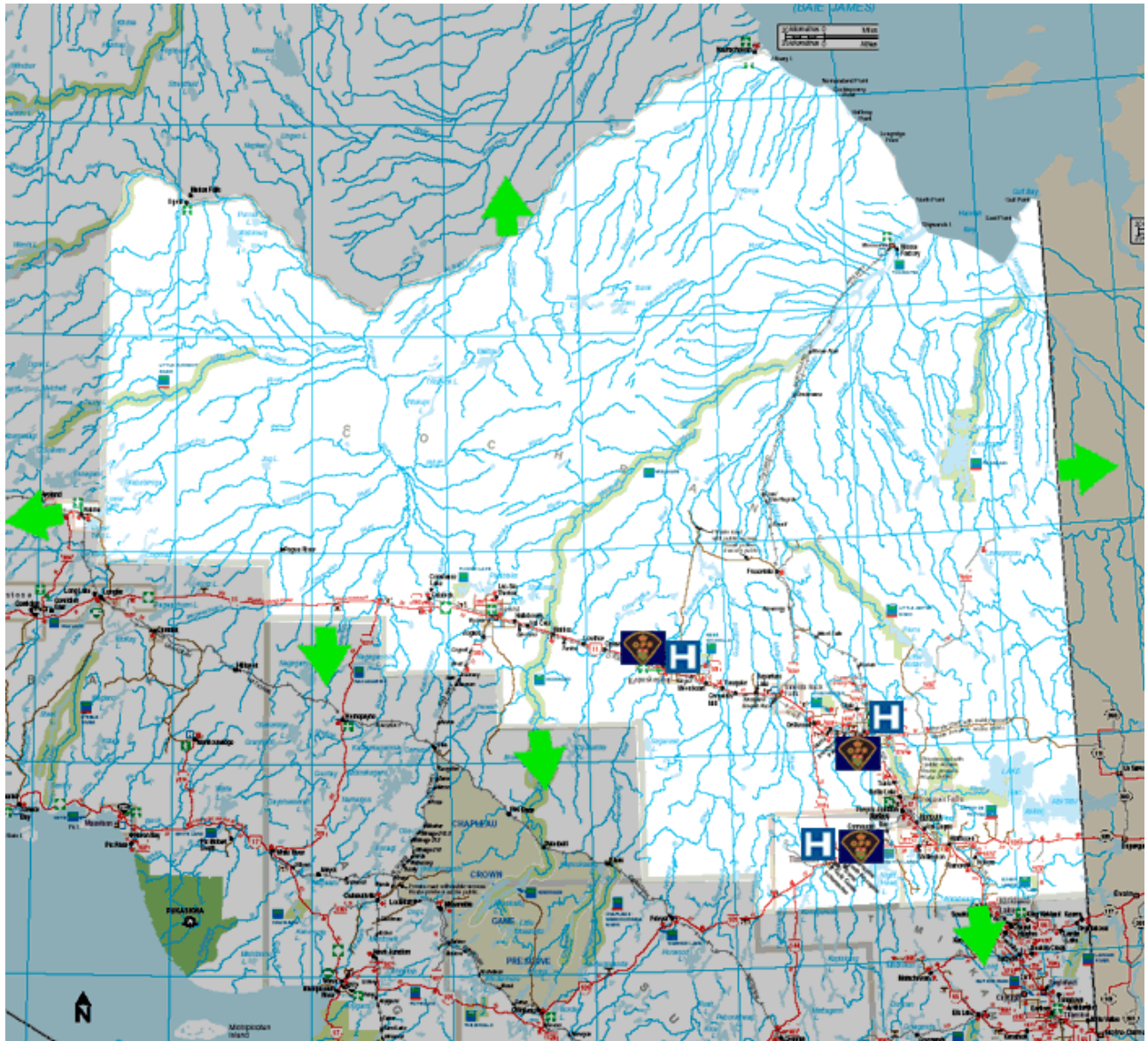
The history of hydroelectric generating stations in Ontario is that they are typically not decommissioned. Rather, as the structures near the end of their engineered life, they are either re-developed or refurbished. The societal benefit of these hydroelectric assets and their associated infrastructure, e.g., transmission and distribution lines, is such that these re-investments are usually considered economically, socially and environmentally preferable to developing new energy projects. As such, no specific decommissioning activities have been identified. Rather, transmission and distribution structures and lines would be maintained and/or replaced as part of ongoing operations.

3.0 DESCRIPTION OF THE EXISTING SOCIO-ECONOMIC ENVIRONMENT

For the purposes of the socio-economic assessment, the analysis has been broken down into two study areas: a regional study area and a local study area.

The regional study area is defined as Cochrane District (Figure 3.1) which is the most northeastern District in Ontario. It stretches from the community of Matheson and the City of Timmins in the south to the Town of Moosonee in the north. The regional area provides primarily for the understanding the broader socio-economic context.

Figure 3.1 Regional Study Area – Cochrane District



The local study area for the socio-economic discipline is defined generally as a 10 km radius around the proposed Project. It also includes the Replacement Lands to be added to LAPP (see Figure 2.1).

3.1 REGIONAL ECONOMY

Northern and northeastern Ontario is a resource based economy driven primarily by the forest products, mining and energy sectors. Tourism which is largely resource-based (e.g., fishing, hunting, and other outdoor recreation) is minor as compared to the industrial resource base, but nevertheless is an important contributor to the economy. Government services whether they be federal, provincial or local are also a major contributor to the economy and employment of people. Most of the other sectors of the northern Ontario economy such as retail and wholesale trade, other manufacturing, construction and services are generally dependent on and strongly impacted by the economic cycles within the resource industries.

According to the Institute for Northern Ontario Research and Development, the unemployment rate in northeastern Ontario was 8.4% in 2011 and 7.0% in 2012. In contrast the unemployment rate was 7.0% in 2011 and 7.6% in 2012 in northwestern Ontario (Robinson, 2012).

Northeastern Ontario's two most important economic sectors, i.e., forestry and mining, which have experienced opposite trends over the last ten years. The forest industry has experienced significant decline with permanent and temporary lumber, board, and pulp and paper mill closures throughout the region. There have been permanent mill closures in Smooth Rock Falls, Timmins, Sault Ste. Marie and Opasatika along with numerous temporary idlings. In contrast, mining has experienced a large boom in northeastern Ontario with various mines being developed and put into operation (i.e., DeBeers Victor Diamond Mine, Lakeshore Gold Mine, Brigus Gold, Detour Gold).

Despite the resurgence of mining in northeastern Ontario, manufacturing now makes up a smaller share of northeastern Ontario's economy. In 1999, manufacturing employment was at 9.6% and by 2011 it had declined to 7.5%. A similar decline occurred in Ontario, i.e., from 18.4% to 11.8% (Di Matteo, 2011).

Timmins is the major economic centre for a vast section of northeastern Ontario stretching from Hearst in the west to James Bay in the north, the Quebec border in the east to the northern section of Timiskaming District in the south (Sudbury and North Bay become the major centres further south). Timmins is the centre for industry, commerce, distribution and finance for communities in this region, such as Cochrane, Smooth Rock Falls, Kapuskasing, Hearst, Chapleau, Iroquois Falls and many other smaller communities serving a regional market territory of approximately 118,000 people (City of Timmins, 2006).

Energy production, while employing many fewer people than mining or forestry in northern Ontario plays an important role in the northern Ontario economy. For example, the OPG NEPG

employs 216 people in its operations centred in Timmins, Dymond, Abitibi Canyon and Kapuskasing.

Most of the typical economic benefits (e.g., employment, contracting opportunities) associated with the proposed Project would be experienced regionally across Cochrane District rather than focused on one particular community. This is largely because labour would likely be drawn from throughout the District.

3.2 REGIONAL SOCIAL COMPOSITION

3.2.1 Cochrane District

Cochrane District is a large census division with an area of over 141,000 km² in northeastern Ontario stretching from Matheson in the southeast to the south shore of the Albany River in the northwest. In 2011, the District had a population of 81,122, a decrease of 1.7% from the 2006 population of 82,503 (Statistics Canada, 2012a, b). In 1986, the population was 93,712. Cochrane District is similar to most parts of northern Ontario which have seen a slight population decline over the last 25 years. This stands in contrast to Ontario which has grown from 9.1 million in 1986 to 13.5 million in 2012.

The total number of private dwellings in Cochrane District in 2011 was 37,242 (Statistics Canada, 2012a).

Similar to other parts of northeastern Ontario there is a significant French influence in Cochrane District with approximately 52.4% or 42,010 of the residents being bilingual. In 2006, 9,665 individuals identified themselves as part of the Aboriginal population (Statistics Canada, 2012b).

In 2011, the median age in the District was 42.5 compared to 40.4 for Ontario and 40.6 for Canada. The difference in median age likely demonstrates that the District as a whole is aging with not enough new economic opportunities to retain and attract younger people in the District.

3.2.2 Town of Smooth Rock Falls

Smooth Rock Falls is the closest incorporated municipality to the proposed Project, located approximately 100 km to the south.

Smooth Rock Falls has been declining in population for many years. In 2011, Smooth Rock Falls had a population of 1,376, a decrease of 6.6% from the 2006 population of 1,473. The population in 1981 was 2,352 (Keir, 1991). In 2011, the median age was 53.1 compared to 40.4 for Ontario and 40.6 for Canada (Statistics Canada, 2012a). Again, this demonstrates that the population was aging with fewer young people in the community. The major reason for the decline in the population was the closure of the kraft pulp mill in the Town. Most recently, this was owned by Tembec and was permanently closed in late 2006.

