Ranney Falls GS G3 Project (Project Number HDEV0024)

1 Recommendation

Approve the release of 6.1 $M (contingency included) to allow the Ranney Falls G3 Project (the **Project**) to proceed to the Definition Phase. The purpose of the Project is to safely decommission the end-of-life 0.8 MW unit at Ranney Falls Generation Station (**Ranney GS**) and construct a new 8 to 10 MW unit. This addition will increase the total station capacity from 10 MW to about 18 to 20 MW. Installing the G3 upgraded unit will result in an increase of 30 GWh in average annual energy from 50 GWh to 80 GWh. This Project compares favourably with other renewable electricity supply options and is aligned with OPG's mandate and the Ontario government's renewable energy and climate change policies. This Project also aligns with OPA direction as an opportunity to redevelop existing infrastructure. The released amount will be spent in 2012 to 2013 to complete the Definition Phase activities.

The Definition Phase deliverables include securing Environmental Assessment approvals, completing civil and water-to-wire designs, perform required technical investigations, complete the process of selecting the construction and installation contractors required to execute the Project. Deliverables will also include securing and arranging for completing Hydro One connection; and obtaining Project approval (Site License and Work Permit) from the Trent-Severn Waterway (TSW).

Following the Definition Phase, construction is currently targeted to commence by mid-2013, and requires about 30 months with a tentative in-service date by the end of 2015 at a total Project cost of about 48.7 $M (including [redacted] contingency), [redacted] to [redacted]. This estimate has been developed by the project team and is based on consultants' and contractors' budgetary estimates. This Project is in the 2012-2016 Hydro Business Plan.

The total Project cost of 48.7 $M includes about 5 $M for the engineering, design and construction of a new spillway adjacent to the new powerhouse. The TSW has indicated that their approval for redeveloping the site requires the contribution to resolve an existing deficiency in spill capacity at their upstream control dam. A spillway not only increases flexibility and efficiency in operating existing Ranney GS but also enhances TSW's limited spill capacity and mitigates the risk of flooding residential areas along the intake canal of the existing Ranney GS site. About 3 $M of the 5 $M cost for the spillway is attributed to mitigating the existing flooding risk, which would cost about 10 $M if undertaken independent of the Project.

The economic analysis of the Project is presented in Appendix E, and summarized in Table 4-1. The Base Case financial analysis includes the full cost of the spillway. It is considered an opportunistic capital expenditure that would otherwise be a cost prohibitive measure for mitigating the existing station flooding risk. The Base Case equivalent Feed-in-Tariff (FIT) rate is about 13.3 ¢/kWh including [redacted] contingency. The equivalent Feed-in-Tariff (FIT) rate excluding the 3 $M cost attributing to enhancing the public safety of the existing station would be 12.1 ¢/kWh. The current OPA FIT rate is 13.1 ¢/kWh for hydroelectric Stations under 10 MW.

Total Investment Cost: 48.7 $M (including 1.5 $M previously approved released OM&A fund for Conceptual Phase. 6.1 $M Definition Phase funding is requested for this release)

	Funding Type	2010 & prior	2011	2012	2013	2014	2015	Later	Total
Previously Released	OM&A	0.6	0.9						1.5 $M
Requested Now	Capital			3.8	2.3				6.1 $M
Future Request	Capital				21.2	14.0	5.9		41.1 $M
TOTAL		**0.6**	**0.9**	**3.8**	**23.5**	**14.0**	**5.9**	**0**	48.7 $M

2 Signatures

Submitted by: Dec. 12/11
Glen Elliott — Date
Acting Director, Business Development

Recommended by: Dec 13/11
Carlo Crozzoli — Date
VP, Hydroelectric Development

Reviewed by: Dec 12/11
Donald Brazier — Date
Director of Finance

Approved by: Dec 15/11
for John Murphy — Date
EVP, Hydroelectric

3 Background and Issues

Ranney Falls Generating Station (**Ranney GS**) was formerly leased by the federal government to the Seymour Power Company and acquired by Hydro-Electric Power Commission in 1916. The site is now owned by OPG and the generating station is managed by the Central Hydro Plant Group (CHPG) with remote operation from the North Bay Control Centre and maintained by the Campbellford Service Centre.

OPG engineers reached the proposed most economical conceptual design of the preferred alternative in response to CHPG requirement of adding a site spillway to the project.

3.1 Description of Existing Ranney Falls Generating Station

Ranney GS is located on the Trent Canal at the south end of the Town of Campbellford, Ontario. The existing Ranney GS consists of two powerhouses, with the main powerhouse housing two operating units (G1 and G2) running at 5 MW each. These units were upgraded from 4 MW between 2005 and 2007. The second powerhouse, commonly referred to as the "Pup", has a 0.8 MW unit (G3) that has reached its end-of-life.

