Xeneca
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PETAWAWA GREEN ENERGY DEVELOPMENT BIG EDDY Waterpower Site Strategy

September 2009

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Written response to MNR Pembroke
regarding the Waterpower Site Strategy document
for PETAWAWA GREEN ENERGY DEVELOPMENT BIG EDDY

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September 8, 2009

Mr. Michael Radford
Area Supervisor, Mountain River - PEMBROKE DISTRICT
31 Riverside Drive
Pembroke ON K8A 8R6

Attention: Waterpower Planner, Ms. Joanna Samson

Dear Mr. Radford and Ms. Samson,

Re: **Petawawa Green Energy Development Big Eddy Waterpower Site Strategy**
Site Release Number WSR 2008-02, Site Inventory Number 2KB21

2106912 Ontario Inc., Petawawa Green Energy Development, the Applicant in partnership with Xeneca Power Development, submits the attached Waterpower Site Strategy document for Big Eddy Rapids in the Town of Petawawa -- Site Release Number WSR 2008-02. Site Inventory Number 2KB21.

As directed by the Ministry of Natural Resources site release process, enclosed are:

- One original copy of the Applicant Team's proposal
- Three collated copies of the Applicant Team's proposal
- One electronic copy of the Applicant Team's proposal on compact disk (attached to original copy)
- Declaration form (Appendix A).

The application fee has been sent and processed. Thank you for your continued assistance in moving this application forward, and, should you have questions or comments, I can be reached at 416-590-9362.

Yours truly,

for Patrick Gillette, BA, MES, MPA
President & COO

Encl.

2. Site Name, Applicant Name and Contact Information

2.1 Site Identification Information

PETAWAWA GREEN ENERGY DEVELOPMENT BIG EDDY

(a) SITE RELEASE NUMBER WSR 2008-02

(b) SITE INVENTORY NUMBER #2KB21

(c) Affected bodies of water: PETAWAWA RIVER and OTTAWA RIVER

2.2 Name of Applicant

2106912 Ontario Inc., Xeneca Power Development Inc., and Firelight Infrastructure Partnership.

2.3 Primary Contact

Patrick W. Gillette, President.

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3. Project Plan and Site Information

Public policy in Ontario is currently focused on the development of green, renewable electricity. The new Green Energy Act is in place to encourage new, green energy projects in Ontario. Directives from Ontario's energy regulating bodies, including the Ontario Power Authority, strongly encourage development of green electricity. Initial investigation and studies indicate the Petawawa River holds good potential to generate green energy that is economical, reliable and environmentally sound. The Ministries and Agencies involved are supportive of the opportunities to build a waterpower project in Southern Ontario where renewable electricity is required.

MNR Policy and Procedures are expected to change to accommodate the Green Energy Act, and new regulations under the GEA are in draft form at MOE and MNR. Of note are the reduced timelines for the permitting of new, renewable waterpower projects in Ontario. As such, Waterpower Site Strategy submissions maybe replaced by a different process which could involve financial and technical viability being assessed by the Ontario Power Authority and the technical, environmental and social issues being integrated (once the Ontario Power Authority accepts the project and awards a Feed-In-Tariff contract) into the Renewable Energy Approval (REA) process or a Class Environmental Assessment (EA). It is expected that the new process will be lead by the Ministry of the Environment and related processes managed by the Ministry of Energy and Infrastructure.

MNR staff are requested to consider these changes and the new direction of the Crown when and if the Waterpower Site Strategy document is evaluated and to keep the proponent informed of any changes in process pending or occurring.

The Petawawa River is designated for general use, allowing for a variety of activities including the development of renewable energy. Proximity to consumers makes the Big Eddy generating site a pragmatic choice economically, socially and environmentally.

In economic terms, the project will provide increased tax assessment, leasing revenues and royalties to the local community of Petawawa. The return to the taxpayer over a 40 year period is about $5 million per MW, and, in the case of the Big Eddy project, that could translate into an amount ranging between $20 million and $50 million depending on power generation levels.

Short term economic benefits stemming from development and construction range between $3 - $5 million per megawatt, about half of which will be spent in the local community. Long term employment through maintenance, operational contracts and future upgrades will also result.

Environmentally, this waterpower project reduces the need for electricity generated by emission producing fossil fuels. Proximity to consumers reduces the need for costly long distance transmission lines and infrastructure.

Socially, the project proponent is committed to working with the community and stakeholders to maintain or potentially enhance the recreational nature of the Petawawa. With respect to kayakers and other white water boating enthusiasts, the season for their preferred activity can be extended, or opportunities for their recreational activity can be enhanced during certain times of the day. Tourism could be increased by ensuring good water flows for competitive events.

3.1 Site Description

The proposed Big Eddy Rapids hydropower development is situated on the Petawawa River within the Town of Petawawa (Figure 1).

The Petawawa River originates in Algonquin Park and drains a total watershed area of 4,120 km^2 relative to the Big Eddy Rapids location (Figure 1). Flows have been measured on the Petawawa

River near Petawawa, since November 1915 by the Water Survey of Canada (WSC) as station 02KB001. At this location, the river has a contributing drainage area of 4,120 km^2. The mean annual flow for the period 1916 to 2007 was 47.4 m^3/s. The flows at this station are classified as "Regulated" by WSC due to the presence of dams on a number of the lakes and tributaries within the Petawawa River watershed. A hydrology study was conducted by Hatch to develop a synthesized daily flow record that could be used to assess the site's hydroelectric generation potential. The complete hydrology study report (Hatch, 2009) is appended to this report as Appendix B.

The project study area includes the $\pm$6 km long reach of the Petawawa River extending from Highway 17 to the Ottawa River (Figure 3). The Big Eddy Rapids consists of four distinct series of rapids over a 2 km section of the Petawawa River. Photographs of the various rapids taken on September 9, 2008 are provided in Appendix D.

The Petawawa River through the project study area is described as follows:

- Upstream of Rapids 1, the river is fairly wide and slow moving. The left bank (looking downstream) is densely treed with no inhabitants. The right bank is primarily treed and there is a partially cleared area with a single residential building upstream of the railway bridge. A quarry is located further upstream on the right bank, south of the treed area aligning the shoreline.
- Rapids 1: The water drops about 8 m over a distance of 200 m. These rapids start just upstream of the railway bridge and are complete as the river flows under Petawawa Boulevard. A pedestrian footbridge bridge is situated immediately downstream of the railway bridge. Through this reach, the river is well defined with exposed bedrock banks.
- Downstream of the Petawawa Blvd bridge the river falls about 2.5 m over a distance of 800 m. This section of the river has a continual gradual elevation drop with the river bed consisting mainly of small rocks and boulders. The right bank is covered with bush or trees that appear to experience flooding during high flow conditions. The left bank is steep and hard to access and appears to be largely sandy and unstable.
- Rapids 2: The water falls about 4.5 m over a reach of less than 50 m. Bedrock is prevalent on both banks. The left bank is covered with trees and is generally steep. A trail, likely accessible by small vehicles, is situated within 20 m of the water's edge along the left bank.
- Downstream of Rapids 2 is a 200 m reach of gradual drop. The left banks remain treed and relatively steep with sandy with rock outcrops. The right bank is close to the Town swimming area, which has been created by a concrete wall isolating it from the main portion of the river.
- Rapids 3: The water falls approximately 1 m.
- Rapids 4: The water falls about 4 m over a reach of 100 m. The left bank remains densely tree lined and steep. The right bank is tree lined with houses behind.
- Downstream of Rapids 4 the river is fairly flat and continues towards the Ottawa River.

3.1.1 Initial Development Concept

The initial development concept for the Big Eddy Rapids (as per the Xeneca application) consisted of installation of an underground conveyance conduit (either a steel penstock or unlined tunnel) along the left side of the river to capture all of the natural head at the four rapids into a single power development (Figure 2). The scheme was for an intake to be constructed upstream of Rapids 1 on the left bank, possibly involving the construction of a low dam (weir) across the Petawawa River to ensure submergence of the intake or to submerge the intake to eliminate the need for a water control structure. The conduit would then traverse a distance of 1.9 km along the left bank eastward through CFB Petawawa lands passing under the railway embankment and Petawawa Blvd to a powerhouse structure situated downstream of Rapids 4.

Based on the rudimentary mapping available at the time and using preliminary estimates of flow, the initial development concept was anticipated to utilize an estimated 15 -18 m of head at the site.

In spring 2009, Xeneca retained Terrapoint Inc. to conduct a LiDAR aerial survey of the Big Eddy Rapids project area. The area surveyed included a 1000 m wide, 5 km long section of the Petawawa River extending from Highway 17 to the Ottawa River (Figure 3). The resulting spatial mapping data was completed in July, 2009. This information provided included the raw ASCII XYZ coordinate data and AutoCAD drawing files of topographic contours at a 0.5 m interval. Using the LiDAR spatial data, a digital elevation model (DEM) raster was prepared of the project area by Hatch using ArcMap GIS software.

Based on review of the LiDAR mapping, the site hydrology and preliminary RETScreen modeling (design flow of 55 m^3/s and assumed residual flow of 9.2 m^3/s) the initial development concept would utilize a gross head of 16 m and provide an installed capacity of 7.4 MW. As noted, this scheme would require the construction of a 1.9 km long underground penstock by tunnelling. The tunnel would need to be approximately 20-30 m deep and would pass under lands owned by CFB Petawawa and the Town of Petawawa.

Although the construction of the 1.9 km long underground conveyance conduit by tunnelling is considered possible, subject to geotechnical and property considerations, it is expected to be costly.

Until market conditions are more fully understood, discussions can be held with the appropriate authorities and, stakeholder consultation can advance forward this option is considered as secondary option to be revisited later in the process.

3.1.2 WSS Site Development Concept

As noted in Section 3.1.1, given the high costs associated with the initial development concept (e.g. Rapids 1-4 single development), development of the Rapids 1 site as a standalone project is instead proposed for the suggested site development concept as per this WSS submission.

Hatch's suggested development concept for the Big Eddy Rapids site is envisioned to consist of the construction of an Obermeyer type gated control structure on the Petawawa River upstream of Rapids 1 (Figures 4 and 5), corresponding to 160 m upstream of the existing railway bridge. The control structure would allow for an operational headpond level of 136 m, approximately 1.0 m higher than the existing river level at the site. A ±375 m long intake channel, excavated along the left side of the river passing underneath the railway embankment, would convey the power flow to the powerhouse. This design with modifications could maintain and potentially enhance whitewater recreation activities by improving water control Plans for S\smaller or no water control structure are viable and will be considered as required. Currently agreements are in place with all Riparian landowners to allow the suggested development concept to proceed forward.

The control structure would consist of a low level concrete dam with a 0.8 m high sill (elev. 134.5 m) fitted with a 1.5 m high Obermeyer type spillway gate. The spillway would be ±70 m wide with a top of gate elevation of ±136.0 m (Plates 1 and 2). Modifications can be made to facilitate recreational activities such as kayaking.

An intake channel would be constructed ±350 m upstream of the control structure dam on the left riverbank and connect to the powerhouse by ±375 m long open channel (Plate 3). The concept would require the construction of a bridge (or multi cell culvert) under the existing railway line as well as the existing road/snowmobile trail in order to convey the power flow to the powerhouse.

The powerhouse and discharge channel would be situated on the left riverbank upstream of Petawawa Boulevard (Plate 4). A single Kaplan type turbine unit would be installed in the powerhouse.

The proposed 'regulated' operating water level for the head pond would be at elev. ±136.0 m. The head pond would flood back ±1.6 km of the Petawawa River inundating ±9.8 ha of area (Plate 5).

The anticipated gross head for the site would be 9.0 m. In terms of power generation, the facility is envisioned to operate as a run-of-the-river facility with an installed capacity of 4.1 MW, which is the basis upon which RETScreens analysis was done.

3.2 Maps and Drawings

The following maps and drawings have been prepared that identify the project site:

General Maps and Figures

- Figure 1 – Project Location, illustrating the location of the Petawawa River watershed area contributing to the Big Eddy Rapids location with and without water control structure.
- Figure 2 – Site Overview, illustrating the initial site application concept and the location of Rapids 1- 4 with and without water control structure.
- Figure 3 – LiDAR Mapping Extents, illustrating the survey limits associated with the LiDAR study area mapping and profile of the Petawawa River with and without water control structure.
- Figure 4 – Project Layout at Rapids 1, illustrating the location of the site facilities including the location of the dam, intake channel and powerhouse with and without water control structure.
- Figure 5 – Rapids 1 Aerial Photo, illustrating the existing features at the Rapids 1 site area with and without water control structure.
- Figures 6, 7 and 8 – Transmission Route Options, illustrating routing options for the transmission line from the proposed generating station.

Suggested Development Concept Drawings

- Plate 1 – With Dam – Conceptual Site Development Layout, illustrating the location of the site facilities including the location of the dam, intake channel, powerhouse and access roads with and without water control structure.
- Plate 2 – With Dam – Conceptual Dam Plan and Sections, illustrating the conceptual features of the dam with and without water control structure.
- Plate 3 – With Dam – Conceptual Intake Channel Profile and Sections, illustrating the conceptual layout of the intake channel, powerhouse and discharge channel with and without water control structure.
- Plate 4 – With Dam – Conceptual Powerhouse Plan and Section, illustrating the conceptual layout of the powerhouse with and without water control structure.
- Plate 5 – With Dam – Estimated Headpond Inundation, illustrating the anticipated extent of the headpond inundation associated with the proposed dam on the Petawawa River with and without water control structure.
- Plate 6 – With Dam – Estimated Flood Plain Limits, illustrating the estimated existing and proposed (i.e., with dam) 100-year flood plain limits based on preliminary HEC-RAS modeling. Note, official flood plain mapping of the Petawawa River is not available and no detailed bathymetric surveys have been conducted to establish the actual geometry of the below water river channel. As such, Plate 6 provides only a preliminary estimation of the 100-year flood extents, based on assumed river depths and is subject to verification with and without water control structure.
- Plate 7 - Conceptual Site Development layout with and without water control structure.
- Plate 8 – Conceptual Intake Channel and Section with and without water control structure.
- Plate 9 – Conceptual Powerhouse Plan and Section, illustrating design with and without water control structure.
- Plate 10 – Conceptual Intake and Conveyance Channel, Powerhouse location, illustrating the conceptual layout of the powerhouse, property boundaries and existing water levels with and without water control structure.

3.3 Background Reports and Studies

The following reports and studies (but not limited to) provide information relevant to the study area:

- Genivar Consulting Group. Final Report. Aquatic habitat survey. CFB Petawawa. September 2003. Report of the Genivar Consulting Group to Defence Construction Canada, February 2004. -23 p. Reference H07608.

- Haxton, T. 2008. A synoptic review of the history and our knowledge of lake sturgeon in the Ottawa River. Southern Science and Information Technical Report SSI #26. 31 p.

- Jacques Whitford Environmental Ltd. National Defense. Natural resources inventory. Canadian Forces Base Petawawa Training Area, February 11, 1994.

- Ontario Resource Management Group Inc. 2006 Species at risk Environmental Study. CFB Petawawa, November 24, 2006.

- Ontario Resource Management Group Inc. 2007 Species at Risk Environmental Study. CFB Petawawa, November 16, 2007

- Ontario Resource Management Group Inc. 2008 Species at Risk Environmental Study. CFB Petawawa. Fishes – Final Report, 19 August, 2008.

- Trent University Watershed Science Centre. 2002. A Comparative Study of Sampling Efficiency between Boat Electrofishing and Non-Lethal Gillnet/Minnow Trap Sampling used in the Non-wadeable River Sampling Methodology, Petawawa River, Ontario, 2001.

4. Technical and Operational Aspects of the Site Development

4.1 Site Development

The proposed site development is envisioned to consist of the following principal components:

- ±400-m long access roads to the both the dam site and powerhouse;
- ±70 m long, ±0.8 m high concrete ogee spillway with 1.5 m high Obermeyer type gates;
- ±110 m long earth fill dam embankments with a maximum height of ±2 m;
- ±375 m long, 6 m deep x 16 m wide unlined intake channel;
- Powerhouse building 10 m x 40 m;
- Option 1 – Connection behind the meter at CFB Petawawa at 12.4 kV;
- Option 4 - 2-km long, 115-kv transmission line extending from the powerhouse to the Petawawa DS/TS.

4.1.1 Access Roads

Access to the site is envisioned to be from Paquette Road via the former roadway/snowmobile trail that passes through the study area from north to south. A new ±290 m long gravel road would be constructed from the former road to the proposed powerhouse and a ±110 m long gravel road would be constructed from the former road to the dam site (Plate 1).

4.1.2 Dam and Control Structure

The proposed dam is envisioned to consist of a low level concrete dam with a 0.8 m high sill (elev. 134.5 m) fitted with a 1.5 m high Obermeyer type spillway gate. The spillway would be ±70 m long with a top of gate elevation of ±136.0 m (Plate 2). For operational flexibility, the 70 m long spillway would be divided into two 35 m sections by a centre pier.

The Obermeyer gate position would be automatically adjusted by level control to maintain an operational water level at ±136.0 m for most flows up to the 2-year (refer to Section 4.2.1). For higher flows, the gates would be in the fully down position. The control structure would be capable of passing the 100-year flow without the need for a separate overflow spillway, although this could be incorporated in the dam embankment if required.

Energy dissipation downstream of the dam is not considered to be required given the presence of the existing bedrock channel.

Modifications can be made to accommodate recreational activities. As an example, a V notch and two Obermeyer spillway gates can facilitate passage of kayaks.

Agreements exist with the Riparian landowners so as to allow this activity to proceed.