The total number of private dwellings in Smooth Rock Falls in 2011 was 693 (Statistics Canada, 2012a).

Smooth Rock Falls has a small hospital that employs some individuals from the Town. While there are fewer people of working age living in the community, a total of 43 individuals have been employed from the community on the Lower Mattagami Re-Development Project (Lower Mattagami Project), a partnership between OPG and the Moose Cree First Nation (MCFN) (Shantz, 2012).

As Smooth Rock Falls is the closest community it may serve as a centre to source some local supplies and equipment although this procurement would likely occur throughout northeastern Ontario. As 43 individuals have been already employed on the Lower Mattagami Project it would be expected that some could also be employed on the proposed New Post Creek Project.

3.2.3 Town of Cochrane

Cochrane has a population of 5,340 in 2011 a decrease of 2.7% from the 2006 population of 5,487, with a median age of 43.3 compared to 40.4 for Ontario and 40.6 for Canada (Statistics Canada, 2012a, b). The population in Cochrane has likely stabilized since 2011 and possibly even grown with the development of the Detour Gold Mine and the re-opening of the True North Plywood mill. The total number of private dwellings in Cochrane in 2011 was 2,407.

Similar to other parts of northeastern Ontario there is a significant French influence in Cochrane with approximately 52.7% or 2,790 of the residents having knowledge of both English and French (Statistics Canada, 2012a).

While Cochrane is over 150 km by road to the proposed New Post Creek Project, it is possible that labour in Cochrane could be employed for Project. For example, despite the distance to the Lower Mattagami Project, 85 individuals have been employed from Cochrane (Shantz, 2012).

3.2.4 Town of Kapuskasing

Kapuskasing has a population of 8,196 in 2011 a decrease of 3.7% from the 2006 population of 8,509, with a median age of 47.7 compared to 40.4 for Ontario and 40.6 for Canada (Statistics Canada, 2012a, b).

The total number of private dwellings in Kapuskasing in 2011 was 3,738 (Statistics Canada, 2012a).

Although Kapuskasing has the most diverse economy for communities along the Highway 11 corridor, the major employer has been the Tembec newsprint and lumber facility. Kapuskasing has also significantly benefited from the recent construction activity in the area associated with hydroelectric projects. Along with the OPG/MCFN re-development of the Lower Mattagami

Complex, Hydro-Mega has also been constructing four small generating stations south of the community.

While Kapuskasing is over 150 km by road to the proposed New Post Creek Project it is possible that labour in Kapuskasing would be involved in the Project. As of November 2012, a total of 319 individuals from Kapuskasing had been employed on the Lower Mattagami Project. As Kapuskasing has the most well developed commercial sector along Highway 11 it may capture some economic spin-off opportunities from the proposed Project.

3.2.5 Taykwa Tagamou Nation

TTN is a partner on the proposed New Post Creek Project with OPG. CRP is the TTN owned company which pursues hydroelectric projects and is OPG's partner and co-proponent on the proposed Project.

TTN has two reserves. The older Reserve is located approximately 14 km east of the Abitibi Canyon GS (see Figure 1.2). This Reserve was set aside for hunting, trapping and other activities, and has not served as the principal settlement location. A new Reserve was created in the early 1980s, approximately 20 km west of Cochrane to provide a settlement location for TTN (TTN, 2012). As of 2012, TTN has a total registered population of 460 individuals with slightly over 120 living on Reserve (AANDC, 2012).

The TTN people are Mushkegowuk Cree, the people of the muskeg, and have lived with and on the lands in what is now known as Ontario for time immemorial. TTN is formerly known as the New Post First Nation. It received this name because the community had been associated with the HBC New Post located on the Abitibi River, approximately 1 km north of the proposed Project. TTN participated actively in trade with the HBC and New Post provided a key location in the trade from the interior of the Moose River Basin to Moosonee on James Bay (TTN, 2012).

The proposed Project lies within the heart of TTN Traditional Territory. Most of the proposed Project occurs in areas held by TTN trappers, except for the extreme western portion of the transmission line which occurs within a MCFN trapline.

3.2.6 Moose Cree First Nation

MCFN is a large First Nation with a 2005 membership of 3,570 individuals of which close to half were located on Reserve at Moose Factory Island just south of James Bay on the Moose River. MCFN citizens also live throughout Ontario and Canada but substantial numbers live in other northeastern Ontario communities such as Timmins, Cochrane and Kapuskasing. The MCFN have Traditional Territory interests on the west side of the Abitibi River.

3.3 LOCAL SOCIO-ECONOMIC ENVIRONMENT

A local socio-economic description is provided below that describes land and resource uses in and near the proposed Project.

3.3.1 Provincial Policy Direction

Provincial policy was also considered when examining the proposed New Post Creek Project. Both the Provincial Policy Statement (PPS) (OMMAH, 2005) and the Growth Plan for Northern Ontario 2011 (MOI and MNDMF, 2011) were examined.

Sections 1.8.2 and 1.8.3 of the PPS (OMMAH, 2005) encourage increased energy supply from waterpower resources:

“Increased energy supply should be promoted by providing opportunities for energy generation facilities to accommodate current and projected needs, and the use of renewable energy systems¹ and alternative energy systems, where feasible.”

“Alternative energy systems and renewable energy systems shall be permitted in settlement areas, rural areas, and prime agricultural areas in accordance with provincial and federal requirements. In rural areas and prime agricultural areas, these systems should be designed and constructed to minimize impacts on agricultural operations.”

The Growth Plan for Northern Ontario 2011 (MOI and MNDMF, 2011) has been prepared under the *Places to Grow Act, 2005* and it sets out:

“a strategic framework that will guide decision-making and investment planning in Northern Ontario over the next 25 years. It contains policies to guide decision-making about growth that promote economic prosperity, sound environmental stewardship, and strong, sustainable communities that offer northerners a high quality of life.”

Lands within the Growth Plan include all Crown lands in the north. Renewable energy is recognized in the Growth Plan as a priority sector that the Province will focus economic development strategies on (MOI and MNDMF, 2011: p. 9). Furthermore, renewable energy projects involving Aboriginal communities are encouraged (MOI and MNDMF, 2011: p. 15).

¹ Renewable energy systems means the production of electrical power from an energy source that is renewed by natural processes including, but not limited to, wind, water, a biomass resource or product, solar, or geothermal energy.

The Growth Plan devotes an entire chapter to Aboriginal Peoples recognizing that (MOI and MNDF, 2011: p. 41):

“Economic development in Aboriginal communities is a key element of this Plan. Aboriginal communities and the Aboriginal workforce offer unique strengths that can benefit all of Northern Ontario. Many Aboriginal communities have adopted economic development approaches that reflect a connection to the land and a focus on community benefits. There is considerable potential to integrate the economic development planning of Aboriginal communities with other regional efforts. This Plan seeks to involve Aboriginal communities and organizations in economic development, and to improve the capacity of these communities to participate in economic development planning.”

In summary, provincial policy currently encourages projects, such as the proposed New Post Creek Hydroelectric Project, especially when First Nations are partners on the projects.

3.3.2 Existing Land Use, Tenure and Resource Policy Direction

The proposed New Post Creek Project is located in the Township of Pinard about 100 km by road north of Smooth Rock Falls in Cochrane District.

TTN and OPG have provincial direction and support in the proposed development of the New Post Creek Project. As indicated in Section 1.0, the proposed Project was identified by the Ontario Ministry of Energy (2010) as being under consideration as a clean, renewable, cost-effective hydroelectric generation project in “Ontario’s Long-Term Energy Plan”. Previous ministers of Natural Resources dating back to 1996 supported a hydroelectric development at New Post Creek in principle, and committed to considering a proposal.

The proposed Project is located in an area that is predominantly Crown land. The proximate LAPP was regulated in 1985 and encompasses, with the addition of the Replacement Lands, a total area of approximately 20,508 ha (Ontario Parks, 2006, 2008). The Park encompasses the Little Abitibi River from the outlet at Harris Lake for a distance of approximately 70 km to the New Post Creek Diversion Dam. From the Dam, the Park encompasses the New Post Creek Diversion Channel and New Post Creek for distances of 4 and 16 km, respectively. Upstream and downstream of the outlet of New Post Creek, LAPP was laid out to include the Abitibi River and adjacent land base to protect the former HBC trading post (New Post). LAPP is a waterway and natural environment class Park with representation in the Lake Abitibi Ecodistrict (3E-1). The Little Abitibi River – New Post Creek section of the Park is managed as waterway class, whereas the Pierre – Montreuil Lakes section is managed as natural environment class (Griffin, 2003).

LAPP is a non-operating provincial park and therefore there are no visitor facilities in the Park but recreational uses such as canoeing, camping, hunting and angling are permitted. Existing

commercial fur harvesting (trapping) is also permitted; however, new commercial fur harvesting is not permitted (MNR, 1992, 2000, 2006).

MNR (1978) identified the significant historical, natural and recreational values of the “Little Abitibi – Newpost Canoe Route” and provided the justification for the establishment of the “Little Abitibi Waterway Park”. LAPP was regulated in 1985 (O. Reg. 279/85 Schedule 195), 22 years after the construction of the New Post Creek Diversion Dam on the Little Abitibi River. Therefore, the Diversion Dam is a pre-existing, non-conforming resource management activity in LAPP, as new hydroelectric developments have not been permitted in provincial parks by policy and more recently by legislation (i.e., *PPCRA*).