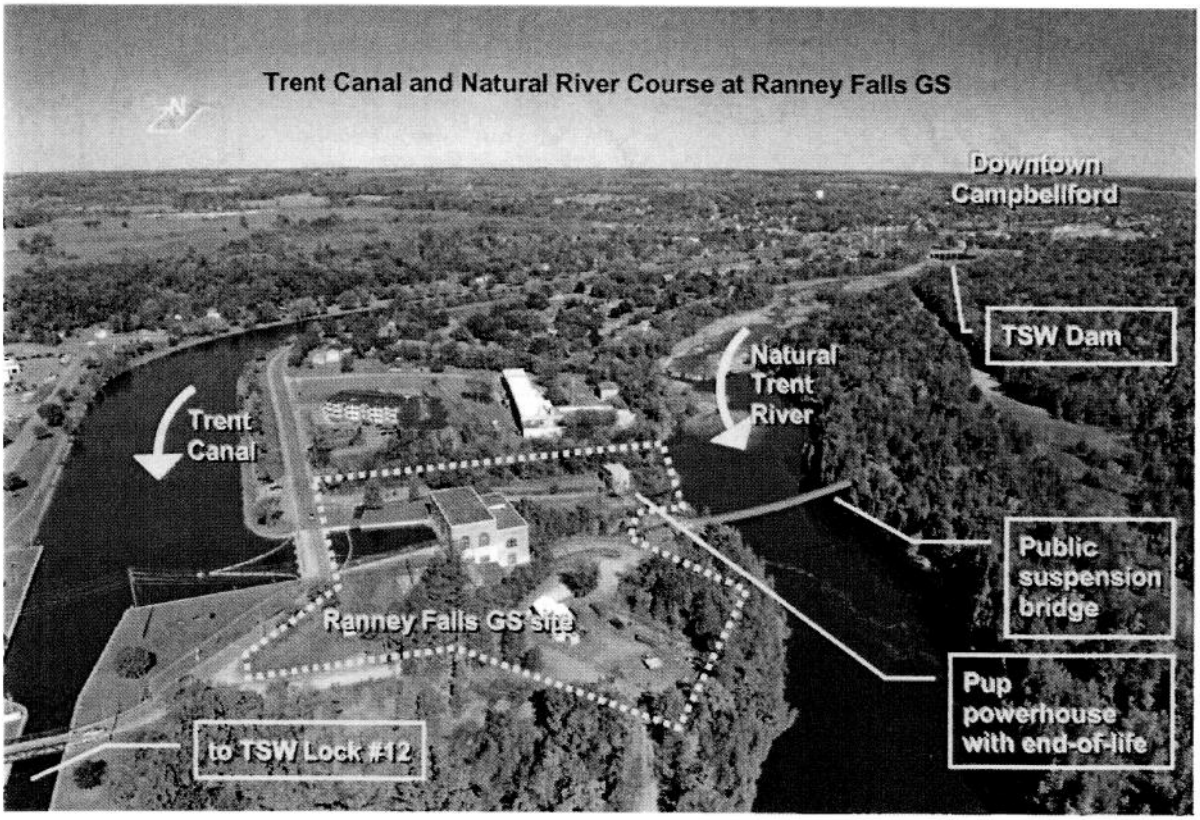

Figure 3-1 Existing Ranney Falls Generating Station – Aerial View

Both powerhouses share a common intake structure from the Trent Canal (Figure 3-2), with G3 being fed by a penstock from a channel that branch off the forebay. The average gross head is around 14.4 m. The average available flow is around 167 m^3/s. The total existing site maximum flow consumption is about 100 m^3/s.

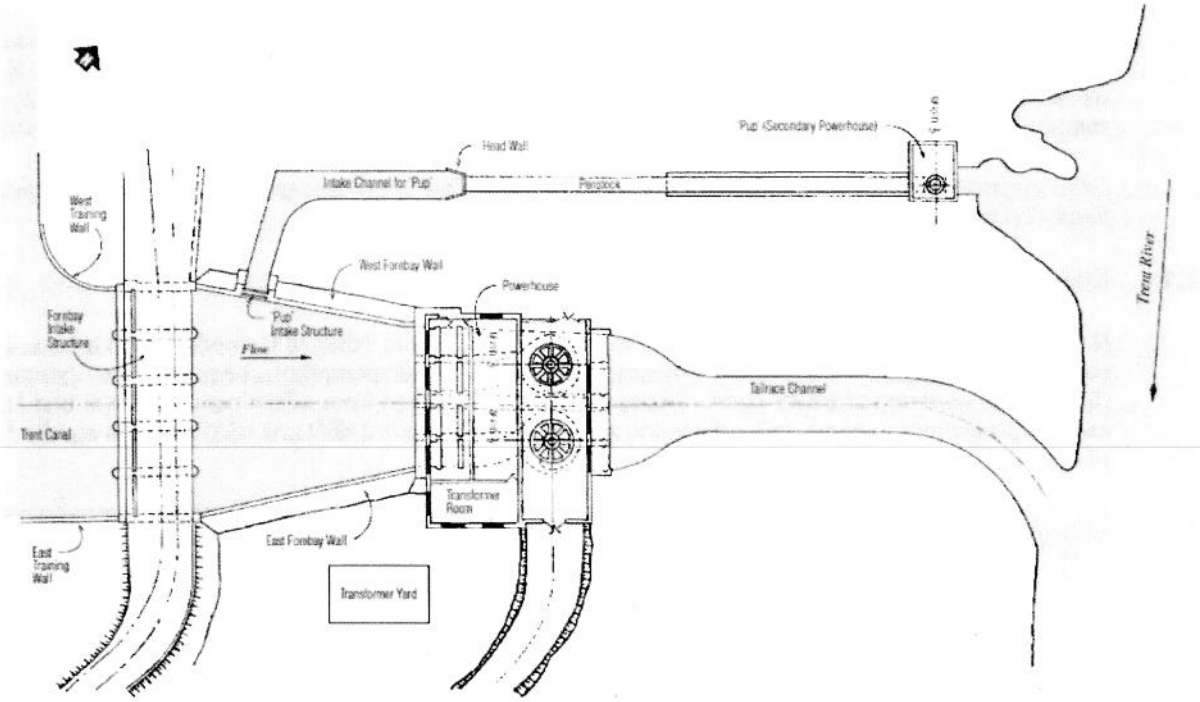

Figure 3-2 Existing Ranney Falls Generating Station - Plan View

The existing G3 unit is undersized for the available flow compared to other sites on the river. Installing in a bigger G3 unit will expand the capacity of Ranney GS making optimal use of the available flow.

3.2 First Concept Study by KST Hydroelectric Engineers

The first Concept Phase Study for the Project carried out by KST Hydroelectric Engineers (KST) in 1992 identified the potential to increase total station capacity to about 24.5 MW and almost double the station energy production. A redevelopment proposal which involved retaining the existing main powerhouse and adding a 16.5 MW unit beside it was recommended.

The KST Study proposed to construct a second forebay just north of the existing one (Figure 3-3). The proposal employed a new, dedicated intake from the Trent Canal and a new public road bridge (Trent Drive) over the new forebay. The existing Pup powerhouse would be demolished and replaced with a larger powerhouse. The existing Pup's penstock would be replaced with two larger penstocks taking flow from the second forebay to the new powerhouse.