4.1.3 Intake Channel

An intake channel would be constructed 350 m upstream of the dam on the left riverbank and would extend ±375 m from the river's edge to the powerhouse (Plate 3). The channel would be ±16 m wide and ±6.0 m deep and is assumed to be predominately unlined, excavated presumably by rock blasting. Geotechnical investigations are required to confirm bedrock elevations and rock suitability to support an unlined channel. In absence of this data, a planning estimate of elevation 134.0 m has been assumed for the presence of bedrock based on field observations of bedrock outcrops at the river's edge at the location of the proposed dam.

Construction of the intake channel would also require the construction of a bridge (or multi cell culvert) under the existing railway line as well as the former road/snowmobile trail in order to convey the flow to the powerhouse. In addition, a low level berm up to 2 m high would be required

to provide the necessary freeboard (i.e., containment of the 100-year flood level) along low lying portions of the channel alignment (Plate 3).

A debris/safety boom would need to be installed across the mouth of the intake channel to prevent floating debris and boats from entering the intake channel. The approximate volume of earth/rock fill material to be excavated for the intake channel is estimated at ±45,000 m^3.

The project will be built on CFB Petawawa land and Crown shoreline allowance. Agreements exist with the Riparian landowners so as to allow this activity to proceed.

4.1.4 Powerhouse and Discharge Channel

The powerhouse would be situated on the left riverbank upstream of Petawawa Boulevard (Plate 4). The powerhouse would be ±10 m wide by ±40 m long, constructed with a concrete substructure and steel superstructure. The powerhouse would incorporate a trash rack across the entrance of the intake to prevent large fish and smaller debris from entering the intake. A ±40 m long discharge channel (tailrace) would be excavated (likely by rock blasting) from the powerhouse to the Petawawa River.

The approximate volume of earth/rock fill material to be excavated for the powerhouse and discharge channel is estimated at ±15,000 m^3.

The project will be built on CFB Petawawa land and Crown shoreline allowance. Agreements exist with the Riparian landowners so as to allow this activity to proceed.

4.1.5 Turbine and Generator Equipment

Turbine and generator equipment would be installed in the powerhouse and is expected to consist of a single Kaplan-type turbine (Plate 4). The initial sizing considerations for the turbine are discussed in Section 4.2 based on an estimated design flow of 55.0 m^3/s. Final selection of the size and type of equipment would be done through equipment quotes obtained from various manufactures following preliminary design.

4.1.6 Transmission Lines

Of the four options judged to have the highest degree of acceptance two are being pursued at this time. For Option 1 discussions have been initiated with CFB Petawawa regarding connection "behind the meter". For Option 4 permission from OPA is being sought to allow connect at 115 kV, such as is the case for small hydroelectric projects being developed under the province's Northern Hydroelectric Initiative. The proposed transmission line route, shown on Figure 6 is expected to consist of two preferred options:

- Option 1 – Connection behind the meter at CFB Petawawa at 12.4 kV;
- Option 4 - Connect to HVDS Petawawa at 115 kV.

4.2 Site Operation

4.2.1 Dam Operating Plan

The dam and spillway control structure would create a headpond which would flood back ±1.6 km of the Petawawa River, inundating an incremental land area of ±9.8 ha (Plate 5). The lands inundated by the proposed headpond along the northern shoreline are federally-owned by CFB – Petawawa. The lands inundated along the southern shoreline are owned by the Town of Petawawa and two privately owned companies, H and H Construction and 1456649 Ontario Inc. Land lease agreements are in place with both the Town of Petawawa and CFB Petawawa. A land easement agreement has been signed with H and H Construction. Although outside of the expected impact area, a letter has been received from Trans Canada Pipeline indicating that it does not believe the Big Eddy Project will impact on its land or its operations. Landowners upstream from the area of impact have been notified but have not commented at this juncture.

The dam facility is envisioned to be remotely operated as Intermediate facility or "Run-of-River" as defined by the Ontario Power Authority. The specific details of the facility operation will be

established as part of a water management plan (WMP) prepared for the new dam as part of the environment assessment for the project.

Operationally, the Obermeyer gate position would be automatically adjusted by level control to maintain an operational water level at ±136.0 m for river flows up to the 2-year flood. For higher river flows, the gates would be in the fully down position (i.e., by deflating the air bladder) and headpond levels would increase incrementally as a function of inflow and the spillway discharge capacity (Table 4.1). The control structure would be capable of passing the 100-year flow without the need for a separate overflow spillway, although this could be incorporated into the proposed dam embankment if required.

Operations will be influenced by the following factors:

- Seasonal uses by recreational users of the river;
- Water flows;
- Mitigation for whitewater activities private and commercial;
- Peak supply demands by the Ontario Power Authority;
- Green Energy Act.

Stakeholder consultation and the other factors noted above will shape future operational plans and WMP. Water-control could mitigate or enhance whitewater activities by regulating water-flows during preferred or high-use periods during the spring and summer.

If no water control structure is built then the project will be pure "Run-of-River' and resource will simply need to be shared as it's available.

Table 4.1 Proposed Headpond Levels

Return Period	[1]Peak Flow (m^3/s)	[2]Head on Gated Spillway (m)	[3]Spillway Gate Position	[4]Headpond Water Level Elevation (m)
Mean Annual	47.4	0.55	Partially inflated	136.00
2-yr	207.5	1.48	Partially inflated	136.00
5-yr	279.3	1.81	Fully deflated	136.31
10-yr	326.8	2.01	Fully deflated	136.51
20-yr	372.4	2.19	Fully deflated	136.69
50-yr	431.5	2.42	Fully deflated	136.92
100-yr	475.7	2.58	Fully deflated	137.08

[1]From flow metric data sheet (refer to Appendix B).
[2]Estimated based on $H = [Q / (CxL)]^{.667}$ based on spillway gate opening position.
[3]Spillway gated is raised when inflated and lowered when deflated.
[4]Estimated water level at control structure only. Levels will increased upstream (refer to Plate 6).

4.2.2 Power Generation

The generating station is envisioned to be remotely operated as a run-of-the-river facility, operating 7 days a week subject to inflows.

Preliminary estimates of the expected average annual energy generation for the proposed Rapids 1 development are discussed in Section 5.

5. RETScreen® Analysis

Natural Resources Canada's (NRCan) RETScreen International Clean Energy Project Analysis Software (RETScreen®) version 4.0 was used to estimate the available energy at the site.

5.1 Estimation of Site Development Energy Generation Potential

RETScreen® was used to estimate the energy generation for the proposed site development concept. The following describes the principal input parameters, assumptions and results.

5.1.1 Hydrometric Data

Hydrometric data consisted of flow-duration data as developed by Hatch based on the findings of the hydrology review (Hatch, 2009). The complete hydrology review report is appended to this report as Appendix B. For reference, the contributing Petawawa River drainage area to the proposed development site is 4,120 km^2 and the estimated average annual mean daily flow is 47.4 m^3/s.

The flow-duration data that was input into the RETScreen® model is listed in Table 5.1.

Table 5.1 Flow Duration Data

Flow Exceedence (%)	Flow (m^3/s)
Q_0	470.4
Q_1	243.8
Q_5	147.1
Q_{10}	104.8
Q_{15}	86.5
Q_{20}	68.2
Q_{25}	59.3
Q_{30}	50.4
Q_{35}	44.8
Q_{40}	39.1
Q_{45}	35.0
Q_{50}	30.8
Q_{55}	28.0
Q_{60}	25.1
Q_{65}	22.9
Q_{70}	20.7
Q_{75}	18.6
Q_{80}	16.4
Q_{85}	14.3
Q_{90}	12.2
Q_{95}	9.2
Q_{100}	4.8

5.1.2 Modeling Parameters

Table 5.2 lists the hydraulic information that was input into the RETScreen® model.

Table 5.2 RETScreen® Input Data

Description	Value
Proposed project	Run-of-river
Hydrology method	User defined flow-duration values
Gross head (m)	9.0
Maximum tailwater effect (m) *Assumed*	0.5
Residual (Environmental) flow (m^3/s) *Assumed as Q_{95}*	9.2
Design flow (m^3/s)	55.0
Turbine type *Assumed*	Kaplan
Turbine efficiency *Assumed*	Standard
Number of turbines	1
Manufacturer	N/A
Model	N/A
Turbine design coefficient *Assumed*	4.5
Turbine efficiency adjustment (%)	0
Turbine peak efficiency (%)	*Calculated by RETScreen* ~90
Maximum hydraulic losses (%)	*Assumed* 3
Miscellaneous losses (%)	*Assumed* 2
Generator efficiency (%)	*Assumed* 98
Availability (%)	*Assumed* 100

5.1.3 Environmental Flow Considerations

For the purpose of the preliminary RETScreen® modeling, a constant minimum environmental flow, assumed equal to the Q_{95} flow of 9.2 m^3/s, to be maintained to the downstream river at all times was been assumed. RETScreen cannot vary flow-inputs for seasonal considerations nor can it accommodate recent MNR compensatory flow analysis and this will need to be done separately at a later stage in the process.

It is expected that the actual environmental flow will be established in consultation with MNR during the EA based on considerations for sustaining downstream fish habitat, water quality and recreational uses (e.g. kayaking). This flow(s) may vary seasonally throughout the year and possibly, daily throughout the week (i.e., weekday versus weekend flow) or hourly throughout a given day.

Increased compensatory flows or allocations during daylight for tourism and recreational uses will simply reduce the capacity of the plant and have no substantive affect on economic viability. Economic viability will also be determined by the Ontario Power Authority before a Feed-In-Tariff contract is issued.

5.1.4 Results

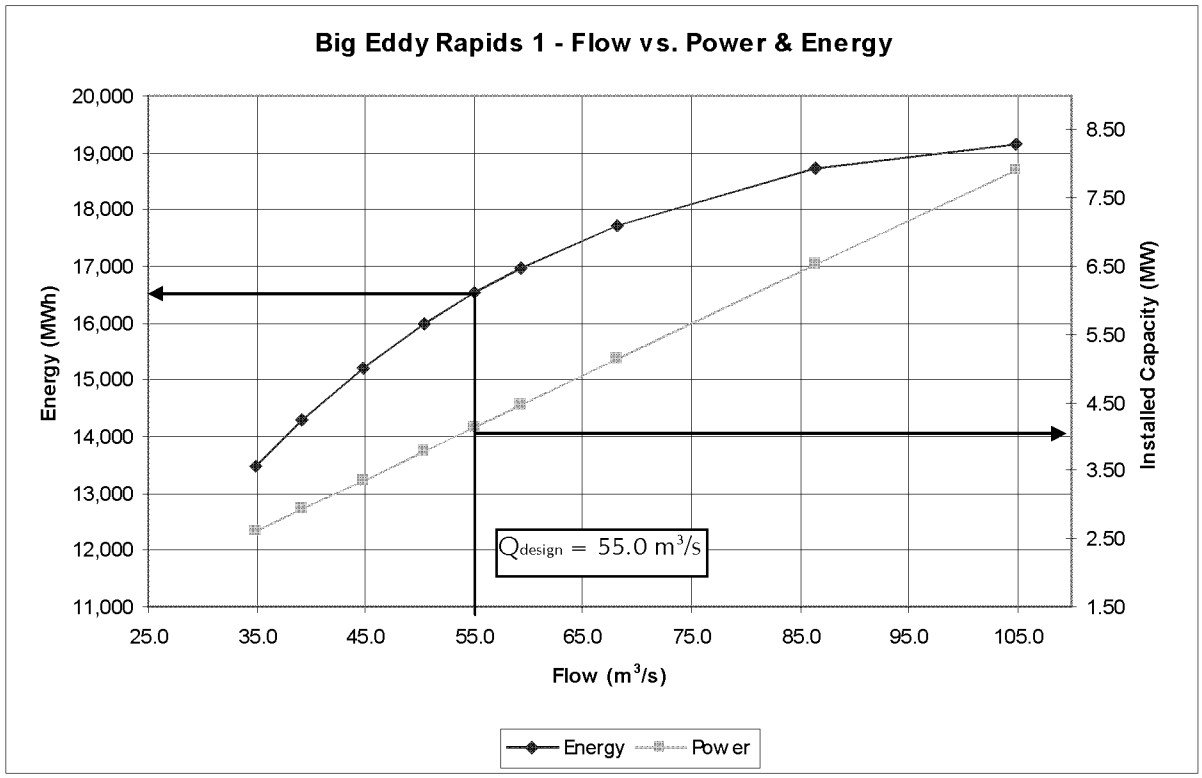
Simulations were conducted using the RETScreen® model for a design flow of 55.0 m^3/s, gross head of 9.0 m and an assumed residual flow of 9.2 m^3/s to estimate the station's power capacity and the potential annual energy generation. Appendix C contains a copy of the RETScreen® model output.

For comparison, simulations were also conducted for flows from 104.8 m^3/s (Q_{10}) to 35.0 m^3/s (Q_{45}). Table 5.3 summarizes the RETScreen® results which are plotted on the following graph.

Table 5.3 RETScreen® Simulation Results

Flow Exceedence (%)	Flow (m^3/s)	*Power Capacity (MW)	*Energy Generation (MWh)	*Capacity Factor (%)
Q_{10}	104.8	7.91	19,158	27.7
Q_{15}	86.5	6.52	18,732	32.8
Q_{20}	68.2	5.13	17,709	39.4
Q_{25}	59.3	4.46	16,978	43.5
Q_{Design}	55.0	4.13	16,556	45.8
Q_{30}	50.4	3.78	15,998	48.3
Q_{35}	44.8	3.36	15,222	51.7
Q_{40}	39.1	2.93	14,284	55.7
Q_{45}	35.0	2.62	13,475	58.7

*As estimated by RETScreen®



Based on the RETScreen® modeling results, for a gross development head of 9.0 m, a proposed design flow (i.e., turbine flow) of ± 55.0 m^3/s, and an assumed residual flow of 9.2 m^3/s, the Big Eddy Rapids 1 development concept is envisioned to have an installed capacity in the order of 4.1 MW and an estimated annual energy generation potential in the order of 16.6 GWhr.

5.2 Pricing, Facility Construction and Operating Costs

RETScreens in Appendix C used the data as outlined in the proceeding by Hatch.

Pricing was taken from the prices issued from the Ontario Power Authority. Based on inflation and other factors the price paid for electricity would range from 16 cents per kWh – 18 cents per kWh.

Capital costs were organized around averages of $3,000,000, $4,000,000 and $5,000,000 per installed MW. This was viewed by Hatch and the Applicant as being more accurate way to estimate capital costs then estimating detailed costs at this early stage of development.

Capital costs to date have averaged in Canada and Ontario at $2.8 million per MW; please see Appendix B. However, as outlined in the Hatch letter in Appendix B there is a greater comfort with a range of $3 million - $5 million per MW installed.

Counterbalancing these capital costs is the Northern Energy Program ("NEP") (please see Appendix K) administrated by Ontario Ministry of Mines and Northern Development through the Northern Ontario Heritage Fund, which could contribute up to $100,000 for pre-construction costs and, $1,000,000 +/- for construction costs. Once Applicant of Record is assigned the Applicant will make application to this program, which is eligible; please Appendix K. ***These and other potential funding sources were not considered in this RETScreen analysis. However, they provide an opportunity to bring costs to the lower end of the capital cost range.***

Applicant defaulted to RETScreen for calculation of operational costs.

Based on the above the Applicant believes $4,000,000 per installed MW is a reasonable estimate when this application was submitted.

5.3 RETScreen Results

As outline previously this project is eligible to be treated as a Legacy project by the Ontario Power Authority and can receive a Feed In Tariff contract in 2009.

Submitted RETScreen results are in Appendix C. Based on the range of prices and compensatory flow regimes the Project is economical. Please refer to Appendix C for RETScreens.

6. Experiential and Additional Financial Information

6.1 Project Team Knowledge

The Applicant, PETAWAWA GREEN ENERGY DEVELOPMENT, is owned by Xeneca Power Development Inc. and supported by a knowledgeable project team with extensive experience in water power project development, construction management, and project financing. The team draws its expertise from three areas:

- Ownership by a fund with extensive experience in renewable projects;
- Key staff with extensive water power experience in Ontario; and
- Engineering and environmental consultants with renowned technical excellence in water power.

The Applicant is a special purpose corporation established for the construction and operation of the Big Eddy site. It is majority owned Petawawa Green Energy Development ("PGED") and Xeneca Power Development Inc. ("Xeneca"), a developer of green power projects. Xeneca is funded and partially owned by Firelight Infrastructure Partners L.P. ("FIP") with committed funding of over $100 million for renewable energy projects from:

- OPTrust (OPSEU Pension Fund); and
- Dundee Realty Corporation ("Dundee").

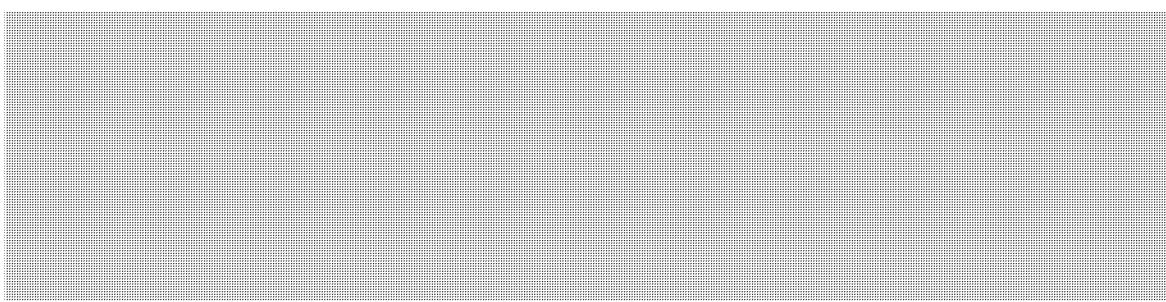
FIP is currently the majority owner of Xeneca, with OPTrust and Dundee each being a member of Xeneca's Board of Directors.