TTN maintains that they were not consulted on the establishment of the Park and that it has negatively impacted on their traditional activities and modern day economic pursuits. It is noted that the protection of aboriginal rights and treaty rights was enshrined in the *Constitution Act* in 1982 with the enactment of section 35. The judiciary has since defined section 35 to require the duty to consult prior to decisions made which could impact aboriginal rights and treaty rights. In 2004, the Supreme Court of Canada, through its landmark decisions in the Haida Nation and Taku River First Nation cases further refined and clarified what the duty to consult entails. As indicated above, LAPP was regulated in 1985.

As indicated in Ontario Parks (2006), “First Nations have expressed interest in and have shared knowledge of the park and surrounding area. Aboriginal communities may have used the area for hunting, trapping, fishing, gathering and travel. These uses may continue, subject to public safety, conservation and other considerations.” It is further stated that “any communications or cooperation between aboriginal communities and MNR for planning and operations purposes will be done without prejudice to any future discussions or negotiations between the Government of Ontario and aboriginal communities.” The proposed New Post Creek Project is being enabled by extensive consultation with First Nations, Métis peoples and the public to change the Park boundary (see First Nation and Métis Interests and Consultation, and Public and Agency Consultation TSDs).

The generation of electricity is not permitted within a Provincial Park as stipulated by the *PPCRA*. As indicated in Section 2.1, a small area of the proposed Project footprint within LAPP was deregulated accompanied by a concurrent regulation of suitable Replacement Lands.

MNR staff completed a land use planning process and met their MNR Class EA requirements in 2013 to facilitate the boundary changes to remove lands from LAPP that would be needed for the proposed New Post Creek Project. As indicated in Section 2.1, the *PPCRA* generally prohibits development of facilities for the generation of electricity within a provincial park. Section 9(5)(c) of the *PPCRA* enables the Lieutenant Governor in Council to dispose of an area in a provincial park that is 50 ha or more if the disposition is being made as part of a transaction that increases the size of the provincial park and enhances ecological integrity. CRP and OPG worked with MNR and Ontario Parks to identify the limits of the area needed to be re-designated as Crown land to be removed outside LAPP. MNR has used this information to describe the

area to be deregulated for the proposed development. This included an Ontario Parks assessment that the proposed area to be removed from LAPP has no significant ecological, geological or cultural values (Beacon, 2010). The area is along a narrow, highly modified section of New Post Creek. MNR identified several options on a replacement area adjacent to LAPP as a proposed park addition. MNR consulted with TTN on all the options and TTN selected a preferred option. This area contains significant terrestrial and wetland ecosystems that are not well represented in the ecodistrict. This addition will result in a net park area increase and will enhance the ecological integrity of LAPP by adding an unmodified stretch of New Post Creek, as well as old growth jack pine communities that have not been altered by forest management activities. The changes to the LAPP boundary support opportunities for economic development for the TTN community. However, land deregulation resulted in the disjunction of LAPP as the waterway class portion is no longer a continuous system.

The Replacement Lands do not overlap with any known mining claims or leases and do not contain timber harvest allocations because they overlap with wildlife habitat deferral areas in the current forest management plan. The forest and mining industries have been advised of the proposal. To date, neither industry has raised any concerns. MNR is working with the local traditional users, members of TTN and MCFN, to ensure they understand that certain lands are being added to the park and that traditional uses will continue. The Replacement Lands to be added to the park are within a Sustainable Forest Licence (SFL) area held by Abitibi River Forest Management Inc., which is a co-operative made up of several companies and First Nation organizations. An SFL amendment to remove these lands from the SFL land base is in progress. The Replacement Lands were withdrawn from staking under the *Mining Act* on June 22, 2009. MNR, TTN and OPG worked together on a Crown land use policy atlas amendment proposal. On November 21, 2011, MNR posted a policy proposal on the Environmental Registry for a major land use amendment to re-designate portions of LAPP and the adjacent Northern Resource and Commercial Recreation General Use Area to enable a boundary regulation change. Provincial, regional and local stakeholders were notified by mail of this policy proposal. No comments were received during this involvement opportunity. The land use amendment was approved on April 13, 2013 and a decision has been posted on the Environmental Registry to reconfigure the park boundary that will increase the overall size and enhance ecological integrity of the park. The MNR boundary amendment process is proceeding internally with an expected date for regulation early in 2014.

Outside of LAPP, the balance of the lands that are proposed as part of the proposed Project are located within the general Crown land use areas G1745, G1754 and G1762 (MNR, 2007).

G1754 is known as the “Northern Resource and Commercial Recreation Area” and extends over a large area from the Quebec/Ontario border to the Abitibi River. Commercial power development is permitted in this Area and MNR will remain involved in the planning and design of future hydro-electric power proposals. The penstocks, access road, some of the inundation and most of the construction laydown areas will be located in this Area.

G1762 is known as the “Abitibi, Frederickhouse, Driftwood & Onakawana Rivers Area” and includes the Abitibi River and its tributaries north of Highway 11 including 120 m of shoreline on each side. The majority of the land in this area is Crown land. Commercial power development is permitted in this Area. The powerhouse would be located in this area as well as short segments of the penstocks and transmission lines.

G1745 is known as the “Southern Resource Area” and extends over a wide area in Cochrane, Kirkland Lake, Timmins and Hearst Districts. In this area G1745 occurs west of the Abitibi River. Commercial power development is permitted in this Area. The transmission line would be located in this Area.

OPG has an existing Crown Lease for the New Post Creek Diversion Dam located on the Little Abitibi River and a Land Use Permit for the Otter Rapids Road bridge across New Post Creek.

The operation of dams and hydroelectric generating stations within the Abitibi River drainage basin must be in compliance with the Abitibi River WMP (OPG *et al.*, 2006).

3.3.3 Local Socio-Economic Uses

Local Settlements

Approximately 10 to 15 km southwest of the proposed Project site are the former communities known as Abitibi Canyon and Fraserdale. The community of Abitibi Canyon was originally a small community that housed the families of the individuals that worked at Abitibi Canyon GS and Otter Rapids GS. Abitibi Canyon is located approximately 10 km south of the proposed Project site. In 1982 Ontario Hydro closed the community as a cost-saving measure. OPG maintains a bunkhouse facility at Abitibi Canyon for workers at the Otter Rapids GS and Abitibi Canyon GS. This facility is open during the week.

Fraserdale, is a grouping of a few houses and cabins at a rail siding for the ONR. Fraserdale is located approximately 15 km southwest of the proposed Project site. There are a few houses, cabins and tent frames belonging to TTN and/or MCFN individuals. The dwellings are generally not permanently inhabited.

Access and Transportation

Access to Abitibi Canyon GS and Fraserdale is via provincial Highway 634 from Smooth Rock Falls. This is a provincially maintained highway.

Access to the proposed Project site from Abitibi Canyon GS is via the Otter Rapids Road at the 6 km mark and then an old clay trace forest industry operational road. OPG has done some limited maintenance on this clay trace road over the last few years to facilitate the EA studies for the proposed Project.

The Otter Rapids Road is used by a diversity of other resource users including the forest industry, trappers, hunters, anglers and other resources users. OPG maintains the Otter Rapids Road. The Otter Rapids Road is an access point for the Wetum winter road which was opened in January 2013. The road is used during the winter by the James Bay people and public to travel to Moosonee and Moose Factory.

Access to the transmission line would be on the west side of the Abitibi River. From Fraserdale the transmission line is accessible via the Little Long Road and then an unnamed forestry road.

In addition to access by Highway 634, the ONR provides passenger and freight services and stops at Fraserdale. The ONR is operated by the Ontario Northland Transportation Commission, a provincial Crown agency.

Forest Operations

Crown lands in the area that are not part of the Province's protected areas system are part of the recently amalgamated Abitibi River Forest. This Forest consists of the former Cochrane-Moose River, Smooth Rock Falls, Iroquois Falls and Nighthawk Forests. This Forest is managed by Abitibi River Forest Management Inc. (ARFMI) which has a SFL for it. ARFMI is a co-operative which is comprised by a number of shareholders of which the three largest are Resolute Forest Products with their newsprint mill in Iroquois Falls, Tembec with sawmills in Cochrane and Hearst and a newsprint facility in Kapuskasing, and Georgia Pacific which has an oriented strandboard mill in Englehart.