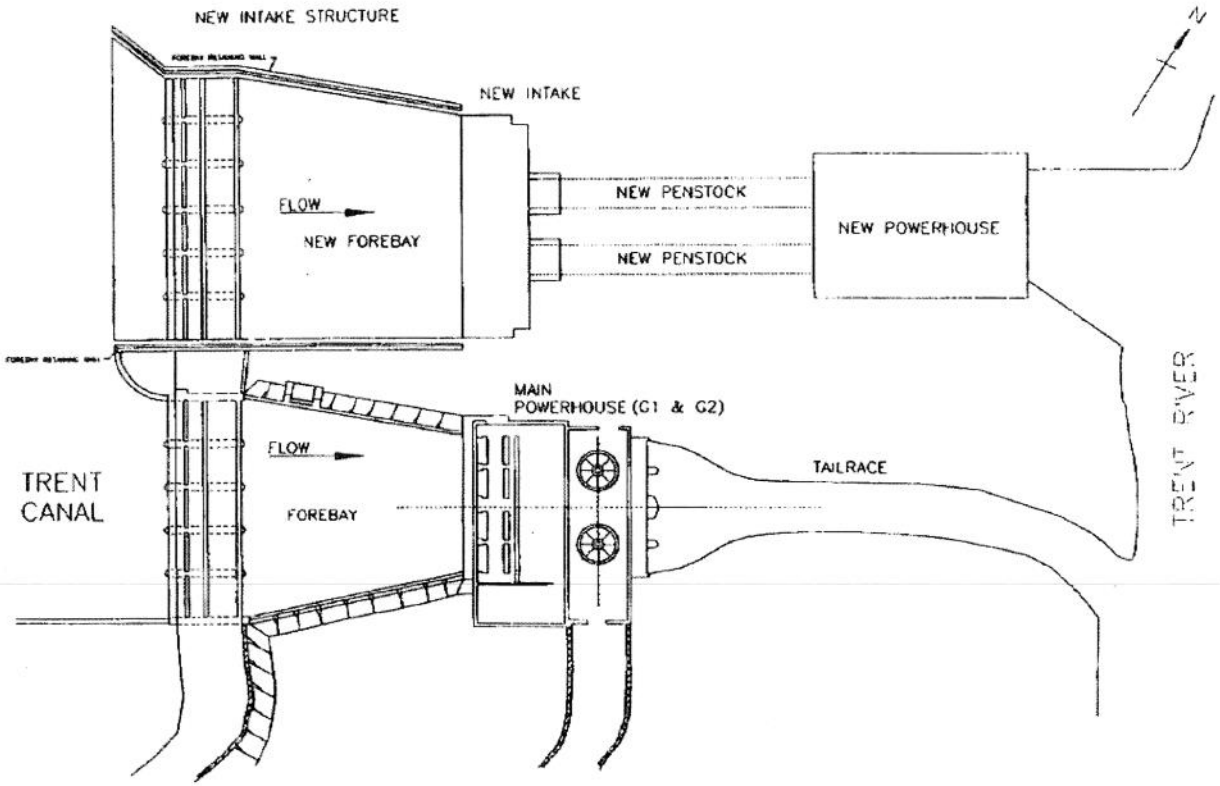

Figure 3-3 KST Hydroelectric Engineers' 1992 recommendation

The redevelopment proposal was not pursued due to unfavourable economics at the time. KST's redevelopment proposal continues to be not feasible at this time due largely to the following reasons:

- In 2006, Aquatic Ecosystem Impacts Research Division, Environment Canada, conducted a field experiment to determine the erosion potential in the Trent Canal leading to Ranney GS. The experiment recommended the maximum flow rate without affecting the stability of the canal to be 172 m^3/s, which is enough for only a total station capacity of about 20 MW.

- In 2006, Hatch Acres International determined that the existing conveyance (i.e., existing intake and forebay configuration) would be adequate with minimal head losses. Accordingly, the envisaged head loss advantage associated with an entirely new intake could not justify the expense of building a completely new road bridge and intake along with the land purchase that would be required from TSW and the municipality.

3.3 Second Concept Study by Hatch Acres International

The second Concept Phase Study for the Project, carried out by Hatch Acres International (HAI), in 2006 utilized the existing forebay and its intake structure for the increased flow and recommended to replace only the existing Pup's powerhouse, penstock, and the penstock head works (Figure 3-4), without the need for a new intake and forebay. Modifications to the existing forebay and its intake would be required for expanding the intake channel of the new penstocks.

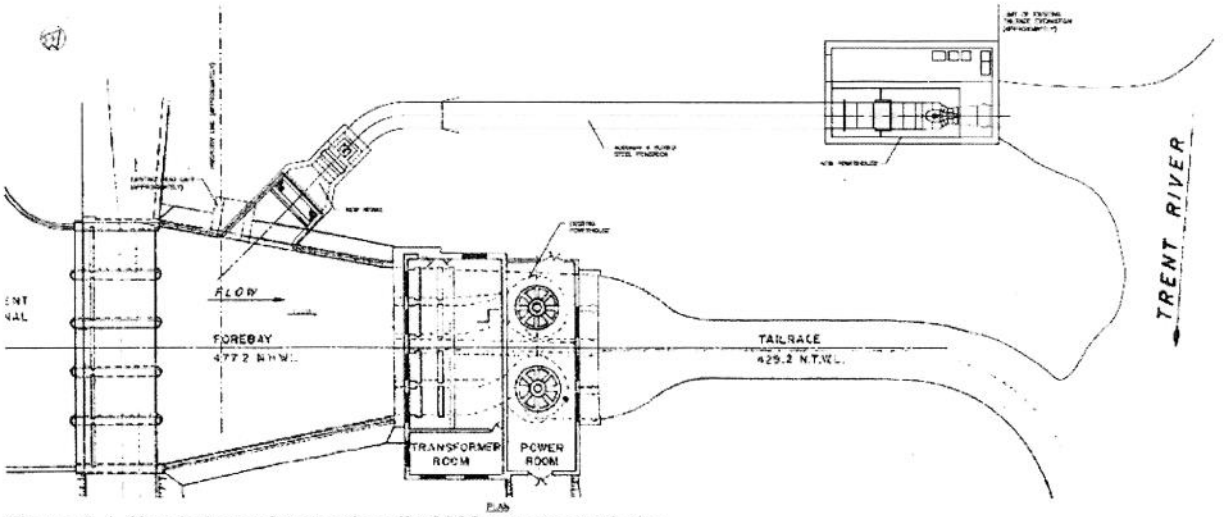

Figure 3-4 Hatch Acres International's 2006 recommendation

3.4 Third Concept Study by OPG Hydro Engineering

In 2011, OPG Hydro Engineering (HED) conducted a third Concept Phase Study in 2011. The Study included the review of the geotechnical investigation carried out by Knight Piesold in 2010. Extensive geotechnical investigation performed at the site to meet CDA - Dam Safety requirements and to better estimate the work required during construction at the site compared with a recent project in the area that needed grout injection in order to complete construction. The Study also encompassed a number of hydraulic models (HEC-RAS and 3-dimentational computational fluid dynamic) and field measurements, which were later used in the calibration of the hydraulic models. Based on the hydraulic models, the addition of a spillway would be required to minimize flooding risk associated with operating the new unit. Consultation with CHPG and TSW later required the size of the spillway to be doubled to minimize the flooding risk associated with the operation of not only the new but also the existing units.