OPTrust manages one of Canada's largest pension funds, with assets under management of approximately $13 billion. OPTrust is responsible for investing the retirement assets of approximately 75,000 plan members and pensioners including non-management employees of the Province of Ontario. Dundee Realty is one of Canada's leading private real estate companies with activities in land, housing and condominium development, as well as the ownership of a significant commercial and industrial portfolio.

Xeneca Power Development Inc. is currently developing a 1.8 MW water power plant at MNR's McGraw Falls Dam (2AB13) on the Matawin River (see Appendix E). FIP is currently building its $135 million Dalhousie Wind Farm in Nova Scotia through Xeneca's sister company RMSenergy Ltd (see Appendix E).

The officers of Xeneca, Patrick Gillette and Uwe Roeper, are the founders of Canadian Renewable Energy Corporation (CREC), which developed a number of wind and water power projects in Ontario between 2000 and 2005, including similar projects, such as the 3 MW Misema Generating Station near Englehart, ON, completed in 2003 and operated by CREC, and the 200 MW Wolfe Island Wind Farm by Kingston, ON, being constructed in 2009/2010..

Xeneca Power Development Inc.



[redacted]

Contracted Consultants: **NOT RELEVANT**

Hatch Consulting: Hatch is the prime consultant selected for leading the engineering and construction of the site. Hatch has 80 years of waterpower experience on 40,000 MW of projects in the design, construction and due diligence review. Hatch will permit and engineer the project for Xeneca. The lead engineer for the project is Mr. Jim Law. Please see Appendix I.

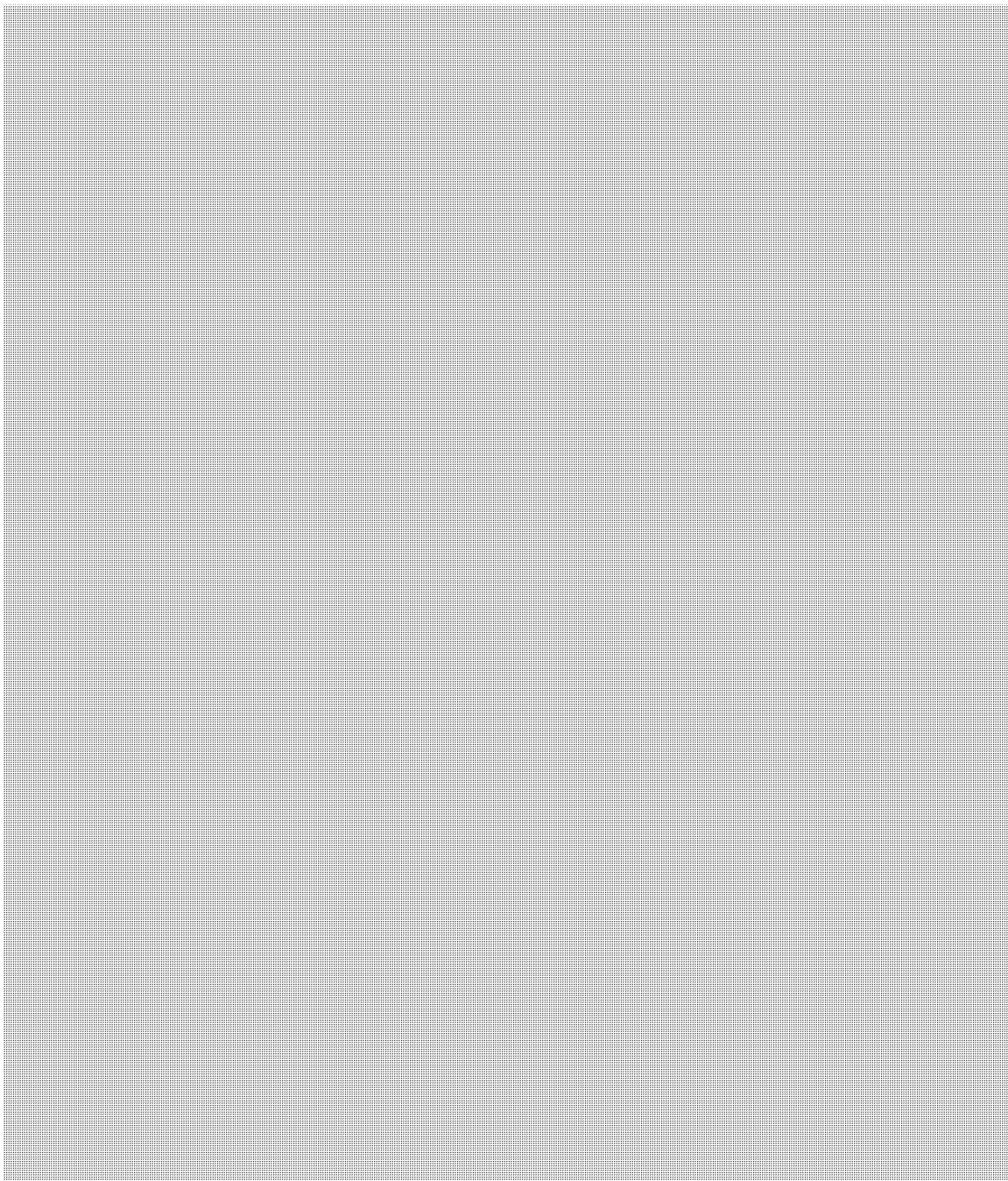
[redacted]

NOT RELEVANT

AMEC: AMEC will provide consulting services related to interconnecting the project to the distribution or transmission grid as per Hydro One, IESO and OPA guidelines. AMEC may also supply other consulting services as required. Please see Appendix I.

Ortech Power: Ortech Power will provide consulting services related to permitting, stakeholder relations, Feed In Tariff submissions, project financing and power plant operation. Ortech was responsible for power plant operations for the Misema GS for Canadian Renewable Energy Corporation. Ortech Power supplies these services to Xeneca on the McGraw Falls project. Please see Appendix I.

6.2 Financial Plan s.17



7. Site Description Package

Information provided in Ministry of Natural Resources' (MNR) Site Description Package (SDP), including site features, potential issues and concerns, and data gaps was reviewed.

Table 7.1 provides a preliminary outline strategy of how the identified site features, issues and concerns, and data gaps will be addressed as part of the project development.

Further specific details regarding follow-up commitments related to public, agency and First Nations consultations, field studies and impact assessments, identification of possible mitigation measures and compensatory works (e.g. fish habitat creation) and environmental monitoring activities will be determined in consultation with MNR as part of, and subject to, the finding of the Environmental Screening Process. Water management planning and detail engineering work will assist in determining final monitoring and verification programs for this project.

7.1 Overview of Process & Strategy to Address Issues and Information Gaps

As a standard approach to the potential development of any waterpower site in Ontario, the Applicant Team ("Team") will provide a study of all site issues and set forth a strategy to address relevant information gaps and potential stakeholders issues that may be identified during the Environmental Screening Process.

Activities anticipated in the course of developing the project technical, economic and environmental screening document include:

- legal surveys to determine land ownership;
- land surveys/topographic studies of the site and vicinity;
- bathymetric/hydrologic surveys of the river (and lake) up-steam and downstream of the site;
- site reconnaissance to solicit information from local interests on issues of land use, identify potential stakeholders and develop an initial understanding of the natural environment prior to commencement of the project Environmental Screening Report (ESR);
- consultation with MNR, Ministry of the Environment (MOE), Department of Fisheries and Oceans (DFO), Algonquin First Nations, kayaking/canoeing and cottage associations and local residents; to determine baseline aquatic/terrestrial survey required for the ESR; and
- development of plans, drawings, specifications, reports, calculations, notes, and similar documents and materials to support the Environmental Screening Process.

7.2 Appreciation of Site Issues - Land Use and Natural Environment

The Team and its Technical Advisors together have successfully completed numerous project environmental studies, EA Screenings, Class Environmental Assessments, and Individual EA's as evidenced in many of our combined project design features in Ontario including the Misema Generating Station (GS) in Englehart, Ontario and McGraw GS on the Mattawin River.

7.3 Environmental Screening

Until regulations, guidelines and procedures are issued for the proposed new Renewable Energy Approval ("REA") Process under the Green Energy Act, the Environmental Screening Process under Ontario Regulation 116/01 of the Ontario Environmental Assessment Act will be applied to the proposed waterpower project. The Team will evaluate flow conveyance design and the potential effects and level/flow management of the associated river (and lake) regimes.

These will be evaluated based on their potential to affect the natural, social and economic environments of the area. The potential effects will be determined in terms of the magnitude of the effect, and value of the features affected, the physical extent of the effect, how often and for how long the effect occurs, how certain the effect is and whether the effect is short-term or permanent.

The potential effects of the project will be described in the context of the baseline conditions, which the Team will determine through field studies, communication/consultation with agency representatives, review of background information, and consultation with potentially affected parties and interest groups. The degree of the potential effects will be assessed in the EA Screening and then will be reassessed or verified after implementation of proposed mitigation measures.

The Team's work plan consists of the following steps:

i. Project Initiation Meeting and Scoping

The Project Manager and key ESR support staff will attend a project initiation meeting with MNR to verify the scope of the project and terms for the completion of the Environmental Screening. Among other issues we will:

- introduce our project staff to MNR, DFO and other identified regulatory agencies;
- confirm the rationale for the project;
- discuss the context of the project within MNR's resource management plans;
- determine the need for preparation of additional supporting documentation;
- address relevant information data gaps; and
- review and confirm the proposed schedule and scope of work.

ii. Preparation of the Draft Environmental Screening Report – Project Proposal

Based on the data gathered, outcome of the Team's initial project meeting with MNR and DFO, discussions with stakeholders, fieldwork to describe the existing environment and fill existing relevant data gaps, and a review of existing secondary data, the Team will prepare a draft ESR that will:

a. Confirm the project category and provide a description of the project;

b. Describe the need, purpose and rationale for the project (by reviewing the planning process that identified the opportunity). The purpose and rationale are intended to provide concrete direction as to the desired outcome for the project. As well, describe potential issues and their resolution.

c. Describe the study area in terms of the geographic extent and physical composition as well as features and functions within and in the context of the surrounding environment. Typically, the study area is determined in the context of the extent and magnitude of potential effects (i.e. both upstream and downstream systems of the selected site).

d. Provide an analysis of the potential environmental effects associated with the project and the identification of measures for mitigating those effects. The environmental analysis will be prepared using the appropriate environmental screening criteria applicable to the proposed project. The following will be determined:

    - significance of the effect;
    - potential mitigation; and
    - effectiveness, cost and feasibility of implementing a suitable monitoring program.

e. Provide information to agencies and to the public on the rationale for the proposed project including potential environmental effects and mitigation along with conceptual details of how the proposed project will be implemented.

f. Provide a review of feedback received from the public and agency consultation process, including:

- a description of the public and agency consultation program and consultation activities/events and results;
- a list of agencies contacted or consulted;
- a summary of public and agency concerns or issues and how they have been resolved or addressed;
- copies of key public and agency comments;

The following activities summarize the nature of the Team's analysis of the site issues that will form the basis of the ESR in determining the potential environmental effects associated with the project:

➢ **Aquatic Ecology**

A full range of aquatic environment studies may be required including studies and assessments of the physical environment and the aquatic ecosystem.

➢ **Physical Assessment**

A description of the physical characteristics of the Big Eddy study area; i.e. the hydrology of the river and associated lakes, bathymetry and water levels, water temperature and ice, erosion and sedimentation, substrates and sediment quality will be prepared, beginning with mapping of existing data on the associated rivers and lakes. The basic hydrology of the watershed will be described including longitudinal river (and lake) profiles identifying the various features of each. This hydrology would involve a description of the tributaries, in-flow to the lakes as reservoirs and general descriptions of various segments of each lake. An understanding of the water levels, water temperature and ice over the course of a year will be developed, much of which could come from existing data sources.

➢ **Aquatic Ecosystem**

The aquatic ecosystem inventory and assessment will be assembled into four key areas:

- habitat mapping;
- fish and invertebrate sampling;
- water quality measurements, e.g. suspended solids and dissolved oxygen; and
- potential effects arising from proposed project design and construction.

The project is to begin with a mapping of all the existing data on the associated river and lakes. The Team will undertake field studies to verify the mapping and GPS coordinates, perform a detailed mapping of the aquatic and associated terrestrial ecosystems, assess existing heritage sites, and bring back a number of field samples and photographs. The fieldwork will be used to complement existing data and address relevant data gaps.

The inventory and mapping is an essential component of the environmental screening report. The mapping information may include:

- habitat delineation;
- habitat inventory and classification;
- resource inventory; and
- environmental and historical data.

The main body of the associated river and lake will be mapped, as will any tributaries within 500 m of the lake. The mapping should cover the areas to be affected by the project, e.g. flooding, downstream section of the river, etc. The aquatic ecosystem inventory preparation will include printing maps of existing data.

The classification of the aquatic habitat that may potentially be affected by the site development is important to future biological assessments. The recommended method to present habitat information is to map all relevant areas as follows:

- Areas delineated as riverine zones and future flooded zones (upstream and downstream areas of potential development areas should be mapped in the greatest detail possible); and
- Areas in or proximate to these zones that are potentially affected by deposition of sediments.

The recommended framework for classifying and mapping aquatic features is the system described in the publication *Canadian Wetland Classification System* (1997).

The identification of aquatic resources and resource uses, which may potentially be affected by the development, is important to future decisions by stakeholders. Description of fisheries resources within the associated rivers and lakes and particularly the development area is required. This information should include the identification of fish, and any species recognized by federal or provincial authorities as rare, threatened or endangered, as well as any species, which may be present in sufficient numbers to be considered as a species for future monitoring.

The review of historical and more recent monitoring data is an important component of the study program preparations for this project. This information may assist in identifying known effects, if any, and will aid in determining future decisions by stakeholders. This review should also identify data gaps and necessary site-specific monitoring programs, for instance, programs monitoring dissolved oxygen, mercury, etc. This review should also identify past problems and constraints.

➢ **Terrestrial Ecology**

The project and the associated undertakings may have an effect on the terrestrial environment. The terrestrial environment includes physiography and topography, groundwater resources, soils, vegetation and wildlife.

The basic geology and soils of the terrestrial environment including bedrock geology, overburden geology, geomorphology, seismicity, groundwater and soils will need to be characterized at the location of the project. Existing reports should provide much of this information.

Terrestrial surveys will be conducted based on the *Ecological Land Classification (ELC) for Southern Ontario; First Approximation and Its Application* (Lee et al. 1998), and incorporate the forest ecosystem classification elaborated in the *Field Guide of Forest Ecosystems of Ontario* and the wetland ecosystem classification in the *Field Guide to the Wetland Ecosystems Classification for Ontario*. These classifications are part of the larger ELC initiative ongoing in Ontario. Ecosystems will be classified based on the vegetation (species composition and number) and additional notes made on soil types within the study area. The ELC work will entail vegetation and wildlife surveys applied to the specific site study areas.

The terrestrial surveys will allow for the preparation for field studies on plants and wildlife for the Big Eddy study area's aquatic and terrestrial ecosystems observed during the field seasons, including amphibians and reptiles, birds and mammals. This database will be considered adequate for the assessment of both the existing terrestrial environment of the site study areas and the potential effects from the project.

➢ **Land Use and Resource Management:**

The Team will describe the existing environment in terms of the following criteria and possibly others determined in consultation with MNR:

- existing and potential recreational trails and uses of the river;
- access routes and views;
- adjacent informal and designated uses (residential, commercial, industrial, etc.);

- resource management projects and issues (e.g., mining and forestry); and
- potential sensitivity of Algonquin First Nations and the general public with respect to existing resources (e.g. trapping and baitfish).

There may be opportunities for visitors to rest, camp and use the site for extended periods of time which can make it a destination. Any projects with the potential to either enhance or negatively affect the experience for visitors to the site are likely to receive significant First Nations and general public support and scrutiny.

➢ **Social, Cultural and Economic Considerations**

The Team will identify the location and sensitivity of any cultural features within the study area including but not limited to:

- buildings and cultural landscape features;
- designated archaeological sites and cemeteries;
- areas of archaeological potential; and
- significant viewscapes.

In the context of this base information the Team will predict the potential environmental effects that would result from the implementation of the proposed project and describe mitigation methods.

➢ **Development of Conceptual Drawings**

Conceptual drawings for the preferred site development will be prepared to assist MNR in determining a water management plan for the affected river (and possibly Lake Percy) and the long term approach to managing this site.

The Team will prepare preliminary drawings for the permanent structures. These drawings will be based on those prepared during the preliminary design phase of each development and will cover the complete structures. AutoCAD format for the preparation of the preliminary engineering plans will be used and will comply with all MNR standards and conventions for drawings.

Drawings will consist of the proposed project site including distribution line routes to interconnect each site with the provincial grid at the Distribution Station as required to support the Environmental Screening Process.

iii. Second Meeting with MNR/DFO:

Once the Team has completed the above tasks, a meeting will be arranged with MNR to apprise MNR and DFO of its findings and recommendations including the rationale, potential effects and mitigation measures for the proposed project.

iv. Notice of Opportunity to Inspect the Draft EA – Project Proposal:

Along with the formal Notice to inspect the Environmental Screening Report, the Team proposes to host a Public Meeting/Open House at a locale designated by MNR as a means of securing public input into the process. Because the project is an important element in the community, the Team believes that the public will expect to have their concerns addressed in a more personal way than through mailings and a public meeting would provide greater opportunity to display the project and to describe the project and address concerns before they can become major issues. The Team would provide a Notice of the public meeting and Notice of Opportunity to Inspect the Draft Environmental Screening Document concurrently, which will ensure that the Team is able to receive concerns both prior to and during the public meeting. It may be possible to host the meeting after the 30-day review period and thus address the written responses during the meeting. The meeting will be held in the summer months to encourage seasonal residents to attend. A notice will be sent to area residents and newspaper advertisement will also be prepared. Residents attending the meeting will have the opportunity to view the conceptual renderings of the project and discuss issues with project personnel. A questionnaire/comment sheet will be included at the public meeting for residents and

agencies once they have had a chance to view the concept presentation and speak to project personnel.