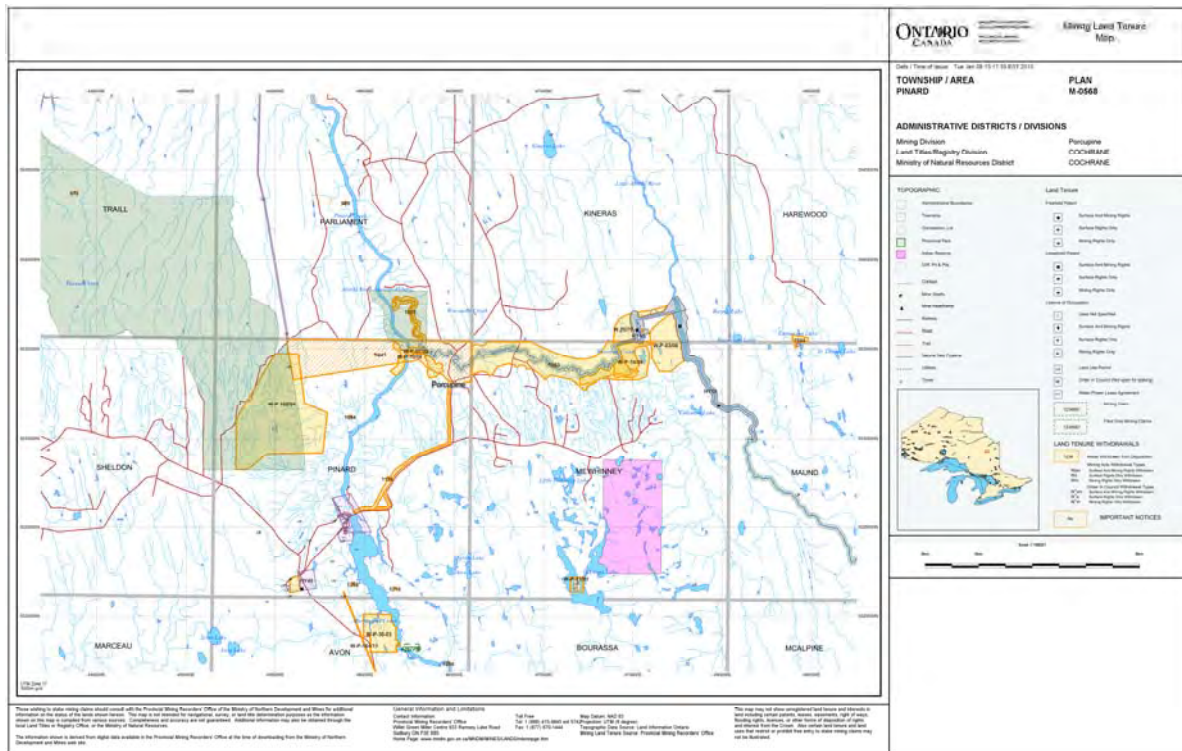
A Forest Management Plan for the Abitibi River Forest is prepared on a ten-year term. Most of the logging on the Abitibi River Forest is undertaken by two First Nations companies, Island Falls Forestry which is owned by TTN and Wahgoshig Resources which is owned by Wahgoshig First Nation.

Much of the forested area immediately around the proposed Project has been harvested. Most of the transmission line area has been harvested within the last 10 to 15 years.

Mining and Prospecting Activities

As shown in Figure 3.2, the local study area is devoid of mineral claims and prospecting activity. Lands associated with the proposed Project have been withdrawn from the mining claims process.

Figure 3.2 Mineral Claims in the Local Study Area



Cottaging

There is no cottaging in the immediate area around the proposed Project. A few members of TTN have camps on the TTN Reserve south of the Little Abitibi River, and a MCFN citizen has a trapping cabin approximately 500 m south of the proposed transmission line interconnection.

Recreational Angling

The MNR does not compile statistics on user days associated with fishing or other Crown land outdoor recreation activities. An economic study conducted for the MNR in 2003 estimated that the actual expenditures per person per day for fishing (for non-lodge, non-remote based fishing) were \$95.43, with a willingness to pay estimate of \$28.35, resulting in a total economic value of \$123.78 per day (Engel Consulting Group, 2002) or in 2011 dollars \$144.37.² Another study in Ontario done exclusively on remote lodge based fishing identified an economic value of \$146.57/day (Hunt *et al.*, 2005).

² Calculated using the Inflation Calculator from the Canadian Union of Public Employees website. Calculation is based on an increase of 16.63% in the Consumer Price Index for Canada, or a compound annual inflation rate of 1.94%.

Recreational Canoeing and Boating

For the purposes of this TSD, recreational canoeing and boating are defined as non-guided canoe or kayak tripping.

Most of New Post Creek is navigable by canoe from the New Post Creek Diversion Dam to the New Post Creek waterfalls. New Post Creek is a small segment of the larger LAPP River Route (158 km) which is described on the Canadian Canoe Routes website (<http://www.myccr.com>). The canoe route is described in detail on this website based on a trip undertaken by one canoeing party in 2001.

Ontario Parks and MNR do not collect user information for general Crown land and non-operating parks. Based on over 40 days in the field, the proposed Project EA field survey team did not observe a single canoe party in the area. Discussions with OPG operational staff and TTN representatives indicate that they have not observed canoeists on this route. However, at least one attendee at an Open House had undertaken a canoe trip down the Little Abitibi River and MNR staff have observed at least one party camping near New Post Creek waterfalls. Based on this information, it is opened that this stretch of New Post Creek is used very infrequently by canoeists.

Prior to the diversion, flows in New Post Creek were sufficient for canoeing only during the spring freshet and generally after significant rainfall events in the fall (P. Archibald, Sr., TTN, 2011, pers. comm.).

The Abitibi River is designated as a canoe route (MNR, 1991). However, many of the rapids previously present have been replaced by long stretches of flat water created by the hydroelectric dams at Island Falls, Abitibi Canyon and Otter Rapids. Moreover, from Otter Rapids to approximately the mouth of the Onakawana River (a distance of 60 km), the Abitibi River is unnavigable because of shallow water and dangerous rapids. Portage trails or roads are available to traverse canoes and gear around the generating stations.

Commercial Outfitting

The New Post Creek Falls location has been identified as a tourism destination by the www.northernontario.travel website under Wilderness Heritage Canoe Tours. Two tourism operators (Howling Wolf Expeditions, Northern Spirit Adventures) provide half, full and/or two-day trips to “New Post Falls” and New Post.

Northern Spirit Adventures is a company operated by an OPG NEPG employee. This individual takes guests on tours in northeastern Ontario in large traditional voyageur canoes and in traditional voyageur clothing. The company does take tourists on trips to New Post and New Post Creek waterfalls. The operator of this business has spoken to OPG about the proposed Project and his main interest was in ensuring that some water would continue to flow over New

Post Creek waterfalls especially in September. The comments submitted by this individual and the subsequent disposition are presented in the Public and Agency Consultation TSD.

Howling Wolf Expeditions based out of Smooth Rock Falls offers guided canoe, kayak, water rafting and winter trips in northeastern Ontario but generally concentrated in the Mattagami, Moose and Abitibi River systems. New Post Creek waterfalls is part of their suite of routes. The owner of this business has spoken to CRP. The comments submitted by this individual and the subsequent disposition are presented in the Public and Agency Consultation TSD.

Hunting

Hunting in this area of northern Ontario is typically for moose, bear and small game (e.g., grouse and partridge). Moose hunting is the most popular activity undertaken by both residents and non-residents. Bear hunting is typically undertaken by non-residents of Ontario. Small game hunting is undertaken by both residents and non-residents.

The MNR does not compile statistics on user days associated with hunting or most other Crown land outdoor recreation activities. An economic study conducted for the MNR in 2003 estimated that the actual expenditures per person per day for hunting were \$52.40; a willingness to pay estimate of \$17.70 resulted in a total economic value of \$70.10 per day (Engel Consulting Group, 2002). In 2011 dollars this was \$81.76. These estimates were largely derived from non-lodge based visitors. It is likely that the actual economic values are more than double the value of the estimates for lodge or guided visitors. Other economic studies on sport hunting conducted in Canada have reported similar hunting values. One paper, which summarized values from ten economic studies, put the small game hunting value at \$55.97/day (indexed to 1997 dollars) (Walsh *et al.*, 1992). Two studies on black bear hunting in British Columbia put the value at \$84.77/day (indexed to 2007 dollars) (Reid, 1996). A 1998 study on Moose hunting in Ontario identified a value of \$232.57 to \$279.09 per trip (Sarker and Surey, 1998).

Bear Management Areas (BMAs) have been established by the local MNR offices. These BMAs are allocated and licensed to hunting outfitters on Crown lands. Bear hunt camps may be allocated to commercial operators in the area under a Mini-land Use Permit during the open bear season. The proposed New Post Creek Project site occurs within BMA CC-26-015. This commercial BMA operator actively hunts bear at the end of the access road to the proposed intake location. TTN has indicated that few if any members hunt bear as it is considered a sacred animal.

Trapping

Trapping is a common traditional activity in northern Ontario undertaken by both Aboriginal and non-Aboriginal peoples. Today, trapping is perhaps more important as a social, cultural and personal activity than it is as an economic one. Typical furbearer species targeted by trappers in the Abitibi Forest include marten, beaver, mink, muskrat, fox, lynx, fisher, weasel, red squirrel and otter.

All of the traplines in the local study area belong to First Nation individuals and therefore the discussion on the effects of the proposed Project on trapping are discussed in the First Nation and Métis Interests and Consultation TSD. All the traplines belong to TTN members except for one trapline held by a MCFN citizen on the west side of the Abitibi River in the area of the proposed transmission line.

The construction of the proposed Project including the intake, a portion of the headpond, penstocks, powerhouse, and most of the transmission line is wholly contained within a trapline belonging to a TTN member. A small segment of the transmission line would be located within a trapline held by a MCFN citizen. The Replacements Lands for LAPP and a portion of the headpond are located wholly within another TTN member's trapline.

Other Recreational Uses

The only other use that appears to occur at New Post Creek waterfalls is the occasional visit by day trippers. The proposed Project EA field study team has observed the odd person at the waterfalls that appeared to access a trail through LAPP. This was also mentioned by one or two individuals at the Smooth Rock Falls Open House. As the road network to get to the trail is not obvious or maintained, this day use must only occur by local residents (i.e., not tourists) who are familiar with the area.