HED study considered numerous configurations for the Project with different types of turbine (CAT, SAXO, Pit, and conventional Kaplan). Based on direct construction cost and space limitation of the site, two-unit configurations were eliminated. Some one-unit configurations were also eliminated based on space limitation, leaving the Project with three schemes for consideration.

In all three schemes, the existing end-of-life G3 would be mothballed with its turbine and generator remaining in place. The existing forebay would be expanded northward feeding the flow directly to the new unit, eliminating the needs for penstocks. With the powerhouse being near the forebay, a long tailrace would have to be excavated. All three schemes included a submerged spillway that was not in the first and second concept studies by KST and HAI, respectively.

The differences between the three schemes are described as follows:

- Scheme A: a long but shallow powerhouse would be constructed for one CAT unit. The new tailrace for Unit 3 is separated from the existing tailrace for Units 1 and 2.
- Scheme B: a short but deep powerhouse would be constructed for one SAXO unit. The new tailrace for Unit 3 is separated from the existing tailrace for Units 1 and 2 like Scheme A.
- Scheme C: a short but deep powerhouse would be constructed for one SAXO unit, like Scheme B. Unlike Scheme B, however, the existing tailrace for Units 1 and 2 would be expanded northward to accommodate flows from all (existing and new) units.

4 Alternatives and Economic Analysis

Economic and sensitivity analysis has been performed for the Project for a total of 48 scenarios with different combinations of powerhouse configurations, unit sizes, project execution situations, revenue alternatives, and financial situations. Significant scenarios are summarized below.

Table 4-1 shows that the proposed Project falls within the FIT Program current rate using the actual Incremental Energy. Using the Incremental Energy according to the FIT Program yields a much lower cost/kWh than the FIT allowed rate. The Project is aiming to secure either a FIT contract or an equivalent HESA revenue agreement with OPA.

Table 4-1 Economic and sensitivity analysis

	Sensitivity Analysis Of PPA recommended *Alternative 2* New 8 to 10 MW unit with extended tailrace canal				***Alternative 3* New 8 to 10 MW unit with penstocks**	***Alternative 2 Base Case* excluding the portion of the spillway enhancing public safety of the existing station**
Capacity (MW)*	9	**9 Preferred Alternative Base case**	9	**9 Preferred Alternative**	9	**9 Preferred Alternative**
Assumption about construction duration (months)	24	**30**	36	**30**	30	**30**
Project cost ($M) (including Escalation and IDC) - $/kw - $/MWh	39.0 4,3335 1,286	**47.2** 5,239 1,555	60.3 6,697 1,987	**47.2** 5,239 1,555	55.8 6,201 1,923	**42.8** 4,750 1,409
Cost associated with mitigating existing flooding risk not included in project cost above and financial analysis ($M)	0	0	0	0	0	0
Annual Incremental Energy (GWh)	30.3	**30.3 Actual Incremental Energy**	30.3	**46.5 FIT Incremental Energy**	29.0	**30.3 Actual Incremental Energy**
Assumption about water availability after in-service date	average water years	average water years	average water years	average water years	average water years	average water years
Minimum revenue required for break-even (¢/kWh)	10.7	**13.3**	15.8	**8.9**	15.6	**12.1**
Current Feed-in-Tariff rate (¢/kWh)	13.1					

Note: * The project is considering the new capacity of 8 MW to 10 MW. Economic analysis is based upon 9 MW unit

4.1 Alternative 1: Status Quo

The status quo alternative is not recommended because it represents a lost opportunity in expanding OPG's hydroelectric generation portfolio and continues to expose OPG to risk of flooding the residential areas along the Trent Canal leading to Ranney GS.

4.1.1 Lost Opportunity

With the Status Quo Alternative, the 0.8 MW Pup unit (G3) that has reached its end-of-life and will be run until failure, leaving Ranney GS with two larger units (G1 and G2) with a reduced total station capacity of 10.3 MW. Average annual energy production by G1 and G2 combined is about 50 GWh.

This Status Quo Alternative under utilizes the available flow during the non-navigation period (between the long weekends of Thanksgiving in October to Victoria Day in May), which if economically utilized could produce on average an additional 30 GWh of electricity in a typical water year. Figure 4-1 shows the percentage of available flow spilling at the site for different new unit sizes.

This Project compares favourably with other renewable electricity supply options and is aligned with OPG's mandate and the Ontario government's renewable energy and climate change policies. This Project also aligns with OPA direction as an opportunity to redevelop existing infrastructure for longer term.