The Team would gather concerns of the attendees of the meeting in a brief questionnaire and those concerns would be tabled along with those that are written, and included in the Environmental Screening Report along with a summary of how they were addressed in the decision-making process. The Team will work with MNR to ensure that the concerns are appropriately addressed.

v. Completion of the Final Environmental Screening Report – Project Plan:

The Draft ESR will be revised based on public, MNR, DFO and other stakeholder input and completed by adding a Project Plan that includes:

- a project description;
- mapping to illustrate the project;
- illustrations of the design characteristics of the project;
- a description of the consultation process, issues raised and the response to issues; and
- a list of mitigation measures to be used and conditions to be applied to the project and proposed monitoring procedures.

vi. Notice of Completion, Opportunity to Inspect the Final Environmental Screening Document – Project Plan:

The Team anticipates that the majority of issues will have been addressed during the consultation plan and once the Team has prepared the final ESR, the Team will provide Notice of Completion issued according to the Environmental Screening Process requirement.

vii. Statement of Completion, Implement Project:

Once the Team is certain that there is no requirement to proceed with a Category C environmental process, the Team will prepare a Statement of Completion for MNR.

Table 7.1 Outline of the Strategy to Address Site Features, Issues and Data Gaps

Site Feature	MNR Map	Feature Description, Issue or Data Gap (as identified by MNR)	Proposed Strategy and Comments	Proposed Stage
Land Use				
Aboriginal Values and Traditional Activities		All of the project area lies within the boundaries of the Algonquin First Nation's Land Claim. First Nations values (based on traditional knowledge) and interests will require confirmation through the Environmental Screening Process. First Nation values will remain confidential, and will not be disclosed to the public.	Contact Ministries of Culture and Aboriginal Affairs for information regarding cultural heritage values. Contact MAA and INAC for information on land claim. Consult with applicable First Nations community, their agents and government on traditional areas, uses and values. Potential effects (if any) on traditional lands, values and activities will be assessed in the Environmental Screening Process.	WSS Environmental Screening Process
Cultural Heritage Values		No cultural heritage sites are known to be in the vicinity of this project. Verification that cultural heritage values will not be affected by this project is required.	Retain licensed archaeologist/cultural heritage specialists to assess potential effects of project on cultural heritage values (at least Phase 1 Assessment).	Environmental Screening Process
Access Points	2.2	Public access for the Petawawa River is located at Centennial Park and on Black Bay. Whitewater recreationalists access the river off of Wilson Avenue and North of 17 via Rantz Road (on Percy Lake). The impact to the whitewater kayaking community at the Big Eddy Rapids is unknown.	Determine frequency of use by the whitewater kayaking community on the river. Potential effects (if any) on public access points will be assessed in ESR.	Environmental Screening Process
Access Road Locations	2.2	Access into the Big Eddy from Portage Road in Petawawa via Petawawa Boulevard. This access is along an all season trail.	A map will be prepared showing how the site will be accessed with existing roads, including any new access roads required as part of the WSS. Potential effects of any existing and new road construction (e.g. stream crossings) will be assessed in ESR.	WSS Environmental Screening Process Engineering Design Engineering Design

Existing Mining Tenure or Claims	2.4	There is no existing mining tenure or claim in the vicinity of Big Eddy as of November 5, 2008. An application was submitted to the Ministry of Northern Development and Mines to withdraw from staking, approximately a 75 hectare area of the bed of the Petawawa River.	Confirmation of land tenure during ESR. Potential effects (if any) on privately owned lands will be assessed in ESR.	WSS Environmental Screening Process
Canoe Routes/Portages/ Kayaking		The Petawawa River is a well known canoe route and it is also extensively used for whitewater kayaking. The impact on the whitewater kayaking community at Big Eddy Rapids is unknown.	Feature noted. Potential effects on whitewater kayaking and canoeing will be assessed in the ESR.	Environmental Screening Process Engineering Design
Land Tenure	2.2	The north bank of the Petawawa River, upstream and downstream of the site, is owned by the Federal Government (Canadian Forces Base Petawawa) while the south shore bank of the river is privately owned land. The Township of Petawawa owns the municipal shore road allowance fronting many of the privately owned parcels of land. The bed of the Petawawa River in the vicinity of Big Eddy is Provincial Crown Land.	Features noted. Other forms of land tenure to be verified through land registry office and other sources during ESP. Potential effects on other forms of land tenure (if present) will be assessed in ESR.	Environmental Screening Process
Other Industrial/Commercial Activities		The Trans Canada Pipeline crosses the Petawawa River above the Big Eddy Site. Ontario Power Generation owns and operates a number of waterpower facilities on the Ottawa River.	Features noted. Potential effects (if any) on these activities will be assessed in ESR.	Environmental Screening Process
Railway	2.2	There is an Ottawa Valley Railway crossing at the Big Eddy Site.	Feature noted. Potential effects (if any) on the railway will be assessed in ESR.	Environmental Screening Process
Parks and Protected Areas	2.1 2.2	The recommended Barron River Provincial Park is located upstream of the Big Eddy Site. The majority of the Petawawa River Watershed is located within Algonquin Provincial Park.	Features noted. Potential effects (if any) on the features and/or uses associated with the potential and existing provincial parks will be assessed in ESR.	Environmental Screening Process
Settled Areas	2.1 2.2 2.3	The Big Eddy site is located within the Town of Petawawa. Other settled areas within the vicinity are the Town of Deep River, Chalk River and the	Features noted. Potential effects (if any) on the town will be assessed in ESR.	Environmental Screening Process

		City of Pembroke.		
Tourism / Cottaging		The Petawawa River, including the area of interest, is enjoyed and utilized by local residents and tourists for a number of general recreational uses.	Features noted. Potential effects (if any) on residents and tourists will be assessed in ESR. ESR consultation activities will include notification to, and consultation with residents.	Environmental Screening Process
Trails (snowmobiling, skiing, hiking)	2.2	There is a TOPS A snowmobile trail and bridge that crosses the Petawawa River at the Big Eddy Rapids.	Features noted. Potential effects (if any) on the trail/bridge will be assessed in ESR.	Environmental Screening Process
Transmission Line Route Location		The location of the transmission line to be utilized for the proposed water power development is Unknown. Values have not been supplied for this aspect of the project and as such other values may need to be considered.	Feature noted. A map will be prepared showing the alignment of the new transmission line. Potential effects of any new transmission line construction (e.g. stream crossings) will be assessed in ESR.	Environmental Screening Process Engineering Design
Trapping, Baitfish Harvesting, and Bear Management Agreement Activities	2.2	There are no Bear Managements Areas within Vicinity of the site as it is surrounded by private and federal land. The Big Eddy site is within the allocated Baitfish Harvest Area PE0123 (10). Other Baitfish Harvest Areas in the study area include PE0124 (6) and PE0125. There are registered traplines in the study area (N001, N022, N024). The potential effect of the proposed project on resident trappers and the baitfish harvesters in the area is unknown.	Features noted. Potential effects (if any) on registered traplines and baitfish harvesters will be assessed in ESR. Consultation activities will include notification to (by MNR), and consultation with trappers and baitfish harvesters.	Environmental Screening Process
Resource Management Plans		There are no resource management plans that will be affected by this proposal as the area surrounding the site is private or federal land.	n/a	n/a
Water Management Plans		At this time there is no existing WMP for the Petawawa River.	The proponent is aware that this project will require the preparation of WMP. Completion of the principal WMP process activities (i.e., public consultation) will be coordinated with the ESR process. Completion of WMP for the new facility will be conducted after facility construction following receipt of Ministerial order to prepare a WMP.	Environmental Screening Process Engineering Design Post-construction WMP (Dam Operating Plan)

Generic Waterpower Lease Agreement (WPLA)		A generic version of the WPLA may be required for this site.	A WPLA will be sought by the proponent following completion of the ESR and project approval from MNR.	Permitting & Approvals
Existing MNR Infrastructure i.e. dams, bridges which may be impacted – decommissioning		There is no existing MNR infrastructure within the vicinity of the Big Eddy Site.	n/a	n/a
Dams/control structures upstream of the site	2.2	Downstream of the Big Eddy Rapids there are two privately owned water control structures that are used for impounding water for swimming in the summer. The area is known as the Catwalk. Additionally there are a number of MNR dams within Algonquin Park.	Features noted. Potential effects on the upstream dams and especially the "Catwalk" will be assessed in ESR.	Environmental Screening Process
Natural Environment				
Aquatic Resource Area Data	2.3	The Petawawa River and inline lakes have been found to support a cool/warm water fishery that includes walleye, pike, channel catfish, yellow perch, smallmouth bass, largemouth bass, lake sturgeon, muskellunge, rock bass, pumpkinseed, white sucker, shorthead redhorse, river redhorse, brown bullhead, logperch, blacknose shiner, brassy minnow, longnose dace, fallfish, central mudminnow, Iowa darter, and Johnny darter. The potential to support coldwater species exists in many reaches of the Petawawa River as mottled sculpin are present throughout and brook trout have been documented in the headwater areas in Algonquin Park and in other adjoining tributaries. The Petawawa River is also known to contain historical American eel habitat and a migration route to other areas within Algonquin Park. Eel are present in the Ottawa River in low numbers with the likelihood will be increased as recovery measures are planned on the Ottawa River in the future.	Background studies to be obtained and reviewed. Baseline studies to collect data on existing fish and fish habitat will be conducted during the Environmental Screening Process. Potential effects on fish and fish habitat will be assessed in ESR and considered in design and operation of the facility. Water quality data will be collected.	Environmental Screening Process Engineering Design Dam Operating Plan

		Water quality parameters are unknown (Dissolved Oxygen, Temperature, TDS, etc.).		
Terrestrial/Aquatic Invertebrate and Invertebrate Habitat		The effect of the proposal on the terrestrial and aquatic invertebrate population and their habitat in the study area is unknown. Potential for rare fresh water mussels exists due to the proximity to the Ottawa River. Additionally, some rare dragonflies have been documented in the area.	Features noted. Baseline studies to collect invertebrate, e.g. mussels and dragonflies, (and habitat) information will be conducted during the ESR. Potential effects on invertebrate and invertebrate habitat will be assessed in the ESR.	Environmental Screening Process
Fish Species present and Fish Habitat		A 2001 Petawawa River survey found the following species; Longnose gar, smallmouth bass, gar species, Common white sucker, silver redhorse, greater redhorse, emerald shiner, blackchin shiner, spottail shiner, rosyface shiner, mimic shiner, bluntnose minnow, longnose dace, fallfish, brown bullhead, channel catfish, rock bass, umpkinseed, yellow perch, walleye, Iowa darter, Johnny darter, and logperch. See ARA information above for additional fish species in the Petawawa River. Spawning habitat is known at the Big Eddy Rapids for common white sucker, redhorse spp., Lake Sturgeon, and walleye. The extent of the migration and use of the river is generally unknown. However, lake sturgeon, muskellunge, walleye and red horse spp., often move between the Petawawa River and the Ottawa River. Similar movements have been documented between the Muskrat River and the Ottawa River for lake sturgeon and walleye. It is unknown how significant the rapids are in this section of the river to spawning. A detailed study and analysis would be required to answer the question along with the fish that utilize the area at different times of year. Fish passage also needs to be considered. The extent of the habitat of fish species present is unknown. Additionally, the population size is unknown.	Background studies to be obtained and reviewed. Baseline studies to collect data on existing fish, fish movements and fish habitat will be conducted during the Environmental Screening Process. Potential effects on fish, fish movements and fish habitat will be assessed in ESR and considered in design and operation of the facility.	Environmental Screening Process Engineering Design Dam Operating Plan

Special Concern/ Threatened/ Endangered Species (Aquatic/Terrestrial)		Lake sturgeon, river redhorse, American eel, wood turtle, map turtle, Blanding's turtle, bald eagle, Kirtland's Warbler and their habitats are known to be present in the Petawawa River system. Stink pot turtle, milk snake, ribbon snake, golden winged warbler, monarch butterfly their habitats may also be present. Eastern wolf are present and typically follow the deer migration to the wintering yards. Several SAR fish species have been observed upstream and downstream of the proposed location, suggesting that migration is occurring. Potential effects to migration need to be assessed. Extent of range/distribution of all the SAR species within the watercourse is not known and should be a part of assessment requirements.	Features noted. Potential effects on VTE species (if identified in project area) will be assessed in ESR. Advise MNR of any identified significant wildlife habitat, particularly for any VTE species.	Environmental Screening Process All project phases
Wildlife Species present and Wildlife Habitat		Fur bearers present in the area include: otter, mink, beaver, weasels, muskrats, and northern water shrew. Reptile and amphibians such as the northern water snake, blue spotted salamander, bullfrog, painted turtle, snapping turtle, mud puppy, green frog, leopard frog have been observed in the Petawawa River. Additionally, deer, moose, black bear, red fox and coyote are known to be in the vicinity. There are known deer wintering yards and migration trails in the area. The effect of the facility on the wildlife species listed is unknown. Generally the size of the population (other than deer and moose) is generally unknown as is the extent of their range. The land surrounding the proposed project is also a travel corridor bottleneck for wildlife. Deer winter migration may be impacted. A detailed analysis of major travel corridors in the vicinity are required to determine whether deer will continue to cross the river safely without causing high mortality.	Features noted. Baseline studies to collect data on existing wildlife and wildlife habitat within the project vicinity will be conducted during the ESR. Potential effects on wildlife, wildlife habitat and if applicable, significant wildlife habitat will be assessed in ESR. Advise MNR of any identified significant wildlife habitat, particularly for any VTE.	Environmental Screening Process All project phases
Provincially Significant Wetlands (PSWs)	2.3	Black Bay PSW is located within the vicinity of the site.	Features noted. Any potential effects on the wetland will be assessed in ESR.	Environmental Screening Process

Areas of Natural and Scientific Interest (ANSIs)	2.3	There are no ANSIs in the vicinity of the site.	n/a	n/a
Water Quality		There is little available or known information on this feature. The effect of flow change on water quality as it pertains to erosion, sedimentation and loss of fish habitat is unknown. Additionally, the effect of lost aeration from the rapids is unknown.	Feature noted. Relevant background information/studies will be obtained and reviewed regarding Petawawa River water quality. Potential effects on Petawawa River water quality will be assessed in ESR.	Environmental Screening Process
Flow Regime Characteristics		A Water Survey of Canada Streamflow Gauge (02KB001) is located on the Petawawa River upstream of the Big Eddy site. Flows on the Petawawa River have been measured at this gauge since 1915. Flow Metric Data Sheets for the Petawawa River will be forwarded as an addendum to the Site Description Package.	The Water Survey of Canada Streamflow data has been reviewed and assessed. Potential effects on Petawawa River flows and levels will be assessed in ESR. Consideration will be given to incorporating Natural Flow Regime characteristics into the design and operation of the facility.	WSS Environmental Screening Process Engineering Design Dam Operating Plan
Soil (Leada Clay), Steep Slopes		There are steep slopes in the study area which could pose a potential hazard. The affect of the project on the slopes/shores of the Petawawa River is unknown. A geotechnical investigation is recommended.	The study area will be investigated for soils that may be prone to erosion. Potential effects (if any) on erosion will be assessed in ESR.	Environmental Screening Process Engineering Design Dam Operating Plan

8. Consultation Strategy and Regulatory Approaches

8.1 Consultation Strategy

In the environmental assessment process, consultation is a two-way communication process that involves affected and interested persons in the planning, implementation and monitoring of an undertaking. The purpose of consultation is:

- To provide information to the public;
- To identify persons and Aboriginal peoples who may be affected by or have an interest in the undertaking;
- To ensure that government agencies and ministries are notified and consulted early in the environmental assessment process;
- To identify concerns that might arise from the undertaking;
- To create an opportunity to develop proponent commitments in response to local input;
- To focus on and address real public concerns rather than regulatory procedures and administration;
- To provide appropriate information to the ministry to enable a fair and balanced decision;
- To expedite decision-making.
  (Source: Code of Practice Consultation in Ontario's Environmental Assessment Process, 2007)

Using a consultation process to consider the views of all interested persons into project decision-making is a key principle in environmental assessment.

A comprehensive consultation process ensures that local values are heard and assessed early on in the planning process. The involvement of stakeholders can aid a project by fomenting progress through permitting and approval in a timely manner. It is the objective of the proponent to ensure that local area values are upheld during this process and, as such, stakeholder consultation will begin early and be ongoing for groups and individuals that have been identified as stakeholders. The process will remain flexible and strive to incorporate pending changes resulting from the Green Energy Act regulations that can pose significant change to this consultation strategy and its timelines.

Although consultation has occurred with some key groups as well as individuals, broader consultation will begin in fall of 2009 and continue in a variety of ways throughout the Environmental Report (ER) process. Stakeholders will become identified at various stages throughout the consultation process. Continued community profiling will help to identify stakeholders, while the Notice of Commencement period will provide information to other stakeholders who may indicate their respective intention to provide input into the process.

A series of outreach programs and activities will be initiated, including community open house events to provide information to interested parties. The open house process will also help to engage stakeholders who may not have become involved in the Notice of Commencement or community profile stages. Contact during the various stages will include: phone calls, direct mail-outs, e-mail, newsletters, and publication in local newspapers. The proponent has also committed to the creation of a Recreational Action Committee (RAC) to give local organizations who are involved in recreation in the area representation in the decision making of advanced conceptual design and operations. This committee will be convened prior to formal consultation.