4.0 SOCIO-ECONOMIC EFFECTS ASSESSMENT

4.1 REGIONAL SOCIO-ECONOMIC EFFECTS

4.1.1 Construction Phase

The proposed Project will have a positive economic impact on the Province, northeastern Ontario and locally in Cochrane District. Positive letters of support have been provided by local Mayors in Cochrane District and appear in the Appendices of the Public and Agency Consultation TSD.

The proposed Project, noted as a “Project Under Consideration” is mentioned in and is wholly compatible with Ontario’s Long Term Energy Plan (Ontario Ministry of Energy, 2010) and offers a substantial opportunity to create approximately 25 MW of power which translates to approximately 125 GWh/year of renewable energy. At full capacity this will meet the needs of 25,000 homes in Ontario.

The proposed Project is expected to result in the creation of 150 to 200 person years of work over an approximately 2.5 year construction period. This employment will be distributed across a wide variety of professions and trades typically associated with a remote heavy construction project. Large labour needs will include: engineers, equipment operators (e.g., backhoe, crane, dozer), labourers (e.g., general, skilled and unskilled), drillers, cement workers, ironworkers/rodmen, electricians, welders, carpenters and camp support services (e.g., catering, maintenance, drivers, clerical).

The extent to which labour requirements for the proposed Project are to be filled by the regional labour market (i.e., within Cochrane District) will be a function of several factors: union requirements; the match of skill requirements of the Project to local labour supply; quantitative labour needs; existence of other projects in the study; and the degree of worker interest in being employed on the Project. All these factors will contribute to the amount of regional labour used on the proposed Project.

Recent OPG experience on the Lower Mattagami Project indicates that approximately 60% of the total labour requirement for the on-site work would be met by the labour market in northern Ontario (Shantz, 2012). The labour required from outside of northern Ontario would be generally managerial, professional and technical professions related to hydroelectric and other large construction projects.

For a construction project, OPG requires that all labour associated with the proposed Project be members of the unions with which it has collective agreements in place. The Electrical Power Systems Construction Association (EPSCA) negotiates and administers collective agreements with the Building Trades for OPG and all contractors performing trades work on OPG projects.

The unions covered under the EPSCA agreement vary from highly specialized workers such as electricians to more generalist trades such as labourers. Local individuals who are qualified to do work but are not union members would be required to join the union that represents their trade.

Opportunities for the region and in particular the local Aboriginal populations to capture a higher proportion of the labour opportunities would be partially dependent on workers ensuring that they are trained and qualified to perform in some of the higher skilled job categories.

Additional indirect and induced employment will also be created as a result of the proposed Project, particularly in sectors associated with the supply of construction materials and the provision of goods and services to the Project and associated workforce. Based on other recent OPG hydroelectric projects in northern Ontario, for every direct job associated with the proposed Project another 0.65 person years of employment will be generated elsewhere in northeastern Ontario.³

Economic and business activity effects are all the economic effects associated with sub-contracting opportunities on the proposed Project to the DBC and also the indirect and induced economic effects associated with the Project on the regional economy. Opportunities for existing local businesses and the regional economy will come via contracting work, as well as local Project purchasing and expenditures by workers in the local and regional economy.

Based on previous projects, OPG has estimated that slightly less than one-third of the total expenditure of the proposed Project is likely to occur in a region such as northeastern Ontario. The balance of the expenditure will occur elsewhere in Ontario, Canada and internationally; the ratios of which are somewhat dependent on the selected DBC for the proposed Project.

Some of the more common businesses or sectors in the local and regional economies that will benefit from this proposed Project include:

- Other construction and construction supply (e.g., building or aggregate supply) companies;
- Local accommodation suppliers (e.g., motels) as short-term workers on the proposed Project visit the area;
- Business, professional and personal services companies that are likely going to experience increased levels of activity;
- Transportation related companies that are likely to experience an increased level of business; and
- Local and regional retail (e.g., convenience stores, grocery stores, drug stores) and food services industries (e.g., restaurants, bars, grocery stores) that will benefit from worker expenditures at these businesses.

³ These regional multipliers are taken from SENES estimates of OPG hydroelectric projects in northeastern Ontario and were derived from the use of an economic impact model used in Timmins and Kapuskasing.

Based on other socio-economic studies on hydroelectric projects in northern Ontario, it is estimated that the sales multiplier associated with the proposed Project will be \$1.50, i.e., for every dollar expended on the Project an additional \$0.50 will be spent within northern Ontario.

It should also be noted that the proposed Project will have additional positive economic benefits for TTN. TTN will benefit both as a partner in the proposed Project and through TTN business and employment opportunities. The proposed New Post Creek Project Team is working to ensure that TTN employment and contracting opportunities are maximized.

Little to no effect is expected on the population, demographic or social composition of local communities such as Smooth Rock Falls or Cochrane because of the proposed Project. It is expected that the proposed Project could require a camp, with the camp located at Abitibi Canyon. While the majority of workers are likely to come from various locations in northeastern Ontario, it would be expected that few if any would re-locate their home residences for the purposes of the proposed Project. It is possible that the employment opportunities created by the proposed Project might allow some people from the nearby communities to continue to live in those communities should other employment opportunities not be available.

4.1.2 Operational Phase

The proposed Project will be operated remotely from the OPG NECC and there will be no permanent staff at the facility. However, staff from the Abitibi Canyon will likely be required to undertake periodic maintenance activities. As such, it may have a positive effect on employment levels.

Over the life of the proposed Project, it is expected that the Province will earn approximately \$150 million in gross revenue charges from water royalties.

4.2 LOCAL SOCIO-ECONOMIC EFFECTS

4.2.1 Proposed Land Use and Tenure

Based on a review of all the relevant Crown Land Use Area Policies, the proposed Project and its ancillary activities are permitted and wholly consistent with the existing land use direction for the area and the PPS (OMMAH, 2005), with the exception of a small part of the Project that is proposed within LAPP.

4.2.1.1 Little Abitibi Provincial Park

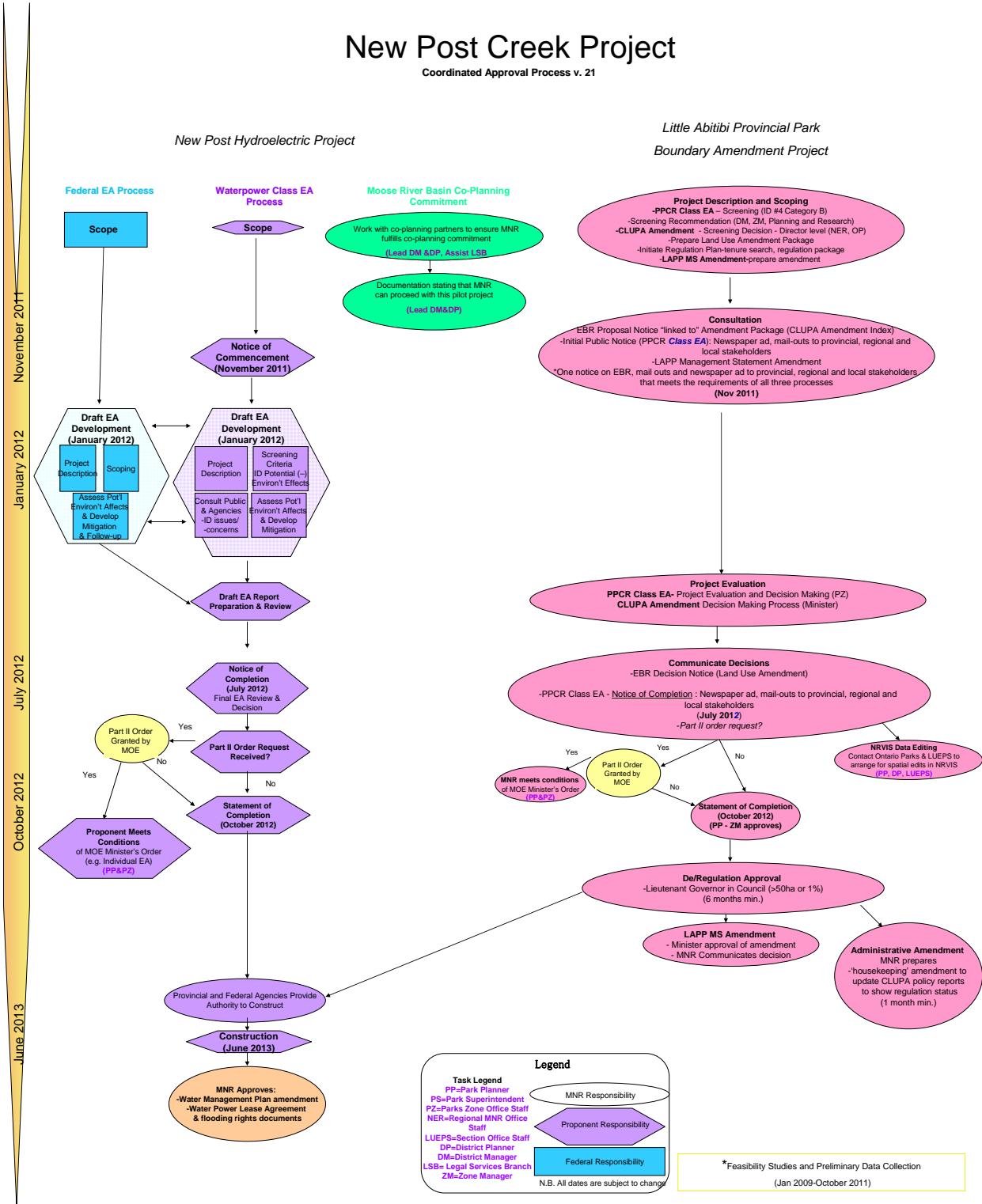
As indicated in Section 2.1, a small portion of the proposed Project was to be constructed within LAPP and this would be in contravention of the *PPCRA*. The area of LAPP that was deregulated to facilitate proposed Project development is approximately 228 ha, representing approximately 1.1% of the original total park area of 20,296 ha. In return, an area of 440 ha has

been added as Replacement Lands to the Park, resulting in the current total park area of approximately 20,508 ha.