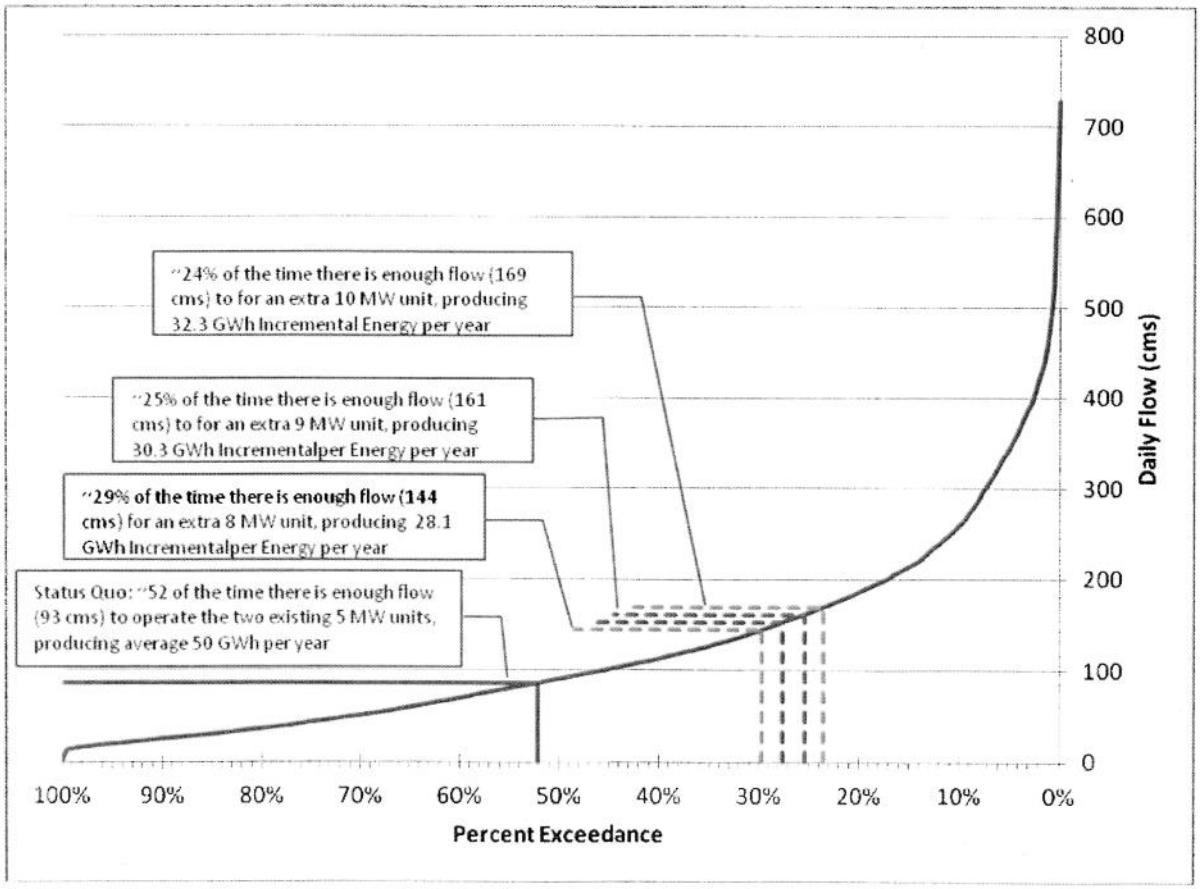

Figure 4-1 Comparison of Unit Size and Incremental Energy

4.1.2 Continued Exposure to Flooding Risk

Trent Canal is sensitive to Ranney GS operations because it is a run-of-the-river station with a very small storage capacity (3 m^3/s-day) with no spilling capacity. The TSW owned and operated control dam is 1.4 km upstream of the station. Therefore, timely diversion of the flow away from Ranney GS is important in emergency shutdown situations. However, there are inevitable delays associated with mobilizing external staff to manually operate TSW Dam #10 to divert the flow.

A major issue with the Status Quo Alternative is that CHPG will continue to be exposed to the risk of flooding the residential areas along the Trent Canal leading to Ranney GS. This risk is credible when an incident of overtopping event occurred. Although TSW is responsible for operating the control dam when the station is down for any reason including the outages imposed by Hydro One, the reputation of OPG is and will be associated with any delay or failure to perform this critical operation in a timely manner.

Including the spillway as integrated part of the new powerhouse is a major enhancement to public safety for the newly developed Ranney GS site. The new spillway will allow for passing the flow from the new unit and also from any or both of the two existing units at the site.

4.2 Alternative 2: Mothball End-of-Life 0.8 MW unit and Construct new 8-10 MW Unit (Recommended Alternative)

In this alternative, an 8-10 MW unit is recommended to be installed in a new, smaller powerhouse, next to the existing main powerhouse. The existing forebay structure will also need to be expanded. This alternative does not require a penstock because the expanded forebay will feed the flow directly to the new unit. In addition, the existing tailrace will have to be expanded to handle the additional discharge from the new unit and spillway.

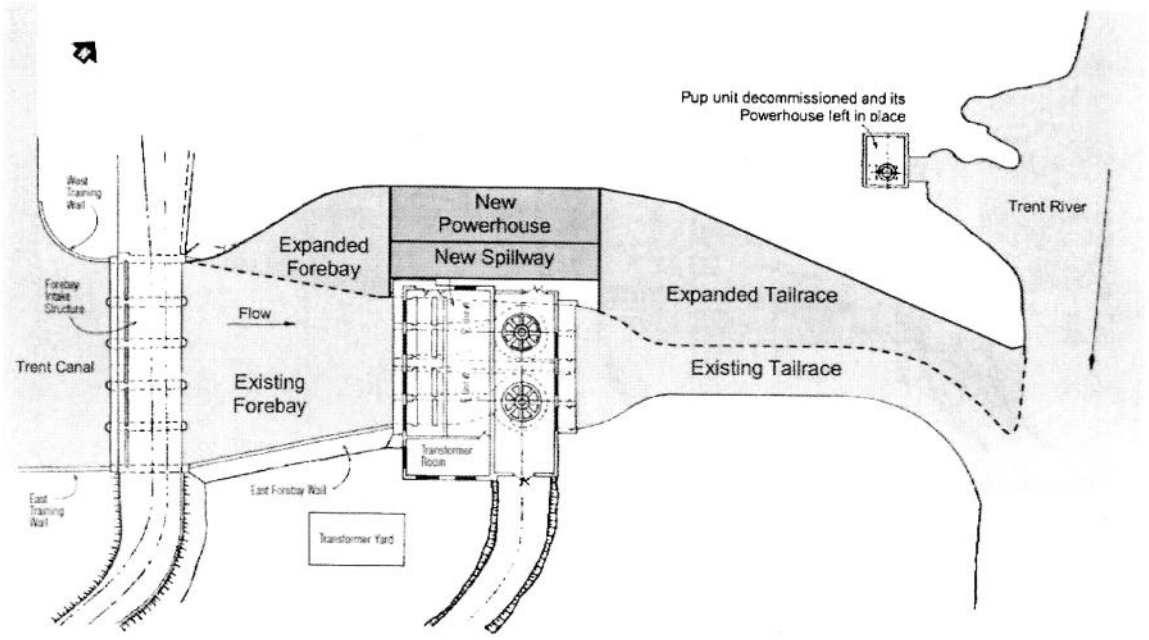

Figure 4-2 Ranney Falls G3 Project with no penstock and long tailrace

In this alternative also, the end-of-life 0.8 MW unit in the Pup powerhouse will be mothballed and its penstock will be partially removed and capped to make space for the new powerhouse. The superstructure of the 'Pup' powerhouse itself will be left in place for heritage and cultural purposes.