8.1.1 Potentially Affected Persons

The current listing of potentially affected persons was compiled using the Ministry of Natural Resources Site Description Package supplemented by a preliminary internet search. It is anticipated that this list will continue to expand throughout the process.

First Nations Governments and Communities

First Nation consultation is an important component of the MNR site release process, as well as any federal assessment. First Nations groups are an important and valued resource, which can provide relevant historical information relating to land use of an area. The following local communities were identified by the MNR:

- Algonquins of Ontario

The immediate site area is within the Algonquin Land Claim area, the MNR indicated that this group has retained consultants Jp2G to act on their behalf. Petawawa Green Energy has had a preliminary meeting with Jp2G and further meetings will be scheduled in the fall of 2009.

PGED will engage the Métis Nation of Ontario in a similar manner.

First Nations consultation is a requirement of the Crown, and PGED is committed to assisting in this process as required under the current process and under any new process mandated by the Green Energy Act.

ER Agency Consultation

Agency consultation will begin in Fall of 2009. Initial coordination of provincial agencies will occur through the Ontario Ministry of Environment and federal agencies through the Canadian Environmental Assessment Agency (CEAA). A request for a coordinated provincial / federal process will be made through the Notice of Commencement in early 2010. It is anticipated that the PGED EA team will prepare a Notice of Project to be delivered to the CEAA and other relevant federal agencies in order to determine if federal/provincial coordination is required. Additional agencies consulted during project development may include:

Stakeholder Identification

The following stakeholders (but not limited to) are identified for the project based on information provided in the SDP and identified to date by Xeneca. Many individual stakeholders have already or will identify themselves throughout the EA consultation process. Stakeholders who have been identified at present include:

Federal, Provincial and Municipal Government Agencies

Canadian Environmental Assessment Agency (CEA Agency)
Fisheries & Oceans Canada (DFO)
Transport Canada – Marine
Environment Canada
Environment Canada (Canadian Wildlife Services)
Health Canada
Natural Resources Canada
Indian and Northern Affairs Canada
CFB Petawawa
Ontario Secretariat for Aboriginal Affairs
Ontario Parks
Ontario Realty Corporation
Ministry of Natural Resources
Ministry of Aboriginal Affairs
Ministry of Environment

Ministry of Culture
Ministry of Heritage and Culture
Ministry of Transportation
Ministry of Municipal Affairs and Housing
Ministry of Northern Development and Mines
Ministry of Tourism and Recreation
Ministry of Labour
Ministry of Agriculture and Food
Town of Petawawa
City of Pembroke
Town of Deep River
Town of Laurentian Hills
County of Renfrew
Ministry of Energy and Infrastructure

Public, Landowners, Associations and Other Stakeholders

17 identified stakeholders Pre WSS Notice
6 Local land owners upstream of the project site
8 Local land owners downstream of the project site
90 identified stakeholders Post WSS Notice
Algonquin College
Baitfish Harvesters
Black Bay Rate Payers Association
Black Feather The Wilderness Adventure Company
Canadian Pacific Railway
Canoe Association of Ontario
Casa Wilkirk Resort
Commercial Whitewater Rafting Companies (Esprit, Wilderness Tours, Owl Rafting, River Run)
Federation of Ontario Naturalists
Fish and Game Clubs
Hydro One Networks Inc.
Keetna Snowmobile Club
Local residents and landowners
Ontario Federation of Anglers and Hunters (OFAH)
Ontario Federation of Snowmobile Clubs
Ontario Power Generation
Ottawa Riverkeeper
Ottawa Valley Forest Inc.
Ottawa Valley Outfitters
Ottawa Valley Railway
Ottawa Valley Tourist Association
Pembroke and Area Field Naturalists
Pembroke Outdoor Sportsman Club
Petawawa Bass Masters, local anglers
Portage Place Bed and Breakfast
Railway Ottawa Valley Railway
Recreational users and tourists
Renfrew County ATV Club
Resident Trappers
Snow Country Snowmobile Association
Superintendent of Algonquin Park
The Coureurs de Bois White Water Paddling Club (CDB)
Tourism operators
Trans Canada Pipeline

Venture Council Scouts of Canada
Whitewater Community Organizations (Petawawa River Rats, etc.)
Whitewater Ontario
YMCA - YWCA Canoe Camping Club (YCCC)

MNR Identified Resource Users

Registered trappers
Baitfish harvesters
Bear Management Area operators
Land Use Permit holders

8.1.2 Methods of Engagement

Recreational Action Committee (RAC)

PGED has committed to the creation of a Recreational Action Committee in order to address issues relating to recreation on the Petawawa River. This committee will consist of: One PGED EA team member, ORTECH stakeholder coordinator, and individuals representing organizations within the local community representing recreational interests including white water rafting and kayaking. PGED is prepared at any time, regardless of committee size, to allow representation from the Town of Petawawa.

Parties will be invited to participate on the committee based on the WSS notification results and initial site background research. It is envisioned that this committee will function as an empowerment mechanism, enabling the recreational and tourism sectors to become more involved with project development and design.

RAC will be called together prior to formal ER consultation, possibly beginning in early fall of 2009. The initial meeting will deal with refining a terms of reference for the committee and housekeeping issues. Following the initial meeting, the committee will begin addressing issues related to design and river usage. The committee may be disbanded following project completion, but, at the request of PGED or the RAC, it may continue throughout project construction and operations.

Prior to convening the RAC, it is expected a draft conceptual design and operations plan will be completed based on resource and financial viability. It is anticipated that the RAC will provide feedback on how this design will impact recreation. The PGED EA team and RAC, facilitated by the ORTECH stakeholder coordinator, will develop a design and operation which will be viable for both parties. Meetings may be monthly or on a set schedule agreed to by PGED and the RAC.

RAC could be used to transition to Community participation in Water Management Planning.

Notice of Commencement Period

Following the community profiling exercise, consultation will formally begin with direct mailings of the Notice of Commencement and a letter describing the projects and the EA process to stakeholders.

In order to identify additional stakeholders the Notice of Commencement will be published in the Pembroke Daily Observer. All correspondence received as a result of the stakeholder outreach program will be held in accordance with the Freedom of Information and Privacy Act (FIPA). Stakeholder comments will be used in the ER process, with the exception of those withheld by FIPA requirements. Private stakeholder information will only be shared with the Ministries involved in the ER process and will be held in strict confidence in accordance with FIPA.

Stakeholders will be asked if they wish to receive e-mail or direct mailing correspondence for future project communications. A project website will be created prior to the issuance of the Notice of Commencement. The website will describe project components, provide facts on low impact

hydroelectric power and project specific resources such as maps and images. Through this website stakeholders will be able to sign up for an electronic newsletter which will be issued during important periods of project development such as open houses and publication of the ER.

Initial Open House

A project open house will be held in order to outline project development and to discuss important baseline data. At this initial open house, a conceptual operating strategy will be presented to the public along with relevant hydrological environmental and social data. Potentially affected persons will be notified of this open house through direct mail-outs or electronic newsletters as well as via publication of a Notice of Open House to the Daily Observer. This open house will be held at a venue in reasonable proximity to the project site in the Town of Petawawa.

The purpose of this open house is to:

- present information regarding the proposed development,
- gather important local opinions on project development,
- identify concerns and information gaps in the planning process.

A survey will be available at this open house session to identify stakeholder issues and concerns in a more formal manner. It will also serve to evaluate the consultation methods so that they can be refined throughout the process. Stakeholders present at the open house will be asked to sign in and provide their name(s) and contact information. A sign-in sheet has been drafted and is available for review. On this sheet individuals can indicate their preferred method of communication, or if they wish to not receive any communication.

Display information from the open house will be available on the project website and comments on the open house material will be accepted for 30 days following the posting. The comment sheet from the first open house will also be used for the extended website consultation. This sheet will be posted on the website, but will be removed following the end of the 30 day comment period. It will be available for review upon request. Comments regarding the open house material will continue to be accepted following this period, however, a deadline will be assigned in order to encourage input at the earliest possible juncture.

As required a second open house will occur.

Notice of Opportunity to Inspect Draft Report

All stakeholder issues and concerns will be examined and responses will be developed. Where gaps are identified, issues will be added to the list of impacts to be examined. An impact summary table will be created outlining the predicted impacts from all development phases stemming from stakeholder comments and concerns. These will be delivered to the PGED EA team so that they may be addressed in project design and development.

Following the mitigation phase, a draft ER will be created following which, notification of the availability of this draft will be delivered to the identified stakeholders by direct mail-outs or electronic newsletters. This letter will also outline specifics for a second open house and indicate the methods for obtaining a copy of the draft ER and how to comment on it. The comment period for the draft ER will be 30-60 days depending on project development and level of stakeholder engagement. It is anticipated this comment period may overlap with the 30 day comment period for the second open house.

A Notice of Opportunity to Inspect the Draft ER will be published to the Daily Observer. A notification of a public open house and details for comment may be included in this notice.

Final Open House

A follow up open house may be held to discuss the mitigation options presented in the draft report. The decision to hold this open house will be made following the results of the initial open house and stakeholder interest in the report process. A comment card will be available at this open house to gauge stakeholder concerns and opinions regarding the mitigation options. As with the initial open house, all written material will be available on the project website with a comment period of 30 days from this date material is posted. This final open house will feature similar items as the initial open house.

ER Wrap up

Following the conclusion of the draft ER and open house comment periods, a final ER report will be prepared and posted to the project website. A Notice of Completion will be published in the Pembroke Daily Observer, and delivered to stakeholders through direct mailings or electronic newsletters. The time allotted for this under the Class EA is a 30 day period. It is hoped that stakeholder issues will be dealt with through the extensive consultation prior to issuance of a Notice of Completion.

Table 8.1: Permits and Approvals Required for a Hydroelectric Project outlines how the permits, approval and legislation interact. Ontario Parks may require a different or modified version of this process.

Table 8.1: Permits and Approvals Required for a Hydroelectric Project

Agency	Legislation	Permit/Approval Required	Estimated Time to Process	Comments	Issues Addressed
Provincial Government (Ontario)					
Ministry of the Environment	Ontario Regulation 116/01 (Electricity Projects)	Provincial Environmental Assessment	6 to 12 months	An Environmental Screen or Report will depend on size of project.	All
	Environmental Protection Act	Certificate of Approval (Air)	4 to 6 months	Required for any air emissions or noise released from building to environment during operation or construction of a facility.	Air and noise
		Certificate of Approval (Sewage)	4 to 6 months	Required for oil skimmer, oil/water separator, septic system, etc.	Water
	Ontario Water Resources Act	Permit to Take Water	3 to 5 months	Required if over 50,000 L of water to be taken per day, e.g. dewatering of cofferdam, station operation.	Water
Ministry of Natural Resources	Lakes and Rivers Improvement Act Public Lands Act	Work Permit	1 to 2 months	Required if work in-water or on shoreline, e.g. cofferdam.	Water, fish, aquatic vegetation, resource users
	Forest Fires Prevention Act	Fire Permit	1 month	Required only if burning necessary.	Vegetation
Ontario Parks separate EA process					
Federal Government					
Canadian Environmental Assessment Agency	Canadian Environmental Assessment Act	Federal Environmental Assessment Screening	6 to 12 months	Agency will help in facilitating the Environmental Screening Process with both federal and provincial agencies, if required.	All

Coast Guard	Navigable Waters Protection Act	Approval under NWPA	3 to 6 months	Check on NWPA approval for existing structure; may require in-water construction approval.	Navigation, resource users
Department of Fisheries & Oceans	Fisheries Act	Fisheries Act Authorization	3 to 6 months	May trigger CEAA screening.	Fish, fish habitat, aquatic vegetation

8.2 Consultation Activities

The following describes the consultation activities conducted by Xeneca during the 120-day period associated with the preparation of this WSS.

Notice of Intent Newspaper Advertisement

A Notice of Intent was published in the Pembroke Observer on _____, 2009 and the _____ on _____, 2009. The notice served to notify the public of Xeneca's intent to pursue the development of a hydropower facility on the Petawawa River. A copy of the notice is provided in Appendix E.

Stakeholder Letter Mail Out

A direct letter mailing of the Notice of Intent was completed during the week of April 22, 2009 to the relevant stakeholders listed above. Notification to First Nations and local resource users (e.g. Land Use Permit holders, trappers, etc.) was conducted by MNR. A total of six letters were mailed. A copy of the letter and mailing list is provided in Appendix E.

8.3 Additional Consultation

Due to extraordinary public interest in the Petawawa River Projects, Petawawa Green Energy Development and Xeneca have engaged in additional consultation above and beyond what is prescribed by regulatory agencies.

The proponent has met with Petawawa municipal officials on several occasions since project conception in 2007. PGED has also had in depth discussion with CFB Petawawa Base Command. Meetings with both the Town and base resulted in land lease agreements and conditional support for moving forward with the Big Eddy Project.

Additionally, PGED has met with two major stakeholder groups in the area, specifically The Pembroke Outdoor Sportmen's Club and the Black Bay Ratepayers Association.

And initial meetings with Commercial Whitewater rafting interests have also taken place.

The most recent consultations took place April 20, 2009 at the Pembroke Outdoor Sportmen's Club and August 30 at the Black Bay Ratepayer's Association Annual Meeting at the home of James Carmody.

The April 20 presentation to POSC attracted about 50 people, including a contingent of vocal kayaking enthusiasts.

The majority of questions were in regard to:

- Water level impacts;
- Impact on recreational uses such as kayaking;
- Impact on fishing/ fish species and aquatic habitat.

The meeting with Black Bay Ratepayers generated the following questions:

1. Water-level concerns. Will there be controls?
2. Dam vs. Weir, what are the differences?
3. Is there danger of flooding onto CFB? Is there danger of mercury contamination to the earth?
4. Are there other projects similar to this proposed project? Where? How did Xeneca work with the community there? Name them.
5. Will the project impact recreation? Safety concerns: swimming, boating, dangerous equipment, turbines etc.
6. How much natural head? It takes 16lb of water pressure to... (very technical question for an engineer to respond to – took person's name).
7. What is the impact study? What will change in terms of water-flow? Are there guarantees?
8. What are the cons of this project? Will there be a website to explore a benefit analysis?
9. If the "Kayakers" protest louder, will they get their way?
10. Will there be proper signage to alert paddlers and swimmers? Will there be portage rights? Insurance? Fences?
11. Petawawa river was not seen as economically viable years ago, why is it now? Will Xeneca receive a government subsidy? What is the return to investors on this project?
12. What are the measurements of the weir? What is the impact? Can absolutes be provided?
13. What will happen if Xeneca sells the Waterpower development to the Americans or the Chinese?
14. What will be the impact during the construction phase? Environmental and recreational?

These issues will be addressed once the project proceeds forward as per the outlined process.

Overall while there is vocal minority that oppose the project, Community support exists and willing to consider the benefits of the project.

9. Results of Public Consultation

a. **May 27th to July 14th, 2009**
Public Notice was posted May 27th, 2009 and May 28th, 2009 with comment period concluding July 14th, 2009.

b. **Names of Newspapers**
This notice was posted to the Pembroke Daily Observer and the Daily News.

c. **Summary of Comments Received**
In total, 96 comments were received through the WSS notification period of May 27th to July 14th, 2009. Complete copies of all these comments including responses can be found in the Appendix.

d. **Form Letter – 53 submitted (Group C)**
Beginning on June 19, 2009 and continuing until several days past the close of the comment period 49 form letters were received. The form letter lists the following concerns:

- Environmental damage during construction;
- Loss of a Canadian right to navigation;
- Loss of tourism revenue;
- Loss of recreational boating and swimming opportunities for residents;
- Destruction of habitat for flora and fauna;
- Damage to fish habitat for lake sturgeon and other species;
- Reduced flow rates in the Ottawa River.

e. **Form Letter Variant A – 6 submitted (C16)**
This letter echoes the concerns listed in the original form letter but adds that this river has a history which is tied to economic development of Canada and that it is heavily used for canoe trips.

f. **Form Letter Variant B, Scouts Canada – 5 submitted (C1)**
Many of these letters take the same format as the original form letter with additional paragraphs which discuss the (Boy Scouts of Canada) Venturer Council's use of the waterway for instructional and other types of recreational activities.

g. **Letter Variant C – 4 submitted (C5)**
This letter submitted by 4 different individuals, discusses the recreational values of the waterway including the use of the system by the YMCA to teach youth canoeing and for other white water recreationalists to improve on their skills. Also outlined were concerns that:

- Irreversible damage that the project will have;
- Impacts on canoe route through Algonquin Park;
- Impacts on flows into the Ottawa River, a heritage river;
- Dewatering of two sets of rapids, (known as Railroad and Lovers) will impact recreation;
- Impacts on tourism from destruction of a publically accessible, navigable waterway;
- necessary resources and remediation measures required so that there will be no diminishment in the ability to use the Petawawa for white water activities.

h. **Petawawa River Blog Form Letter – 7 Submitted (C17)**
This letter is a standard form letter printed off a blog site at www.petawawa-river.blogspot.com and mailed in. The letter identifies concerns to be:

- Destruction of recreational resource;
- Dewatering of the river, with only a bare minimum flow;
- Destruction of rapids;

- Stagnation at catwalk swimming hole;
- Impacts on sport fishing from mouth of the river up through Black Bay;
- Object to damming and destruction of the river.