As indicated in Section 2.1, OPG, CRP and TTN had been working with MNR and Ontario Parks since 2006 to: (i) discuss mechanisms for allowing the hydroelectric facility to be built on lands currently within LAPP, and (ii) discuss the required site release process since the existing MNR Site Release Process does not allow for this. As well because the proposed Project is within the Moose River Basin, the Project needed to meet the requirements of co-planning as discussed in Section 4.2.1.2. OPG, CRP and TTN came to an agreement with MNR and Ontario Parks for a coordinated process to deregulate a small portion out of LAPP and regulate the Replacement Lands into LAPP. This required that the OWA Class EA for the proposed Project be coordinated with the MNR Class EA. As well, since the proposed New Post Creek Project does not meet the existing MNR Site Release Policy or Guidelines, MNR agreed to release the site as a 'pilot' to co-planning. Based on the Coordinated Regulatory Approval Process (see Figure 4.1), consultation activities, such as Aboriginal consultation, community meetings and public open houses, were coordinated for the OWA Class EA and the MNR Class EA.

More specifically, it was agreed that if lands currently in LAPP were required for the proposed Project then certain other suitable Replacement Lands must be proposed to be incorporated into the Park and accepted in accordance with the *PPCRA*. TTN, MNR and Ontario Parks participated in the identification of Replacement Lands that would compensate for the deregulation of the small portion of land related to the proposed Project. A Coordinated Regulatory Approval Process was agreed to by OPG, CRP, TTN, MNR and Ontario Parks (see Figure 4.1). OPG and CRP conducted the EA for the proposed New Post Creek Project according to the OWA (2011) Class EA. MNR committed to ensuring that their EA requirements under the MNR (2005) Class EA, amendments required under the Crown Land Use Policy Atlas and other MNR assessments were co-ordinated with the OWA Class EA. A New Post Creek Task Team comprised of a TTN member, and individual representatives from OPG/CRP, MNR and Ontario Parks was established to implement the Coordinated Regulatory Approval Process prior to the proposed Project entering Definition Phase. Figure 4.1 also includes the Moose River Basin co-planning commitment, which is further discussed in Section 4.2.1.2. Note that the diagram allows for the harmonization of the OWA Class EA with a federal EA. As indicated in Section 2.1, the proposed New Post Creek Project is not subject to a federal EA process.

Figure 4.1 New Post Creek Project Coordinated Approval Process



4.2.1.2 Hydroelectric Development in the Moose River Basin

In a letter to the Chairman of the Moose River/James Bay Coalition, from then Minister of Environment and Energy, Bud Wildman, the provincial government agreed that “within the Moose River Basin north of Highway 11, there will be no hydroelectric development beyond Ontario Hydro’s Mattagami River Hydroelectric Station Extensions project until such time as a co-planning process has been developed, agreed to and applied by the affected First Nations and Ontario”. More recent correspondence (August 1, 2007) from A/Assistant Deputy Minister David de Launay of the MNR invited discussion on the Moose River Basin Co-planning Commitment, and proposed to MCFN, TTN and MoCreebec Council of the Cree Nation (MoCreebec) that (1) lands within the Moose River Basin north of Highway 11 could be directly allocated where such applications for new hydroelectric projects are proposed by the local First Nation and/or their development partner; (2) there not be a megawatt limit on the installed capacity of a project; and (3) the current Northern Rivers Policy for the Albany, Winisk, Attawapiskat and Severn Rivers remain in place for the time being.

Subsequently, the MCFN, in a written agreement with TTN, acknowledged receipt of both of the above letters, and agreed to support the proposed New Post Creek Project. Further, the MCFN agreed that the proposed Project could proceed as an exception to the Co-Planning Commitment. Subsequently, MCFN have had substantial involvement in the proposed Project. A Joint Working Group (JWG) was established prior to the commencement of the EA that includes membership of MCFN, TTN, CRP and OPG. A MCFN representative has been hired to work on the proposed New Post Creek Project acting as an MCFN Coordinator on the JWG and identifying relevant MCFN issues to the New Post Creek Project Team. As well, two consultation sessions were held in Moose Factory. In addition, the MCFN trapper, whose trapline is overlapped by the proposed transmission line, has also been consulted.

Similarly, MoCreebec has provided a letter of support to TTN for the proposed New Post Creek Project in light of the co-planning discussions.

4.2.1.3 Other Land Use and Tenure

OPG currently has a LO for a section of New Post Creek in the vicinity of the New Post Creek Diversion Dam. Various Land Use Permits, Crown Leases and a Construction Lease will be required from MNR under the *Public Lands Act* to allow for short-term tenure authorizing the occupation of Crown land for construction of the proposed Project. Plans and Specifications are required for the construction of the proposed waterpower facility.

A Location Approval is required for the approved use of the proposed Project site for waterpower generation (not construction). As well, CRP/OPG will need to obtain a Waterpower Lease Agreement for the proposed Project once construction is completed and the site is in-service. A new Easement will be required for the proposed inundation area.

A Land Use Permit or an Easement will also be required under the *Public Lands Act* for the transmission line. A Letter of Authority can also be provided by the MNR for the construction of the transmission line in correspondence with a Land Use Permit or Easement.

4.2.2 Access and Transportation

Access to Abitibi Canyon GS and Fraserdale is via provincial highway #634 from Smooth Rock Falls. This is a provincially maintained highway.

Access to the site from Abitibi Canyon GS is via the Otter Rapids Road and then a clay trace site access road. OPG currently maintains the Otter Rapids Road and would continue to do so during the construction period for the proposed Project. The road is deemed sufficient for the purposes of the proposed Project.

The clay trace road from the Otter Rapids Road to the proposed site of the GS will need to be upgraded for the proposed Project. This will be undertaken by the DBC.

Access to the transmission line would be on the west side of the Abitibi River. From Fraserdale the transmission line is accessible via the Branch Road #1 and then an unnamed forestry road. These roads are in good condition and will likely be sufficient for the construction of the transmission line.

With respect to traffic, the operation of the proposed GS will be remotely controlled at OPG NECC and permanent staffing will not be required. However, OPG staff will periodically visit the station to undertake maintenance, minor repairs and tests. It is anticipated that there will be only a couple trips to the proposed GS per week and therefore the incremental traffic on an already lightly used road will be insignificant.

As previously indicated OPG/CRP anticipates that the DBC will establish a workers camp at Abitibi Canyon. Some workers could commute from their homes to the camp. In general, workers will travel from the camp to the work site on a semi-regular basis. Most of the workers will remain at the work site during the day and therefore traffic movement between Abitibi Canyon and the construction site will be controlled and limited.

It should be noted that all roads will have a half load restriction from mid-April to June, 1.

4.2.3 Social and Economic Uses

Forest Resources

The SFL for the recently amalgamated Abitibi River Forest will be amended by the MNR through a separate process to change the boundary of the licensed area to account for the proposed Project property.

A Forest Resource Licence (FRL) would be required from MNR to harvest the timber associated with all aspects of the proposed Project. Wood would have to be skidded out to the existing roads to allow it to be utilized.

It is expected that MNR will determine which forest processing facilities the wood would be directed to at the time of harvest. Depending on when the harvest occurs and the state of markets for forest products in northeastern Ontario, there may not enough volume to be easily marketable, particularly given its location farther from the mills. Therefore, one other option may be to provide the non-economic volume(s) to local TTN or MCFN people.

Stumpage fees would be due to the Crown on the merchantable volumes. Compensation is required and the dollars collected are to go into the appropriate Forest Renewal Trust account. Cochrane District MNR would set the general rule for the \$/ha required for artificially-regenerated Crown lands lost to clearing activities. This would be negotiated based on the FRL.

Mining and Prospecting Activities

As indicated in Section 3.3.3, describing the baseline conditions, there are no mineral claims at or near the proposed Project or in the vicinity of the Replacement Lands; and therefore, there will be no effect to mining and prospecting activities. MNR, working through the Ontario Ministry of Northern Development and Mining, has alienated lands to ensure that there are no new claims in the vicinity of the proposed transmission line, the generating facility including the inundated area and the Replacement Lands.

Recreational Angling

Angling does reportedly occur in the stretch of the Abitibi River from Abitibi Canyon to Otter Rapids. The OPG/CRP consultant team has noticed the odd angler in this stretch. Angling in New Post Creek below the New Post Creek waterfalls is also likely. It would be expected that the main target fish of sport anglers is walleye. The proposed Project will not affect sport fishing for walleye in the Abitibi River and below the New Post Creek waterfalls, and this activity will likely continue to occur. The proposed operating regime ensures that walleye spawning habitat will be maintained and during some years enhanced.