In addition, a new spillway will be installed to mitigate the dam and public safety risks associated with operating flow from the existing and new units. The spillway will be capable of passing 172 m^3/s; the combined flow of all (existing and new) generating units.

Table 4-1 shows the results of the economic analysis for Alternative 2. At the total Project cost of 47.2 $M, this would require a revenue rate of 13.3 ¢/kWh to break even. However, when considering the fact that about 3 $M of the total Project cost is a license-required expenditure that would provide value-added public safety benefits for the existing station, the Project would require a revenue rate of only 12.1 ¢/kWh. This is estimated after considering the portion of the spillway expenditure as adding value to public safety of the existing station. The current Feed-in-Tariff would provide a rate of 13.1 ¢/kWh.

4.3 Alternative 3: Replace End-Of-Life 0.8 MW with 10 MW Unit with Penstocks

For this alternative, the end-of-life 0.8 MW unit, the Pup powerhouse and its penstock will be demolished and replaced with an 8-10 MW unit housed in a new powerhouse and utilizing two larger penstocks to convey the flow from the expanded forebay to the new unit. Similar to Alternative 2, the existing forebay structure will be expanded to provide water to the new unit. Unlike Alternative 2, this alternative requires two large penstocks, each capable of passing 40 m^3/s of flow but less excavation would be required for the tailrace canal in order to increase its discharge capacity.

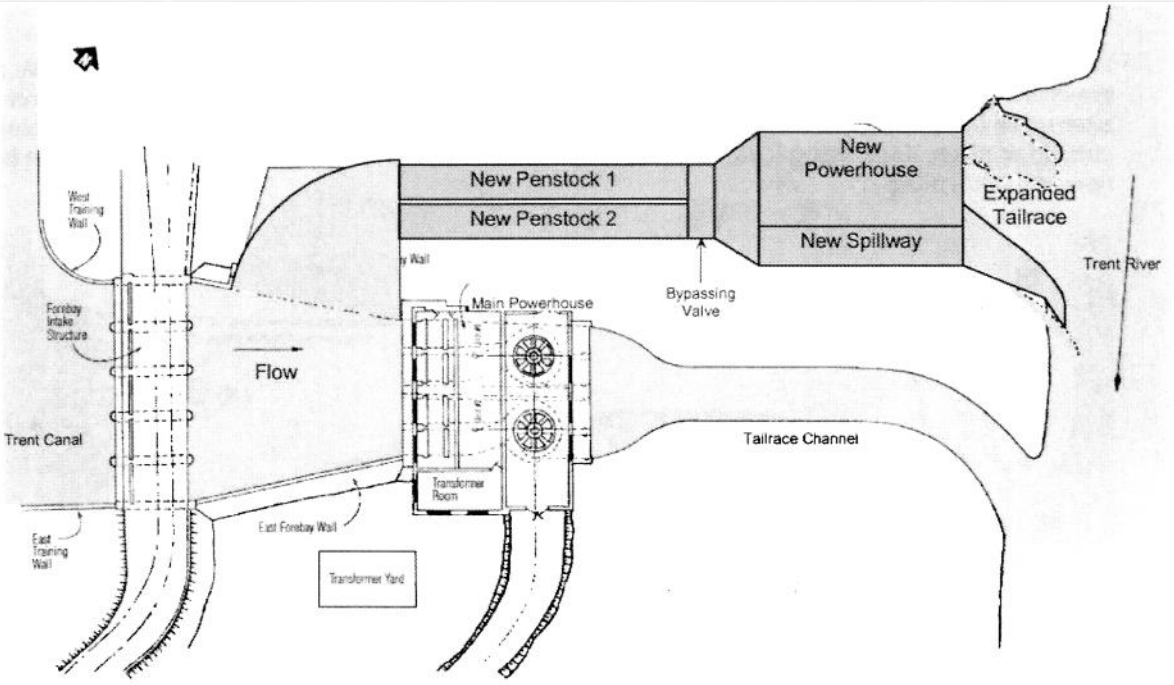

Figure 4-3 Ranney Falls G3 Proposal with penstocks and short tailrace

A bypass valve inside the new powerhouse would be installed for dam and public safety purposes. The bypass valve would be capable only of passing 80 m^3/s the maximum flow of the new unit. Unlike the spillway discussed in Alternative 2, the bypass valve in this alternative would not be able to bypass the combined flow of all (existing and new) units at Ranney GS. As a result the flooding risk at the site is not mitigated when the station operates above the new unit maximum capacity.

A bypass valve inside the new powerhouse would be installed for dam and public safety purposes. The bypass valve would be capable of passing only 80 m^3/s – the maximum flow of the new unit. Unlike, the spillway discussed in Alternative 2, the bypass valve in this alternative would not be able to pass the

combined flow of all (existing and new) units at Ranney GS. As a result, the flooding risk at the site would not be fully mitigated when the station operates above its new maximum capacity.

The Project also would require a revenue rate of 15.6 ¢/kWh to break even (Table 4-1, Alternative 3) while the current Feed-in-Tariff would provide a revenue rate of only 13.1 ¢/kWh.

5 The Proposal

The requested release of 6.1 $M covers the Definition Phase for the recommended alternative (Section 4.2). The release amount will be utilized during 2012 and 2013 to cover costs associated with: OPG project management and other labour; Environmental Consultant for assessments and approvals; Owner's Engineer studies, design, and support; Hydro One fees; negotiation of construction and installation contracts; revenue contract negotiations; and' preparation of an approved business case for the Execution Phase.

Specifically, the work scope will include the following deliverables and activities with the support of the Owner's Engineer and the Environmental Consultant:

- Contracting strategy;
- Finalize technical and commercial documentation and obtain ready to sign civil and water-to-wire contracts;
- Civil and water-to-wire designs;
- Design for connection with Hydro One's distribution system;
- Dam safety assessment;
- Environmental Assessment and approvals obtained;
- Revenue agreement (the Project fits within the FIT program rules);
- Execution Phase BCS and approval; and
- Project Execution Plan for the Execution Phase.