Additional concerns identified by the submitters are:

- Unexploded ordinance (UXO) needing to be removed from the Base of the Bois Dur Rapids;
- Fish habitat concerns;
- Lack of information regarding the exact nature of the project;
- Wildlife migration from Algonquin Park and concern for habitat impacts from the structure;
- Decline in property values.

i. Recreational Comments – 11 submitted

These comments are believed to have stemmed from the Form Letter variants. Some of them mirror the concerns identified in the original Form Letter (Group code C). Concerns outlined in these letters are:

- Concern that issues of commerce are being placed ahead of health and wellbeing;
- Environmental damage during construction;
- Loss of a Canadian right to navigation;
- Loss of tourism revenue;
- Loss of recreational boating and swimming;
- Destruction of habitat for flora and fauna;
- Damage to major tributary of heritage designated Ottawa River;
- Damage to fish habitat for lake sturgeon and other species;
- Lower property values;
- Aesthetic concerns with structures;
- Water diversion around the rapids will result in inadequate flow to accommodate recreational use;
- Loss of use of the catwalk swimming area in summer due to low flows resulting in closures from high bacterial counts;
- Discovery of stray ammunition in the river, which could pose a risk to residents if it goes through a turbine;
- Damage to riverbed and shoreline during construction;
- Dewatering of the riverbed;
- Obstruction to spawning fish migration;
- Without adequate flow, clogging of the mouth of the Petawawa by sediment and sand;
- Alteration of electrical production of the OPG and Hydro Quebec Dams on the Ottawa River due to lower spring time flows and higher summer flows;
- Elimination of former and present sites of the Kayaking World Championships and Kayaking North American Cup due to low flows;
- Loss of recreational area used to teach youths white water skills;
- Loss of ability to kayak in the area due to decreased flow rates;
- Destruction of community values;
- Loss of publically accessible waterway.

j. **Other Comments – 10 Submitted**

In addition to comments which were in the form of a standard letter submitted by multiple parties, unique letters from concerned individuals were also received. While some of these comments were from individuals asking only to be kept informed on project process and status, some included lists of concerns. These concerns are:

- Diverting from the river will have potential effect on recreation (canoeists, kayakers and anglers);

- Who will benefit from this project if it goes ahead;
- Concerns regarding proponent description of 'Big Eddy' and the location of the structure;
- Project is not necessary and is only a cash grab;
- Electricity is not needed as the market has a surplus;
- Concerns may be varied depending on the proposal for the project;
- Concerns relating to changes in water flow, extreme low flow conditions, flooding, changes to fish community, changes to navigability;
- The lack of a conceptual strategy makes it difficult to comment;
- The project must respect and maintain the residents' present use and harmony with the river;
- Residents have purchased the shoreline as well as the property and built homes and other facilities along the water's edge which accommodate natural flow regimes;
- Project must ensure that natural flow dynamics are protected;
- Residents must have an active role in the process and decision making of the project.

Summary:

Although very early in its development process, considerable media attention has been drawn to the Big Eddy project. Given the prolonged period needed to submit the Waterpower Site Strategy, the proponent has had only limited information and opportunity to address concerns, clarify issues and outline actual impacts. Greater availability of information will occur as Project proceeds forward, but time may be required to balance against opinions expressed by a small but vocal interest group that has disadvantaged Project in terms of broader public perception.

Overall, it is anticipated the effects of Project are marginal and can be mitigated. Positive benefits include increased renewable energy and positive economic factors for the region. Recreational uses of the river including kayaking will be changed with the sharing of water resources. However, if a water control structure is utilized, it may be possible to enhance white water recreational opportunities by limiting night-time flows to acceptable minimums in order that water can be applied to day-light uses.

k. **Plan to Address Potential Issues Discussed in Notification Process**
Below is a listing of issues identified through the notification process, divided into categories:

Table 9.1 Outline Strategy to Address Consultation Issues and Concerns

Environmental Concerns

Concern	Response
There is a concern that construction activities could result in environmental damage, including damage to the shoreline and riverbed.	Through comprehensive studies and review, a mitigation plan will be enacted to the satisfaction of all regulatory agencies.
Concern has been expressed regarding the health of wildlife habitat, and the damage construction and operation of this structure will have. This includes potential impacts to wildlife corridors leading to Algonquin Park.	Potential effects on water levels are expected to affect only an area approximately 1 km immediately upstream from the Big Eddy rapids. Riparian land issues in the affected area are being dealt with. Water levels are expected to be within seasonal norms.

The health of fish habitat is important to the community, and there are concerns that the construction and operation of the dam will result in destruction and irrevocable harm to fish habitat, and will obstruct fish spawning pathways.	Through comprehensive studies, fish communities and habitat will be identified. Facility construction and operation will be done in a manner that mitigates potential effects. Facilities will be constructed and operate in a manner consistent with policy established by government agencies and community values. Water control structure in river are not necessary for operation. The water control structure contemplated is a weir with an inflatable dam which minimizes and supports the mitigation of effects.

Navigability Concerns

Concern	Response
Concern has been expressed that this project will result in the loss of a Canadian right to access a public navigable waterway.	Projects will not impede navigation and efforts will be made to work with recreational users to protect and possibly enhance navigation.
This project could impede a canoe route through Algonquin Park.	1. Canoes and other water recreation uses are prohibited on CFB Petawawa lands upstream of the project site thus already presenting a navigational barrier to Algonquin Park. 2. All other recreational canoeing will continue unimpeded. 3. Safety issues will need to be considered/addressed but will not be an impediment to recreational canoeing.

Tourism Concerns

Concern	Response
It has been stated that tourism will drop as a result of the inability to use the waterway for recreation.	Tourism values will not be impacted and may even be enhanced (e.g., a longer white water season) through input into the Recreational Stakeholder Action Committee being formed by Petawawa Green Energy Development. If a water control is built, it is possible to minimize downstream evening flows and regulate optimal water flows at specific times of the day. Regular enhanced water flows over a prolonged seasonal period could help tourism.

Recreational Concerns

Concern	Response
Many comments have stated that the waterway is a popular training area for youth and other beginners, and intermediate level white water enthusiasts. The project could result in the inability to use this area and the closure of these programs.	The project will not impede training programs and may ultimately enhance the experience by providing desired water flows. Use of waterways will be gauged as part of process.
A reduced flow rate as a result of the project could lead to stagnation of the Catwalk Swimming area. Currently in times of low flow this beach is closed because of high bacterial counts (a result of the decreased flow).	PGED will work with all recreational users to mitigate potential effects and seek means to improve the recreational opportunities on the river through the Recreational Stakeholder Action Committee. Is unlikely to occur given this would entail sustained impoundment, which is not contemplated. Water flow over 24 hour period will not be changed. If the water control structure option is pursued evening flows could be minimized

	during the summer to increase water flows during the day. If Big Eddy Project operations are combined with Half Mile Project, combined operations could actually sustain higher water flows in the summer.
As a result of habitat disruption there are concerns that sport fishing could be impacted from mouth of the river up through Black Bay.	PGED will work with local fish and game clubs as well as government agencies to mitigate potential effects to the sport fishery. Will meet regulatory requirements so this is unlikely to occur.
Decreased flow rates will have a negative impact on white water activities including kayaking. There are concerns that sites used for the Kayaking World Championships and Kayaking North American Cup will be lost.	Project design and operation can be developed that protects and possibly enhances kayaking and other recreational uses on the river and possibly prolongs the season if, combined with Half Mile Operation, controlling flows in the evening flow is reduced and daytime flow increased for recreation. (See examples referenced at the end of this section.) Input into the Recreational Stakeholder Action Committee being formed by Petawawa Green Energy Development will be sought.

Flow Rate Concerns

Concern	Response
There is a variety of concerns regarding reduce flow rates and potential dewatering of the rapids at Railroad and Lovers, and how they will impact recreational use of the system.	Project design and operation can be developed that protects and possibly enhances kayaking and other recreational uses on the river. Example, water control from Half Mile and, if a water control structure is put in place for Big Eddy, g evening flows may be minimized in order that desired flow is available in daylight hours, which increases water for waterpower and kayaking and could prolong the season. Input into the Recreational Stakeholder Action Committee being formed by Petawawa Green Energy Development will be sought.
It was mentioned that reduced flow rates on the Petawawa could lead to reduced flow rates in the Ottawa river, thereby impacting electrical production of the OPG and Hydro Quebec Dams on the Ottawa River.	As the facility is only diverting water along a relatively short reach of the river and is a run-of-river operation, flows into the Ottawa River will not be significantly altered.
There is some thought that without adequate flows, sediment and sand will clog the mouth of the Petawawa.	Water flows at the mouth of the river are not expected to vary significantly due to the project and no change in sedimentation is expected.
There is a desire to see natural flow regime remain.	PGED will work with the best available science and data to maintain flow regimes in the river.

Heritage Concerns

Concern	Response
The Petawawa is a tributary of the Ottawa River which is designated as a Heritage River. Stakeholders are concerned about potential effects to this protected system.	No potential effects on any heritage values are expected. As mandated by MNR site release process, archaeological studies will be undertaken to ensure that natural and historical values are considered.

Land Owners Concerns

Concern	Response
There is some concern that this development will have an adverse impact on property values and concern over the aesthetics.	Big Eddy Project is a relatively small, low impact development. No impacts on property values are expected, nor are aesthetic values expected to be impacted. Stakeholder Input into project design is also anticipated.
There are some stakeholders who voiced their distrust with the development in concept and stated they were concerned that issues of commerce are being placed ahead of health and wellbeing, that electricity is not necessary.	An open and transparent consultation regime is expected to build trust. The project is being developed in concurrence with current public policy that outlines the need for localized generation of electricity that is renewable and green and that waterpower provides highly desirable base load and peaking power that reduces greenhouse gas emitted by fossil fuel generation.
It has been mentioned that the description of the project may be inaccurate and that the "Big Eddy" is different than the project location currently.	Approx. site location has been identified within the Application and final location of facility components will be verified via MNR site approval process. Final location will be presented at Public Open House in 2010 or 2011.
Concern has been raised regarding residents who have purchased the shoreline and have constructed houses and other facilities along the water's edge, consistent with the current natural flow rate. There is an expressed desire to protect these investments.	Property owners identified within the area of potential effects have or will be notified. Facility development and operation are not expected to exceed normal seasonal water levels and therefore will not affect structures currently in place. Through water control structures and water use planning, increased protection of property may be realized.

Concerns with the Process

Concern	Response
It has been expressed that residents feel that the lack of information available during this consultation period prohibits them from adequately commenting on the project. They also as a result feel that PGED is not being open and honest with them and are not allowing them to have an active role in the decision making process.	Process will follow established guidelines to engage all stakeholders. Perception may be related to misinformation in media and from poorly informed but vocal interest groups. PGED follows all application and development process guidelines and information will be shared in an open and transparent manner as it becomes available.
There is an expressed desire to ensure PGED uses the necessary resources and remediation measures to ensure that there will be no diminishment in the ability to use the Petawawa for whitewater activities.	Project design and operation can be developed that protects and possibly enhances kayaking and other recreational uses on the river. Input into the Recreational Stakeholder Action Committee being formed by Petawawa Green Energy Development will be sought.

Health and Safety

Concern	Response
Stakeholders have commented that they've discovered live and stray ammunition in the river, likely from CFB Petawawa, and that these arms could pose a safety risk to residents if they were to pass through a turbine.	Technical and physical means can be used to greatly minimize or eliminate this risk. Specifically, intake will have a gate that would prevent this from occurring. Intake is also above main channel and unlikely ammunition could float into intake. A plan to address this will be developed in cooperation with CFB Petawawa.

References for Whitewater Opportunities with Dams:

- American River Expeditions. 2009. We have water all summer long. Why?? From website: http://www.americanwhitewater.com/american-river-faq.htm

- Karwacki, P. 2006. Navigation of Water Control Structures Paper given at Canadian Dam Association Conference, Québec City.

- Kleinschmidt Associates. 2005. Old Town Maine Whitewater Park, Eastern Maine Development Corporation Preliminary Feasibility Study. From website: www.emdc.org/community/pdf/Penobscot%20River/Report.pdf

- National Recreation and Parks Association. 2005. All the Rage. From website: http://www.nrpa.org/content/default.aspx?documentId=3611

- Tennessee Valley Authority. 2009. Ocoee Whitewater. From website; http://www.tva.gov/river/recreation/wwc.htm

10. Proposed Milestone Dates

The following project milestones dates (subject to adjustment) are proposed:

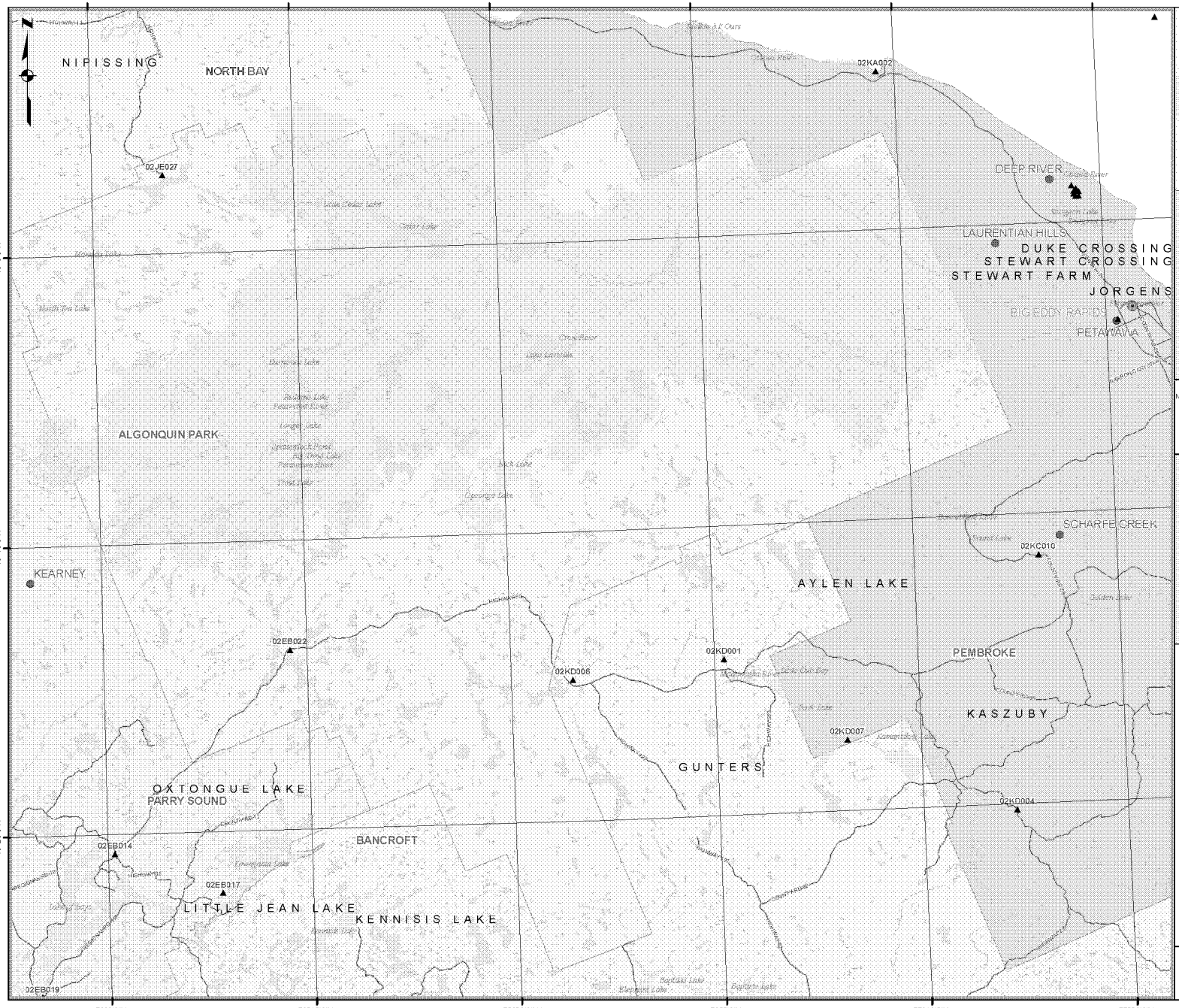
Waterpower Site Strategy Submission:	Sep 2009
Site Release / Applicant of Record:	Nov 2009 (*60 days following WSS submission*)
Notice of EA Commencement:	Nov 2009
Statement of EA Completion:	Nov 2011
Location Approval (MNR (LRIA):	Jan 2012
Plans and Specifications Approval (LRIA):	Jan 2013
Construction Commencement:	Sep 2013
In-Service Date:	Sep 2015

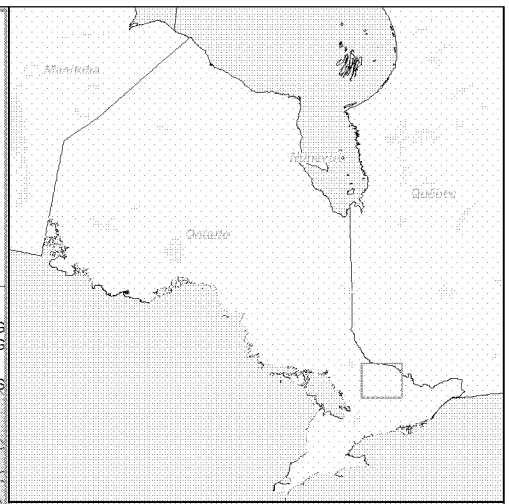
11. List of References

Hatch, 2008. Big Eddy and Half Mile Site Visit Report - Memo issued to Xeneca Power Development Inc. October 7, 2008.

Hatch, 2009. Petawawa Hydropower Sites, Hydrology Review Report prepared for Xeneca Power Development Inc. August 18, 2009.

MNR, 2008. Ministry of Natural Resources, Site Description Package – Big Eddy Rapids – Petawawa River, File # WSR–2008-02. November 13, 2008.