The proposed Project would exclude public fishing in the stretch of New Post Creek from the intake to New Post Creek waterfalls, as it will effectively become a spillway should the generating station shut off. As such, fishing in the creek would be very dangerous and contrary to OPG's public safety objectives. As documented in the Aquatic Environment TSD, New Post Creek supports a sparse (primarily non-sport) fish community. As public fishing has not been observed in New Post Creek, the proposed restrictions for public safety would not likely affect any anglers.

SENES would also make the point that marginal angling opportunities in northeastern Ontario are not limited by supply.⁴ There are hundreds of areas available for fishing in northeastern Ontario. While remote angling opportunities may be limited, non-remote opportunities would not be. As such, it is opined that the proposed operating regime would not negatively affect the low value of recreational angling in New Post Creek above the waterfalls.

Because of the area's general importance as fishing, wilderness and recreation area it is important that workers associated with the proposed Project not degrade the experience of other users. Therefore, it is recommended that subcontractors and employees of the DBC be restricted from fishing at the proposed Project site during the duration of the construction period. As well, overnight trailers and stays by workers will not be permitted.

Recreational Canoeing and Boating

While existing canoeing and boating use on New Post Creek is negligible, it is known to occur and OPG/CRP would not want canoeists utilizing the spillway (New Post Creek downstream of the proposed intake weir location) as a canoe route. Therefore, it is recommended that CRP/OPG develop a portage from upstream of the intake on New Post Creek to the Abitibi River. This alternative portage trail approximately 1 km long from New Post Creek to the Abitibi River could be provided to the south of the proposed Project site to facilitate further access for canoeists to LAPP. This alternative would enhance public safety by precluding the need to portage around the proposed Project intake weir on the east side of New Post Creek, and to locate and access the difficult portage around the waterfalls. The areas associated with the proposed alternative portage would be delineated by public safety measures such as booms, buoys and signage, in accordance with MNR and OPG dam safety requirements.

Prior to initiation of construction of the proposed Project, the DBC will identify disembark/launch locations (with appropriate signage) for canoeists to access the new portage trail between New Post Creek and the Abitibi River during the construction period. A map showing the proposed location of the new portage trail will be provided to Ontario Parks and MNR for review and approval. The disembark/launch location on New Post Creek will subsequently likely need to be relocated due to the proposed inundation and the final portage trail location between New Post Creek and the Abitibi River will be discussed with Ontario Parks during the construction phase.

⁴ The concept of available outdoor recreation opportunities should be considered from the perspective of demand and supply. Supply of outdoor recreational opportunities such as canoeing areas, hiking trails and fishing lakes will be more constrained closer to the large populations of southern Ontario. As such, wilderness or semi-wilderness opportunities are much more limited near large population centres and are most evident in the demand and use for parks and wilderness areas such as Algonquin Park or the Kawartha Highlands which are located in close proximity to southern Ontario populations. However, as has been demonstrated by basic travel cost models and Ontario Parks visitor statistics use is highest in areas near southern Ontario. In northern Ontario the supply of wilderness areas increases relative to the demand to the point where most areas are relatively interchangeable in terms of meeting demands and needs (i.e., walleye fishing). The exception to this may be highly unique landforms or ecological features that are marketable on their own (e.g., Temagami, Lake Superior Provincial Park).

Given that the canoeing use is negligible and a portage established, there would be considered no loss of use and therefore no cost (or loss of economic value) to the canoeists.

Commercial Outfitting

As indicated in Section 3.3.3, two tourism operators (Howling Wolf Expeditions and Northern Spirit Adventures) provide half, full and two-day trips to “New Post Falls” and HBC New Post. The outfitters host a few to several trips to the waterfalls each year. Neither of the outfitters relies solely on New Post Creek waterfalls for their business or income.

OPG and CRP recognize that flow over New Post Creek waterfalls is part of the experiences package that these outfitters are selling to guests. The proposed operating regime will reduce flows over New Post Creek waterfalls with proposed minimum operating flows of $7.5 \text{ m}^3/\text{s}$ in July and August and $5 \text{ m}^3/\text{s}$ in September that will provide a continuous flow and would exceed the historical flow in the creek (estimated mean of $3.6 \text{ m}^3/\text{s}$).

Reduction of flows over the waterfalls to historic levels may possibly diminish visitor experience appreciation value, particularly with respect to the mist generated by the waterfalls. Although no visual record of the waterfalls is available for the proposed minimum flows of 7.5 and $5 \text{ m}^3/\text{s}$ during the summer period, the waterfalls did generate appreciable mist during an average daily flow of $9.17 \text{ m}^3/\text{s}$ (see Photograph 4.1). Appreciable mist generation is also expected at the minimum flows of 7.5 and $5 \text{ m}^3/\text{s}$.

**Photograph 4.1 New Post Creek Waterfalls, September 17, 2011,
Average Daily Flow of $9.17 \text{ m}^3/\text{s}$**



A reduction of water flowing over New Post Creek waterfalls due to the proposed New Post Creek Project would result in flows more typical of natural conditions as recalled by TTN Elders prior to the diversion of the Little Abitibi River (P. Archibald Sr., TTN, 2011, pers. comm.). As described by Bell (1904), “an interesting fall is that on the Blue Water river or New Post brook just behind New Post. At this point the small stream enters the Abitibi with an almost vertical fall of ninety feet, flowing directly over the edge of the plateau in a veritable hanging valley” (see Photograph 4.2).

Photograph 4.2 New Post Creek Waterfalls, 1899 (Bell, 1904)



It should be noted that an individual who describes himself as a “friend of the falls” requested additional information on the potential effects of the proposed minimum flows on the scenic value of the New Post Creek waterfalls. Based on the detailed information provided to him by CRP (including Photographs 3.4 and 4.1), he responded with the following: “Thanks so much for the thorough letter and information. Great job. I now know the story....there still will be a falls.” It should also be noted that the New Post Creek waterfalls was not included in a recent inventory of over 425 waterfalls in Ontario (Harris, 2011).

It is anticipated that the minimum flows of 7.5 and 5 m³/s over the New Post Creek waterfalls will continue to generate appreciable mist and provide a rewarding experience for visitors.

If it was desired by MNR, CRP/OPG could work with the Ministry and do a comparison of the relative economic benefits of and impacts on the tourist operations and the proposed New Post Creek Project. While the presence of the one business does not have to preclude the other (as

discussed above), it could be useful to show the current and projected revenue contribution of both.

Hunting

As indicated earlier, moose, bear and small game hunting occur in the local study area.

During the construction period it is likely that game animals may be disturbed from the immediate area of the proposed Project by noise and traffic but this effect will be limited to the construction site and the immediate area around it (i.e., circumference of approximately 1 km). In order to ensure both worker and hunter safety there will be no hunting in the immediate area of the proposed Project. Both of these effects will be very localized and will only result in a negligible effect on hunting.

Because of the area's importance as a hunting area it is important that workers associated with the Construction Phase of the proposed Project not degrade the experience of these other users. Therefore, it is recommended that contractors and employees of the DBC be restricted from fishing and hunting at the site during the duration of the construction period. As well, overnight trailers and stays by workers will not be permitted.

During the operation period of the proposed Project it is not expected that there will be any effect on game animals.

Trapping

As indicated previously, all the trappers in the vicinity of the proposed Project are members of TTN except for one trapper who is a MCFN citizen. The construction of the proposed Project including the intake, headpond, penstocks, powerhouse and most of the transmission line is wholly contained within the trapline of a TTN Trapper with a small segment of the transmission line located within the trapline of the MCFN citizen. The Replacements Lands for LAPP are located wholly within a trapline of another TTN member.

During the full two to three year construction period, it is expected that fur bearing wildlife will leave the area of construction being disturbed by the noise and heavy equipment in the areas around the proposed Project footprint. This effect could be extended up to 1 km from the footprint. This same effect would occur for the transmission line but the effect would be limited to the construction period of less than six months.

None of the trap cabins will be affected by the proposed Project.

OPG/CRP is having direct discussions with the three Trappers with respect to any mitigation and compensation associated with the effects on their traplines.

Other Recreational Uses

The proposed Project will not displace or disrupt any snowmobile trails in the region.

As Crown land camping does not occur directly at the proposed Project site or along the transmission corridor, there will be no effect on this activity.

4.2.4 Conclusion

The proposed Project is wholly compatible with Ontario's Long Term Energy Plan (Ontario Ministry of Energy, 2010) and offers a substantial opportunity to create approximately 25 MW of power which translates to approximately 125 GWh/year of renewable energy. At full capacity this will meet the needs of 25,000 homes in Ontario.

The proposed Project is expected to result in the creation of 150 to 200 person years of work over an approximately two year construction period. This employment will be distributed across a wide variety of professions and trades typically associated with a remote heavy construction project. Recent OPG experience on the Lower Mattagami Project indicates that approximately 60% of the total labour requirement for the on-site work would be met by the labour market in northern Ontario. It is likely that many of the workers currently working on the Lower Mattagami Project from northeastern Ontario communities will be employed on the proposed Project as they are qualified, local and have directly relevant experience.

Economic and business activity effects are all the economic effects associated with sub-contracting opportunities on the proposed Project to the DBC and also the indirect and induced economic effects associated with the Project on the regional economy. Opportunities for existing local businesses and the regional economy will come via contracting work, local Project purchasing and expenditures by workers in the local and regional economy.