The project Definition Phase is expected to start in Q1 2012 and be completed by Q2, 2013. Construction is targeted to start in Q3 2013 and the plant is targeted to be in service in Q4 of 2015. Key Project milestone are listed below.

Milestone	Target Completion Date
Definition Phase Milestones (to be delivered as part of this funding request)	
Contract for Environmental Consultant Awarded (Completed)	Q4, 2011
Finalize Contracting strategy (Report is in progress)	Q4, 2011
Contract for Owner's Engineer/Representative Awarded	Q1, 2012
Contract for Water-to-Wire supplier selected and Design Package Awarded	Q2, 2012
Water-to-Wire Design Complete	Q3, 2012
Civil Design Complete	Q4, 2012
Selection of Civil Work Contractor	Q1 2013
Environmental Assessment Complete	Q2, 2013

Execution BCS Approved	Q2, 2013
Execution Phase Milestones (to be delivered as part of future funding request)	
Contract for Civil Works Awarded	Q3, 2013
Construction Permits Obtained	Q3, 2013
Contract for Water-to-Wire Equipment Fabrication and Installation Awarded	Q3, 2013
Civil Works Construction Started	Q3, 2013
Civil Works Construction Complete	Q3, 2014
Water-to-wire Installation Started	Q4, 2014
Water-to-Wire Installation Complete	Q2, 2015
In-Service date without schedule contingency	Q2, 2015
In-Service date with schedule contingency	Q4, 2015

6 Qualitative Factors

The Preferred Alternative will:

- Confirm OPG's commitment to public safety and demonstrates good corporate citizenship. The inflow design flood of the TSW control Dam is 1,110 m^3/s and the current flood passing capacity of TSW control dam is much less, at only 776 m^3/s. The Project will increase the site capacity to pass flood water by 170 m^3/s. The new flood passing capacity will be 946 m^3/s.

- Strengthen OPG's relationship with TSW by reducing demand of their day-to-day operations of TSW Control Dam when units shut down. Currently, and after the development of this project, TSW is and will remain in water control of the site and responsible for operating the water control structure (Dam #10). With the project increasing site flow intake, TSW will only be in water control for about 2 months in a year, meaning they are able to re-assign their field staff to activities other than operating Dam #10. This will also reduce call-out costs for OPG-CHPG.

- Demonstrate that at OPG, we strive to meet our obligation to produce power in a manner that reflects our commitment to the environmental dimension of sustainable development. The new unit will add to OPG's green energy portfolio 30 GWh per year, equivalent to removing more than 4,100 passenger vehicles from the roads annually.

- The estimated Ranney 30 GWh incremental energy assessed against the overall OPG fleet 2010, will result in the avoiding the following emissions:

  - CO_2 Emissions (tonnes) 4,298
  - SO_2 Emissions (tonnes) 12.8
  - NO_x Emissions (tonnes, as NO_2) 5.4

- Increase operational flexibility and efficiency at the existing Ranney GS. Without the spillway, the station is currently operated at a head water level that is much lower than permitted because of the lack of the ability to timely pass the water flow when the units are shutdown in emergency situations. The

new spillway will provide this ability and enable the units to be operated at the permitted water level. This is part of the ongoing communication process with TSW.

- Enables OPG to meet its mandate from the Government of Ontario to expand hydroelectric generation on existing sites. This Project also aligns with OPA direction as an opportunity to redevelop existing infrastructure for longer term.

- Have limited environmental impact as the Project does not involve new inundation that is often seen in other hydroelectric development projects. In-stream construction is limited in scope and poses minimal concerns that will be fully addressed by the project. A coordinated federal-provincial environmental assessment will be completed. The Project requires only screening level assessments..

- Boost local economic activity during construction. About hundred man-year jobs are expected to be created during the three year duration of this project.

- Have limited Employee/Public Safety risks with any potential risks being assessed and addressed through a site and project-specific Public Safety Risk Assessment and Action Plan.

7 Risks

The Project's Risk Management Plan (RMP) establishes how risks associated with the Project are identified, assessed, mitigated, controlled, and tracked until they are adequately resolved. The RMP employs a Risk Register which is periodically updated as new risks are identified and existing risks are resolved. Table 7-1 is a summary of risks from the Risk Register.

Table 7-1 Summary of Risks

Risk Rating before Mitigation	Risk Description	Risk Mitigation	Residual Risk
High	The Regulators could require the Project to provide an eel ladder or a new fish passage even though there is currently no eel or fish passage through the site	The Project will mitigate this risk by starting the environmental assessment process early to identify the regulator requirements. The business case of the Project will evaluate the cost impacts of those requirements before going into the Execution Phase.	Low
Medium	Serious or fatal accident may occur during the construction	To reduce OPG's liability, the Project will set up the contracting strategy such that: 1. The Project will only work with pre-qualified contractors with high safety records. 2. An Owner's Representative will be employed to monitor the contractors' safety program and compliance. 3. OPG will be in the Owner-only role and the contractor will be the Constructor as per Ontario's *Occupational Health and Safety Act*. 4. In additional, OPG will perform Health and Safety auditing during construction.	Low