NOTES:

1. MAPPING INFORMATION SHOWN ON THE DRAWING HAS BEEN DERIVED FROM THE MNR DIGITAL DATABASE (LAND INFORMATION DATA SUBSCRIPTION SERVICE.
2. PROJECTED COORDINATE SYSTEM IS NAD 1983, UTM ZONE 17N.

LEGEND

- SITE LOCATION
- POPULATED PLACES
- WSC GAUGING STATION
- ROAD NETWORK
- WATER BODIES
- PROJECT WATERSHED
- MNR DISTRICTS

Xeneca

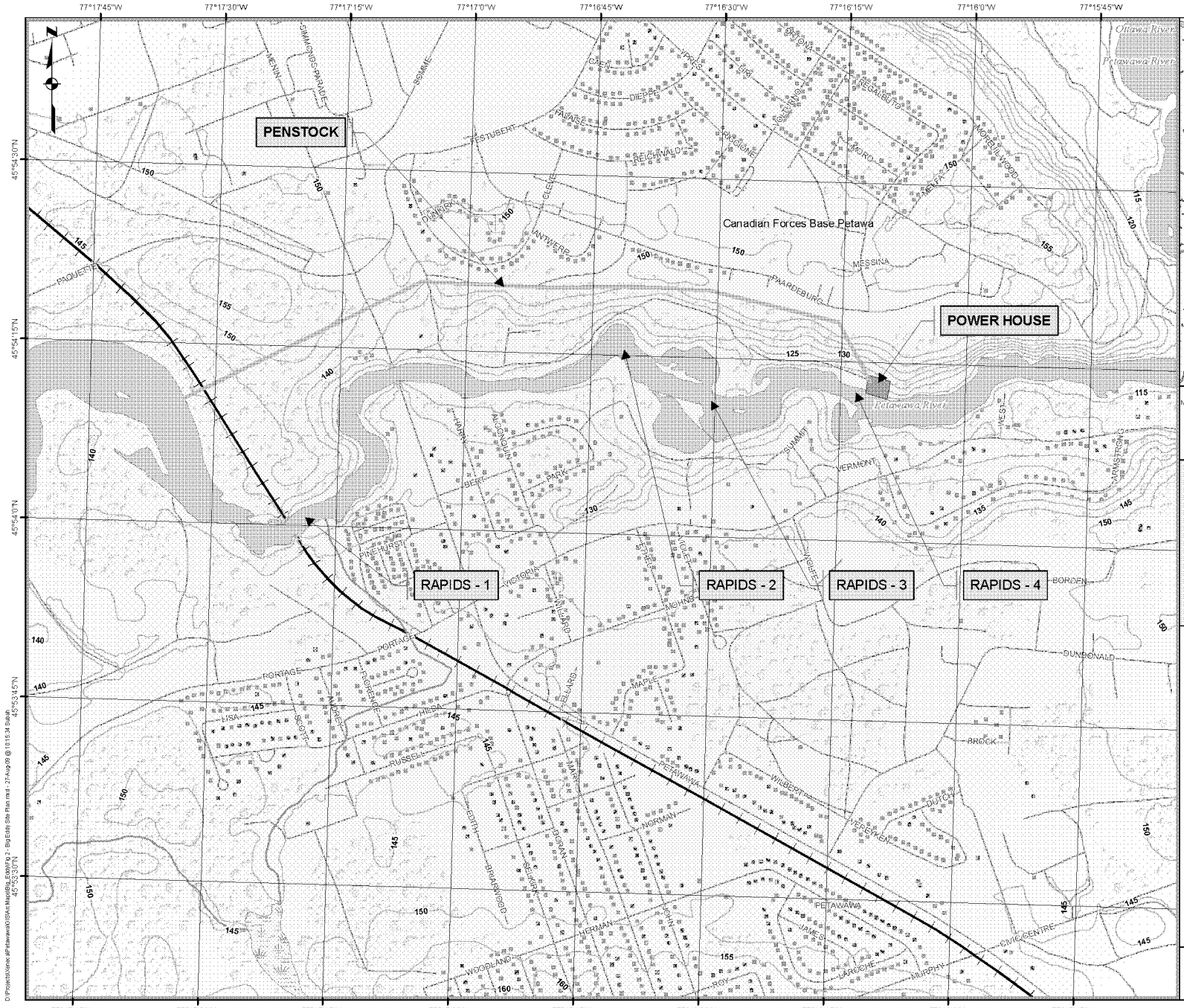
0 1 : 500,000 20 kms

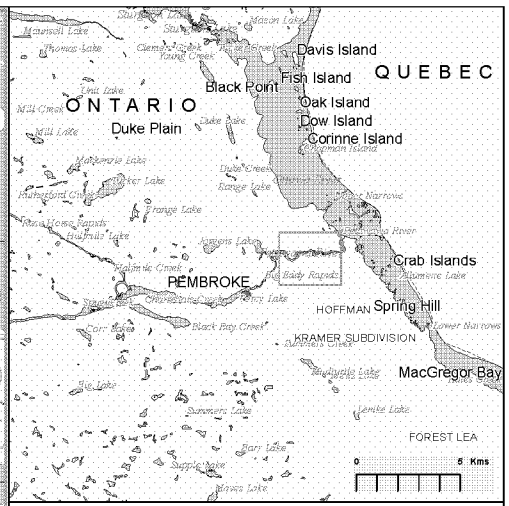
XENECA POWER FIGURE 1

BIG EDDY RAPIDS HYDRO PROJECT
PROJECT LOCATION HATCH™

D:\Projects\Xeneca\Petawawa\GIS\ArcMapFig 1 - Petawawa Site Location.mxd - 27-Aug-09 @ 8:40:05 Sabah

A0108489_55-000055





NOTES:

1. MAPPING INFORMATION SHOWN ON THE DRAWING HAS BEEN DERIVED FROM THE MNR DIGITAL DATABASE (LAND INFORMATION DATA SUBSCRIPTION SERVICE).
2. PROJECTED COORDINATE SYSTEM IS NAD 1983, UTM ZONE 18N.
3. CONTOUR INTERVAL ARE 5 M TAKEN FROM MNR DATABASE.

LEGEND

- BUILDING SYMBOLS
- PENSTOCK (MNR APPLICATION CONCEPT)
- ROAD NETWORK
- RAILWAY
- CONTOUR
- WATER BODIES

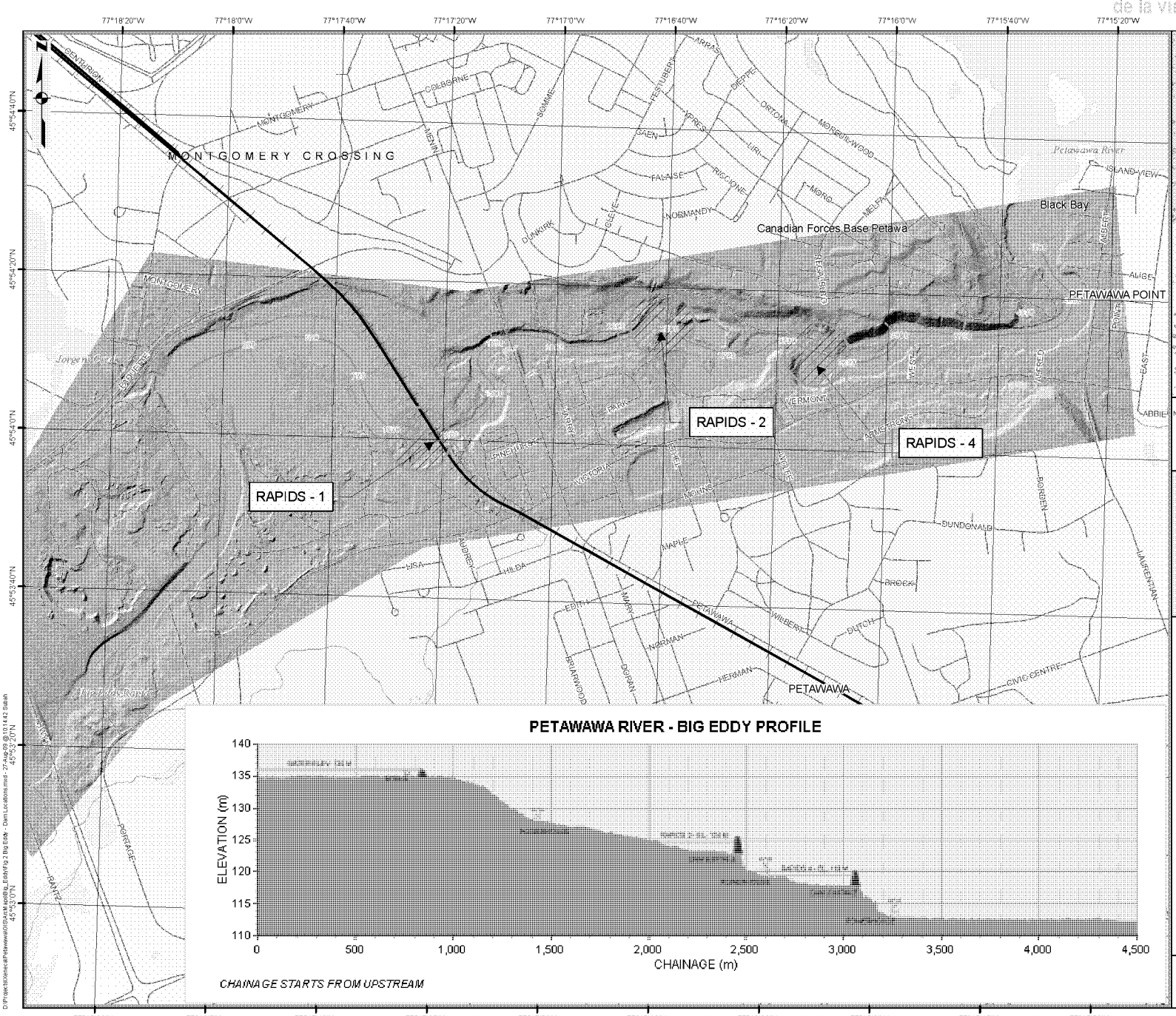
Xeneca

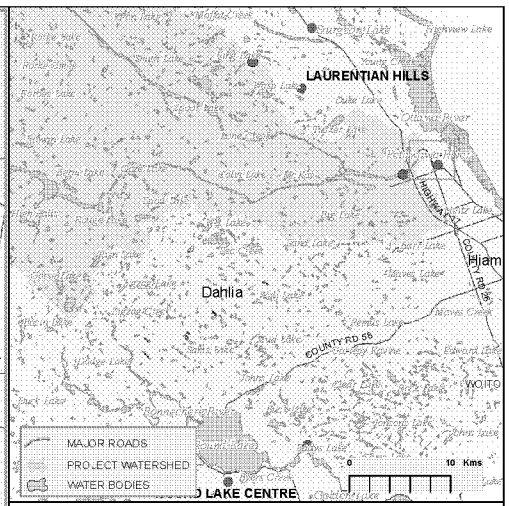
0 1 : 10,000 500 M

XENECA POWER FIGURE 2
BIG EDDY RAPIDS HYDRO PROJECT
SITE OVERVIEW HATCH

D:\Projects\Xeneca\Petawawa\GIS\Arc Maps\Big Eddy\Fig 2 - Big Eddy Site Plan.mxd - 27-Aug-09 @ 10:15:34 Sallah

A0108489_56-000056





NOTES:

1. MAPPING INFORMATION SHOWN ON THE DRAWING HAS BEEN DERIVED FROM THE MNR DIGITAL DATABASE (LAND INFORMATION DATA SUBSCRIPTION SERVICE).
2. CONTOUR AND DEM INFO DERIVED FROM LIDAR SURVEY CONDUCTED IN 2009.
3. PROJECTED COORDINATE SYSTEM IS NAD 1983, UTM ZONE 18N.

LEGEND

- POTENTIAL SITES DEVELOPMENT
- ROAD NETWORK
- RAILWAY
- LIDAR MAPPING EXTENT
- WATER BODIES

PETAWAWA RIVER - BIG EDDY PROFILE

CHAINAGE STARTS FROM UPSTREAM

Xeneca

0 1 : 15,000 500 M

XENECA POWER FIGURE 3
BIG EDDY RAPIDS HYDRO PROJECT
SITE DEVELOPMENT LOCATION HATCH

D:\Projects\Xeneca\Petawawa\GIS\ArcMaps\Big_Eddy\Fig 2 Big Eddy - Dam Locations.mxd - 27-Aug-09 @ 10:14:42 Sabah

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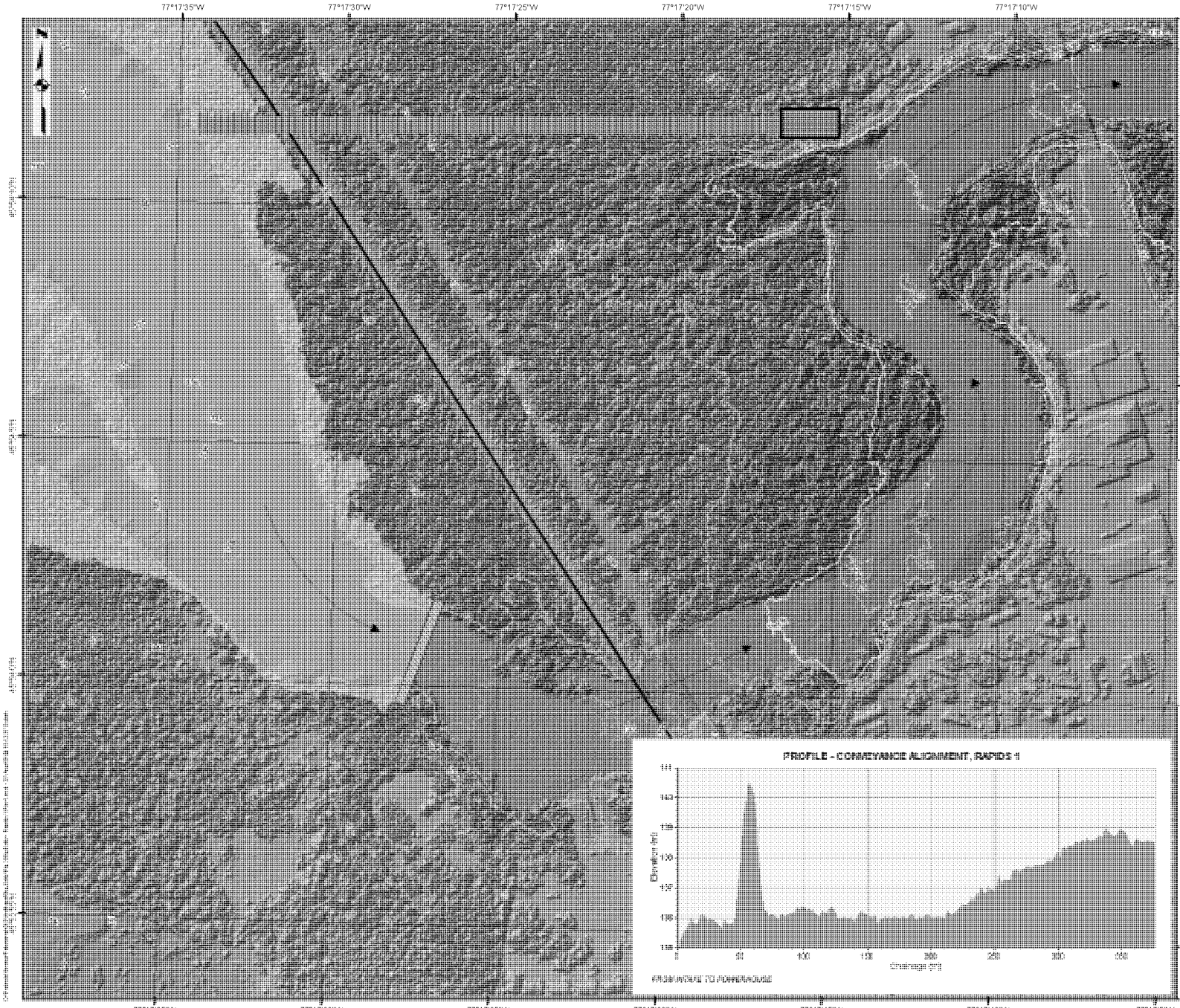

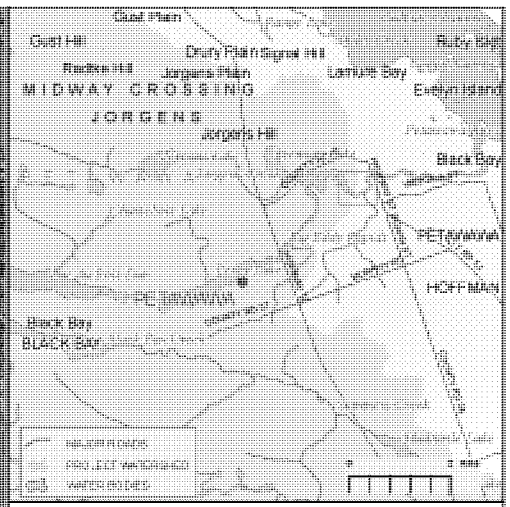

NOTES:

1. WATERSHED INFORMATION DERIVED ON THE BASEMAP HAS BEEN SIMPLIFIED FROM THE NRCAN CANVEC DATABASE (LAND FEATURES DATA SUBSCRIPTION SERVICE).
2. CONTOUR ANALYSIS WAS DERIVED FROM LIDAR SURVEY CONDUCTED IN 2009.
3. PROJECT INFRASTRUCTURE SHOWN IS BASED ON 90% DESIGN.