The proposed New Post Creek Project provides some unique opportunities for economic and social development for TTN and its members. TTN's equity share in the proposed Project will provide a steady flow of revenue to use as a source on which to build future development within TTN Traditional Territory. The proposed Project will also have a positive economic benefit for TTN through partnership in the Project and from employment, business and contracting opportunities during the Construction Phase. Employment and contracting opportunities will also be available for other First Nation and Métis communities.

The proposed Project is consistent with the existing Crown land use direction for the area but requires the deregulation of a small area in LAPP. However, Replacement Lands have been identified that will result in an increase in Park area and overall improvement in ecological integrity.

Two traplines utilized by TTN members will be affected by the proposed Project, with the intake, penstocks, powerhouse, a portion of the headpond and most of the transmission line located in

one trapline, whereas a portion of the headpond and the Replacement Lands are located within the other trapline. A third trapline utilized by a MCFN citizen also overlaps the proposed transmission line. Discussions with the three Trappers are ongoing with respect to mitigation.

For the most part the proposed Project will have minimal effect on other land and resource uses with the exception of two small outfitting businesses which occasionally visit the New Post Creek waterfalls with clients. Minimum flows of 7.5 and 5 m³/s in New Post Creek have been proposed for July/August and September, respectively, that will be less than that current flows (mean summer flow of ~34 m³/s). Reduction of flows over the waterfalls may possibly diminish visitor experience appreciation value, particularly with respect to mist generation. However, this reduction would result in flows more typical of natural conditions as recalled by TTN Elders prior to the diversion of the Little Abitibi River (estimated mean historic summer flow of 3.6 m³/s). As described by Bell (1904), “an interesting fall is that on the Blue Water river or New Post brook just behind New Post. At this point, the small stream enters the Abitibi with an almost vertical fall of ninety feet, flowing directly over the edge of the plateau in a veritable hanging valley.” It is anticipated that the minimum flows of 7.5 and 5 m³/s over the New Post Creek waterfalls will continue to generate appreciable mist and provide a rewarding experience for visitors. Maintaining the current summer flows would make this proposed Project not viable and therefore should the Project not be constructed, the positive benefits noted above, including those potentially accruing to TTN and the local, regional and provincial economy, would not materialize.

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6.0 ACRONYMS AND ABBREVIATIONS

&	And (ampersand)
~	Approximately
\$	Dollar
<	Less than
#	Number
+	Plus
AANDC	Aboriginal Affairs and Northern Development Canada
AoC	Area of Concern
A/Assistant	Acting Assistant
ARFMI	Abitibi River Forest Management Inc.
ATV	All-terrain vehicle
Beacon	Beacon Environmental
BMA	Bear Management Area
c.	Chapter
CEAA	<i>Canadian Environmental Assessment Act</i>
CEAA 2012	<i>Canadian Environmental Assessment Act, 2012</i>
CRP	Coral Rapids Power Inc.
DBC	Design Build Contractor
e.g.	For example (exempli gratia)
EA	Environmental Assessment
<i>EA Act</i>	<i>Environmental Assessment Act</i>
Eds.	Editors
EPSCA	Electric Power Systems Construction Association
ER	Environmental Report
<i>et al.</i>	And others (et alia)
FRL	Forest Resource Licence
FSL	Full Supply Level
GS	Generating Station
H	Horizontal
HBC	Hudson's Bay Company
Hydro One	Hydro One Networks Inc.
i.e.	That is (id est)
IESO	Independent Electricity System Operator
Inc.	Incorporated
JWG	Joint Working Group
KGS Group	Kontzamanis, Graumaun, Smith, MacMillan Inc.
LAPP	Little Abitibi Provincial Park
LO	Licence of Occupation
Lower Mattagami Project	Lower Mattagami Re-Development Project
Ltd.	Limited
MCFN	Moose Cree First Nation

MNDMF	Ontario Ministry of Northern Development, Mines and Forestry
MNR	Ontario Ministry of Natural Resources
MNR Class EA	Class Environmental Assessment for Provincial Parks and Conservation Reserves
MoCreebec	MoCreebec Council of the Cree Nation
MOE	Ontario Ministry of the Environment
MOI	Ontario Ministry of Infrastructure
MoU	Memorandum of Understanding
NA	Not applicable
NECC	North East Control Centre
NEPG	North East Plant Group
OMMAH	Ontario Ministry of Municipal Affairs and Housing
ONR	Ontario Northland Railway
O.Reg.	Ontario Regulation
OPG	Ontario Power Generation Inc.
OWA	Ontario Waterpower Association
OWA Class EA	Class Environmental Assessment for Waterpower Projects
p.	Page
pers. comm.	Personal communication
<i>PPCRA</i>	<i>Provincial Parks and Conservation Reserves Act</i>
PPS	Provincial Policy Statement
Project	New Post Creek Hydroelectric Project or New Post Creek Project
ROW	Right-of-way
S.C.	Statutes of Canada
SENES	SENES Consultants
SFL	Sustainable Forest Licence
SIA	System Impact Assessment
Sr.	Senior
TSD	Technical Support Document
TTN	Taykwa Tagamou Nation
V	Vertical
WMP	Water Management Plan

Measurement Units

\$/ha	dollar per hectare
GWh	gigawatt hour
H	hour
ha	hectare
km	kilometre
km ²	square kilometre
kV	kilovolt
m	metre
m.a.s.l.	metre above sea level
m ³	cubic metre
m ³ /s	cubic metre per second
MW	megawatt
%	percent
rpm	revolution per minute

7.0 GLOSSARY

Anode Cathodic Protection	Technique use to control corrosion of a metal surface by making it a cathode of an electrochemical cell by connecting the metal to be protected with another more easily corroded metal to act as the anode of the electrochemical cell.
AoC Prescription	Mitigation direction prescribed by the MNR to minimize or obviate a potential adverse effect on a habitat value or feature.
Bedload	The solid debris transported in a stream on or near its bed; because this material is too heavy to be carried in suspension, it is moved by rolling, sliding or saltation (sudden jumps) along the bottom.
Bulkhead	A steep or vertical wall retaining an embankment, often used to line shorelines, 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.)
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.
Crest gate (Control gate)	The gate that controls water flow into a hydroelectric dam.
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 turbine to its tailrace.
Dyke	Embankment against flooding.
Feldspar	A group of common aluminum silicate minerals that contains potassium, sodium or calcium; the most important group of rock-forming minerals, making up about 60% of the rocks of the earth's crust.
Forebay	The part of a dam's reservoir that is immediately upstream from the powerhouse.
Freshet	High flows caused by snow melt, runoff, heavy rains and/or high inflows.
Generator	A machine that changes water power, steam power, or other kinds of mechanical energy into electricity.

Geotechnical	Concerned with the physical properties of soil, rock and groundwater usually in relation to the design, construction and operation of engineered works.
Gneiss	A coarse-grained metamorphic rock commonly composed of quartz and feldspar, with lesser amounts of mica.
Granite	Medium to coarse grained igneous rock that is rich in quartz and potassium feldspar.
Head	The difference in elevation between the water surface at the intake and tailrace.
Headpond	The reservoir from which the hydroelectric facility draws water flow for generation.
Headwater	The section of a river or stream with the highest elevation above sea level.
Igneous	Rocks formed from the solidification of molten magma either beneath (intrusive igneous rock) or at (extrusive igneous rock) the earth's surface.
Intake	A structure which regulates the flow of water into a water-conveying conduit.
Lithification	Process by which sediments are consolidated into sedimentary rock.
Magma	Molten or fluid material generated from rock deep within the earth that may force its way upward into the crust (as igneous rock) or onto the surface (as lava).
Metamorphic	A rock that forms from the recrystallization of igneous, sedimentary or other metamorphic rocks through pressure increase, temperature rise, or chemical alteration.
Mica	Silicate mineral that exhibits a platy crystal structure and perfect cleavage.
Muskeg	A term describing a type of landscape, environment, vegetation and deposit; peatland and organic terrain are equivalent terms generally referring to northern landscapes characterized by a wet environment and vegetation (e.g., Black Spruce) botanically classified as mire (subdivided into bogs and fens).
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.
Pneumatic	Involving the mechanical properties associated with air or other gas pressure.
Powerhouse	A primary part of a hydroelectric facility where the turbines and generators are housed and where power is produced by falling water rotating the turbine blades.
Quartz	A mineral: an oxide of silicon which is abundant and widespread occurring as an important constituent in many igneous, sedimentary and metamorphic rocks.
Reservoir	A body of water collected and stored in an artificial lake behind a dam.
Riparian	Of or on a watercourse bank.
Runner	An enclosed water wheel that transforms the static and kinetic energy of the water into useful work.
Sedimentary	Rock formed by the deposition, alteration and/or compression and lithification of weathered rock debris, chemical precipitates, or organic sediments.
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).
Sluice gate	Gate used to regulate the flow of water through an opening usually used to pass water over or around dams.
Spillway	A passageway 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 spillwall must be capable of discharging major floods without damaging the dam while maintaining the reservoir level below some predetermined maximum level.
Stop log	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.

Till	Material derived from bedrock and overlying unconsolidated material and deposited directly by glacial ice with its characteristics dependent upon the source rock.
Trash rack	Bar screen with larger space openings installed to prevent logs, stumps and other larger 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.