Risk Rating before Mitigation	Risk Description	Risk Mitigation	Residual Risk
High	The submerged spillway either contains design flaws or does not operate as designed causing the Trent Canal to be flooded or drained depending on the failure state of the spillway gate (failed opened or failed closed)	The Project will minimize this risk by having three separate teams (HED, CHPG-Engineering Support Services, and CHPG-Operations at CSC) review the spillway design. A formal commissioning plan for the spillway will also be developed and executed prior to placing the unit in service. All HED and Dam Safety standards and guidelines will be followed for the spillway from design to maintenance. Regular gate testing will be mandated after commissioning the gate as per OPG Standard guidelines.	Low
High	The Project is unable to secure a revenue agreement that provides a revenue rate of more than the project's break-even rate	The Project is mitigating this risk by aligning itself for the application with the Ontario Power Authority through the Feed-in-Tariff Program which would provide a current revenue rate of 13.1 ¢/kWh. The Project would not proceed to the Execution Phase until an acceptable revenue agreement is secured.	Low
High	With the increased flow, the increase in water velocity may have adverse impacts on boaters experience and wildlife	The Project is mitigating this risk by having developed a hydraulic model to estimate the new water velocity. The predicted water velocity will be provided and discussed with the regulator as part of the environmental assessment process.	Medium
Medium	The Project cost and schedule may increase because the bedrock conditions are unfavourable for supporting the powerhouse or dewatering during construction.	The Project has partially mitigated this risk by having conducted an extensive geotechnical investigation to confirm rock mass as foundation and identify dewatering requirements during construction. Although the results of the investigation are favourable, the risk remains because as with any geotechnical investigations, the results are based on only the core samples. The true conditions of the entire bedrock are not known until excavation is complete.	Low
High	The Project could not secure distribution capacity from Hydro One	The Project has mitigated this risk by executing a Connection Cost Agreement with Hydro One to reserve a capacity of 10 MW on their existing R8S line.	Very Low
High	The increased flow in the Trent Canal could introduce unacceptable levels of erosion	The Project has mitigated this risk by hiring Environment Canada's Aquatic Ecosystem Impacts Research Division to perform a detailed investigation for the canal integrity at a flow up to 171.4 m^3/s. The investigation has concluded that no erosion would take place up to this flow level.	Very Low

Risk Rating before Mitigation	Risk Description	Risk Mitigation	Residual Risk
High	Consultation with Aboriginal Communities in the area takes longer than anticipated schedule	The Trent River is located in an area covered by the 1923 Williams Treaty. In this Treaty area, the Aboriginal Communities gave up all their rights along the Trent River. No impact on Aboriginal Communities is expected from the project, as the existing station is already in operation since 1922. Consultation will start as early as possible in the environmental assessment process, with the guidance and assistance of the Ministry of Energy and TSW.	Medium
High	Environmental Assessment requires longer than targeted schedule while coordinating with Federal and Provincial agencies. For example data collection needs a season or more to satisfy agencies.	OPG retained an experienced consultant (SENES Consultants Limited) to perform the EA activity. Extensive field data collection completed by Q4 2010. Mitigation plan studies regarding endangered map turtle species started in 2007. Contingency fund is available for any additional studies or data collection if requested by any involved agency. OPG will also propose additional work to be done after the EA as a condition of approval.	Medium

8 Post Implementation Review (PIR) Plan

Type of PIR: Simplified

Target Project In-Service Date: Q4, 2015

Target PIR Completion Date: 18 months after the project's In-Service date

Measureable Parameter	Current Baseline	Target Results	How will it be measured?	Who will measure it (person/group)?
Station annual energy production (GWh)	50 GWh annually	80 GWh annually	Production records for 12 months or 6 months rolling	CHPG – Asset & Technical Services Manager
Performance Guarantee	As per the specification of the water-to-wire supplier (to be selected in the Definition Phase)	Meets or exceeds the specification of the water-to-wire supplier (to be selected in the Definition Phase)	Performance testing	Independent performance and testing consultant (to be selected in the Execution Phase)
Total Project Cost ($M)	40.0 to 60.0 $M (This range will be refined before the start of the Execution Phase)	47.2 $M for the capital cost of the recommended alternative for the Project	Project accounting	Project Manager

Measureable Parameter	Current Baseline	Target Results	How will it be measured?	Who will measure it (person/group)?
Project In-Service Date	Q4, 2015 (This date will be revised and refined before the Execution Phase)	Q4, 2015	Commercial production	Project Manager
Report of Equipment In-Service (REIS)	1 month after In-Service date	1 month after In-Service date	REIS fully approved	Project Manager and CHPG senior Managers
Turn-over documentation	- As-built drawings - Operating and maintenance (O&M) manuals	- As-built drawings - O&M manuals	- As-built drawings electronically available in SAP - O&M manuals available in the station, Campbellford Service Centre, North Bay Control Centre	CHPG – First Line Manager, Campbellford CHPG – Engineering Manager, North Bay

9 Appendix B – Glossary

BCS	Business case summary
CHPG	Central Hydro Plant Group
EA	Environmental Assessment
FIT	"Feed-in-Tariff" Program managed by OPA
HAI	Hatch Acres International
HED	Hydro Engineering
IRR	Internal rate of return
KST	KST Hydroelectric Engineers
NPV	Net present value
PCA	Parks Canada Agency
PIR	Post implementation review
Project	Ranney Falls G3 Project
Ranney GS	Ranney Falls Generating Station
REIS	Report of Equipment In-Service
RFP	Request-for-proposal
RPM	Risk Management Plan
TSW	Trent-Severn Waterway

10 Appendix C – Cost Variances from Business Plan

	2010 & prior	2011	2012	2013	2014	2015	2016 & beyond	Total
Previously Released	**584**	**873**						**1,457**
Spent Life-to-Date (up to month-end August, 2011)	584	700						1,284
Remaining to Spend		173						173

Previously Released	584	873						1,457
Request Now			3,839	2,262				6,101
Future Request				21,160	14,039	5,900		41,099
Superseding Release								
Revised Project Total	**584**	**873**	**3,839**	**23,422**	**14,039**	**5,900**		**48,657**

OM&A	584	873						1,457
Capital			3,839	23,422	14,039	5,900		47,200
Revised Project Total	**584**	**873**	**3,839**	**23,422**	**14,039**	**5,900**		**48,657**

11 APPENDIX D – Summary of Estimate for Definition Phase

	2012	2013	Total
Internal Labour	**540**	**670**	**1,210**
- Hydroelectric Development	400	500	900
- Hydro Engineering and CHPG	140	170	310
Internal Expenses	**70**	**70**	**140**
- Hydroelectric Development	50	50	100
- Hydro Engineering and CHPG	20	20	40
External Expenses	[redacted]		
- Owner's Engineer Services			
- Geotechnical Investigation			
- Environmental Assessment Consultant			
- Hydro One connection and allocation deposit			
- FIT deposits and TSW deposit			
- Turbine/Generator final design (5% of W2W cost)			
- Map turtle fence - 1 year before construction starts			
Interest ([redacted])	[redacted]		
Contingency ([redacted])	[redacted]		
Escalation (3%)	**86**	**47**	**133**
Total Release for Definition Phase ($k)	**3,839**	**2,262**	**6,101**

12 APPENDIX E – Financial Analysis and Assumptions