LEGEND

- POWER HOUSE
- DAM
- AUXILIARY DAM
- CANAL
- PENSTOCK / TUNNEL
- WATER BODIES
- POTENTIAL INUNDATION (ELEV. = 138 M)

CONTOUR - 1 m INTERVAL

- 115
- 120
- 125
- 130
- 135
- 140

PROFILE - CONVEYANCE ALIGNMENT, RAPIDS 1

COMPONENT DESCRIPTION:

MAIN DAM LENGTH	70	(m)
AUXILIARY DAM LENGTH	N/A	(m)
CONVEYANCE CHANNEL LENGTH	375	(m)
PENSTOCK LENGTH	---	(m)
INUNDATION AREA (TOTAL)	42	(ha)
HEADPOND ELEVATION	138	(m)
TAILWATER ELEVATION	127	(m)
GROSS HEAD	9	(m)

Xeneca

XENECA POWER FIGURE 4

BIG EDDY RAPIDS HYDRO PROJECT
PROJECT LAYOUT AT RAPIDS - 1

HATCH

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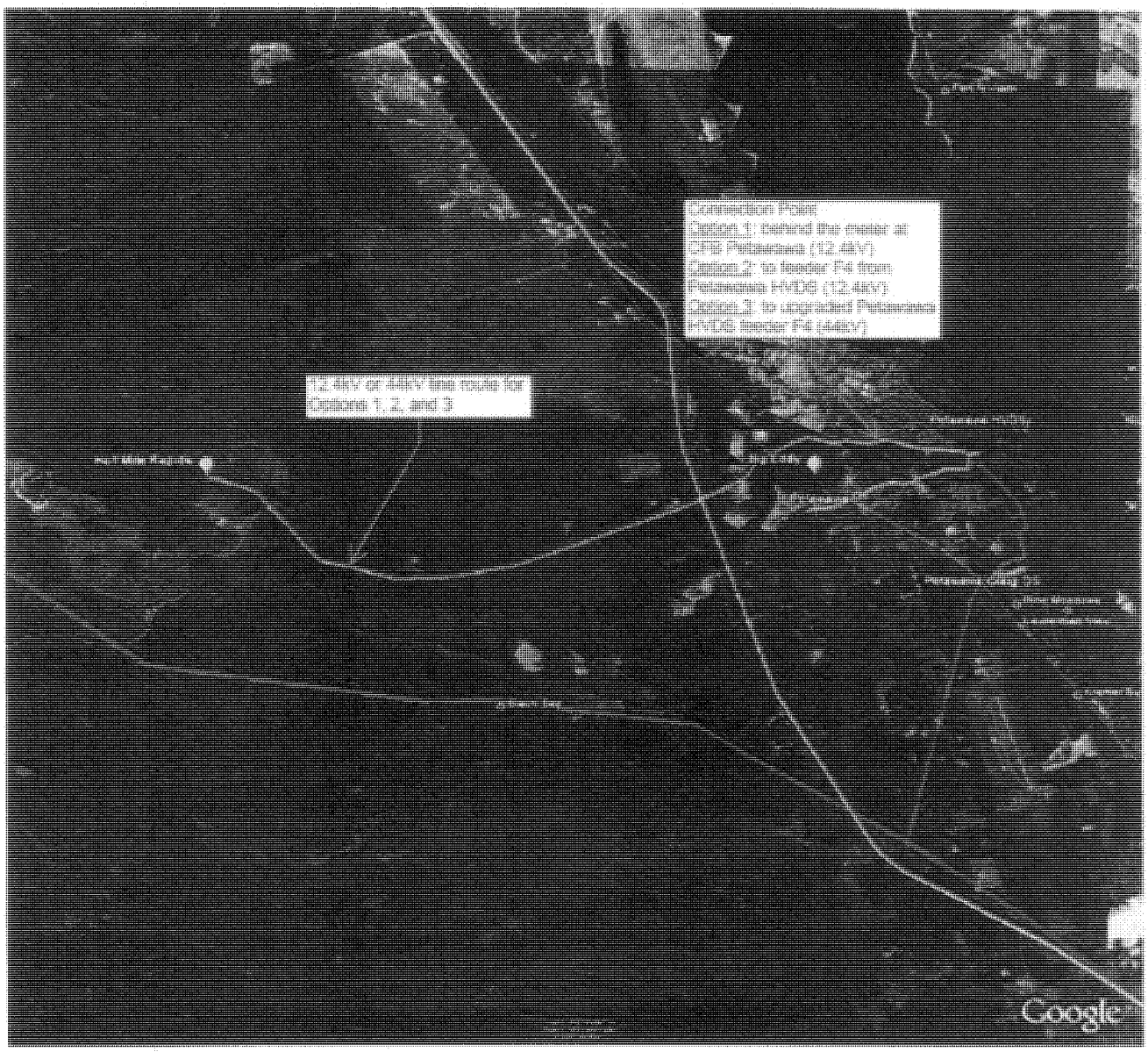


Figure 6 – Line Routing and Connection Points for Options 1, 2 and 3

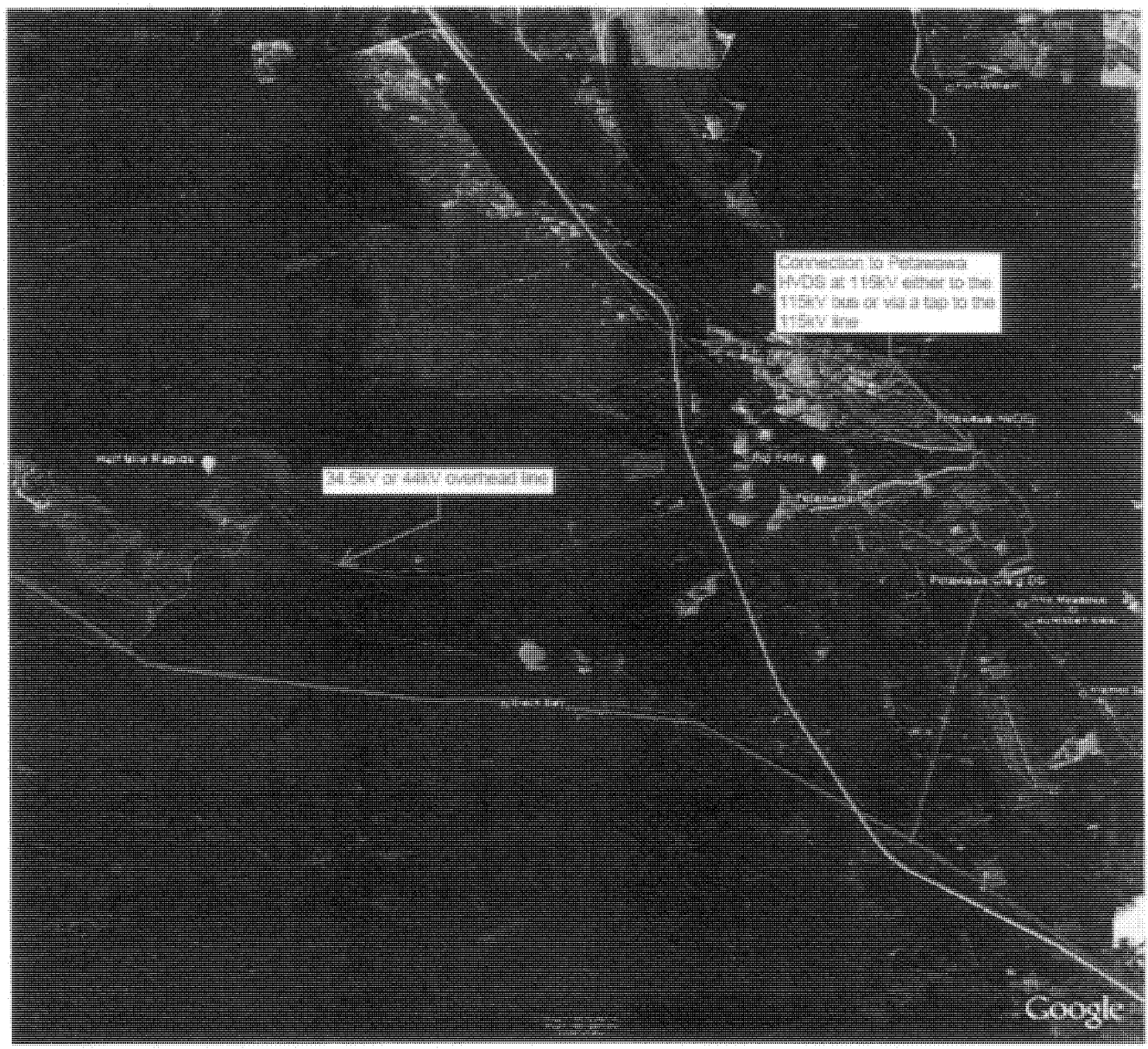


Figure 7 – Line Routing and Connection Point for Option 4

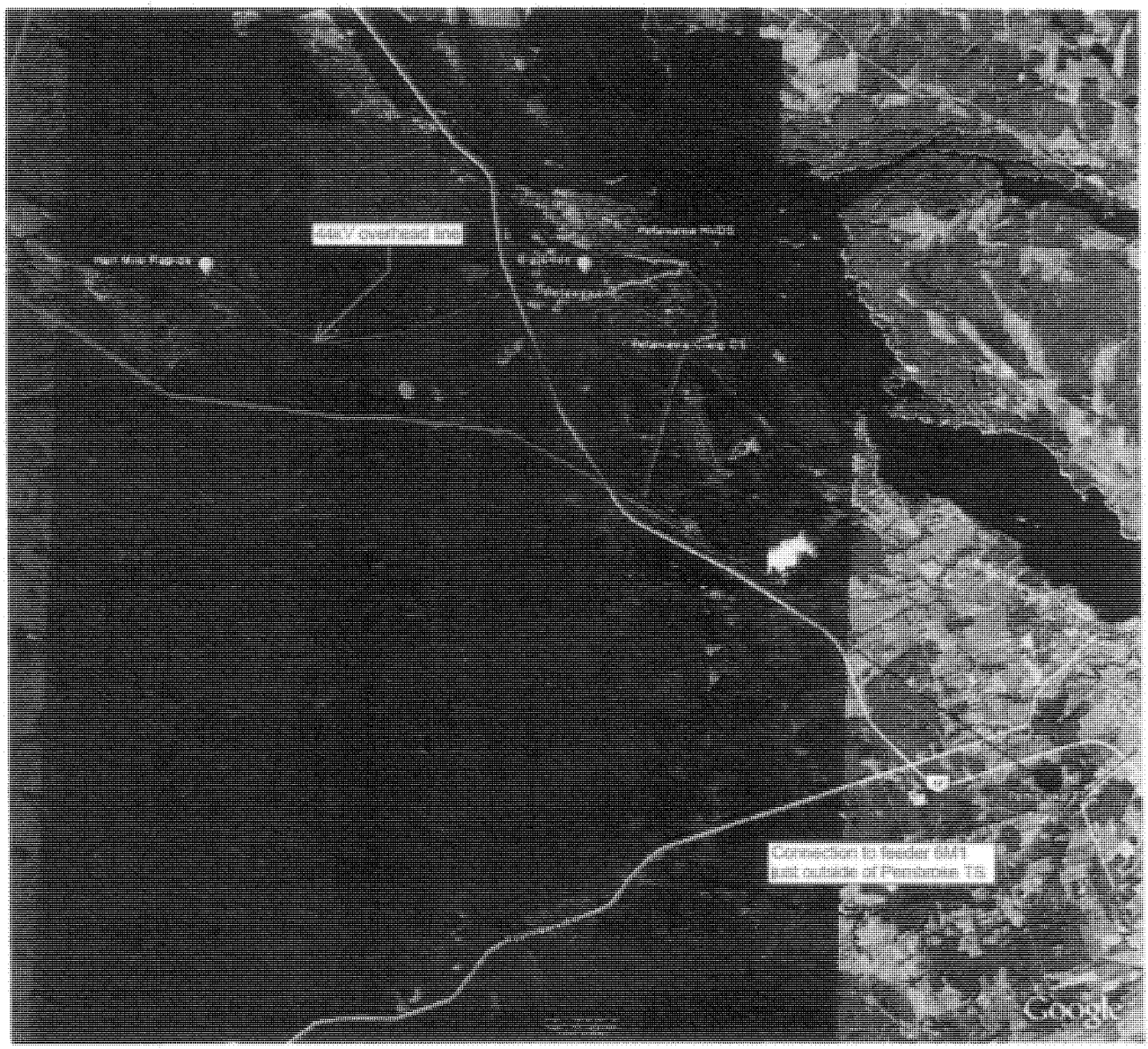
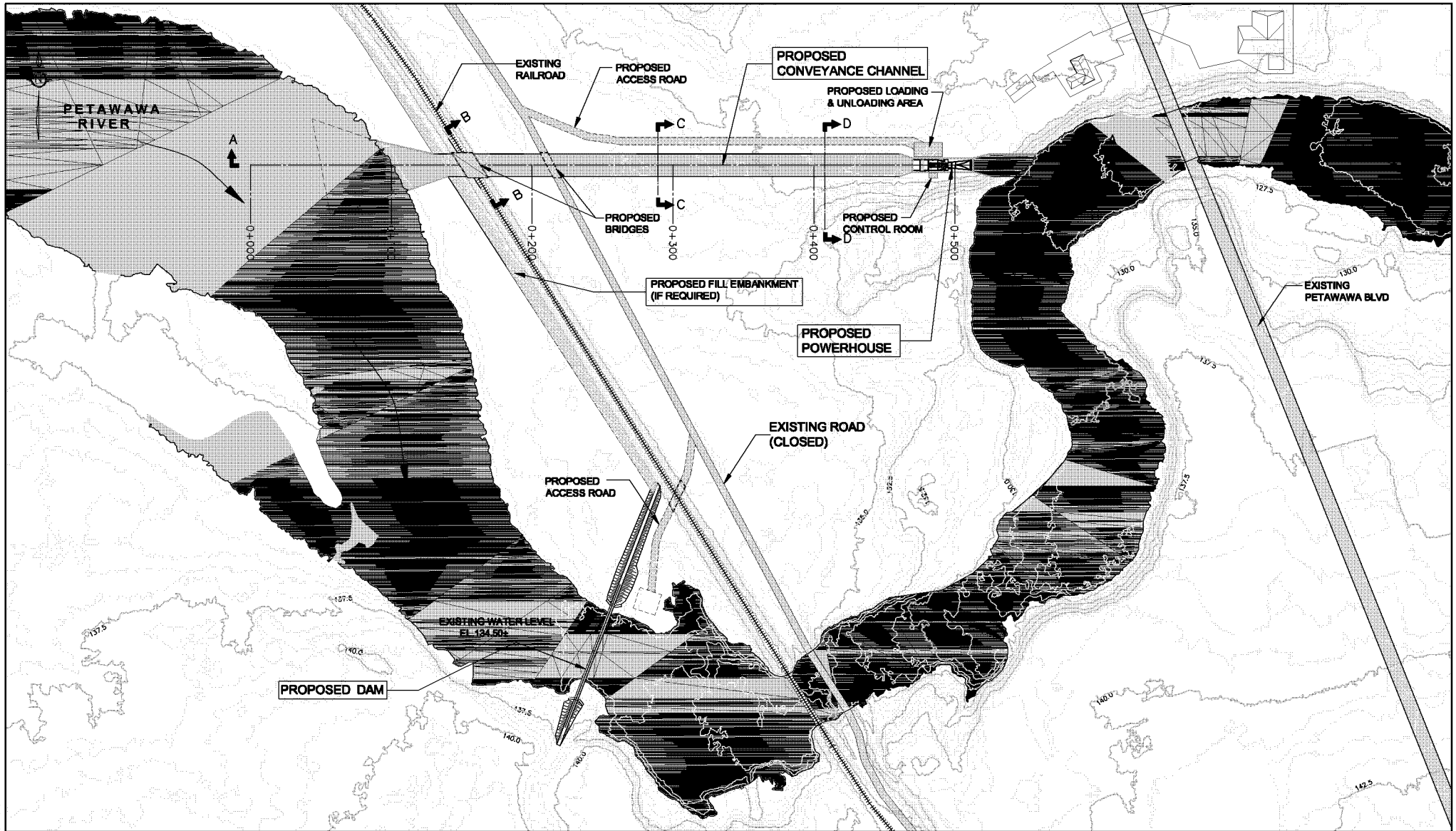


Figure 8 – Line Routing and Connection Point for Option 5



NOTE:

1. TOPOGRAPHIC BASE MAPPING PREPARED BY AIRBORNE LIDAR BY TERRAPOINT, SPRING 2009. CONTOUR INTERVAL IS 0.5 METRES. PROJECT COORDINATE SYSTEM IS NAD1983, UTM ZONE 18N.
2. CONTOURS SITUATED WITHIN RIVER CORRESPOND TO WATER SURFACE ELEVATIONS.
3. MUNICIPAL ROAD ALLOWANCE AND PROPERTY BOUNDARIES ESTIMATED AND ADJUSTED FROM TOWN OF PETAWAWA PROPERTY MAP BLOCK 57095.
4. HEADPOND EL.136.0 ASSUMED LEVEL POOL BASED ON LOW FLOW CONDITION (SEE PLATE 6 FOR 100-YR FLOOD PLAIN)

SCALE 1:2500 Metric
0 25 50 75 100 Metres

LEGEND:

- EXISTING WATER LEVEL (APPROXIMATE)

Xeneca Power Development Inc.

PLATE 1

XENECA POWER DEVELOPMENT INC.

BIG EDDY RAPIDS HYDROPOWER DEVELOPMENT

HATCH

CONCEPTUAL SITE DEVELOPMENT LAYOUT

A0108489_62-000062

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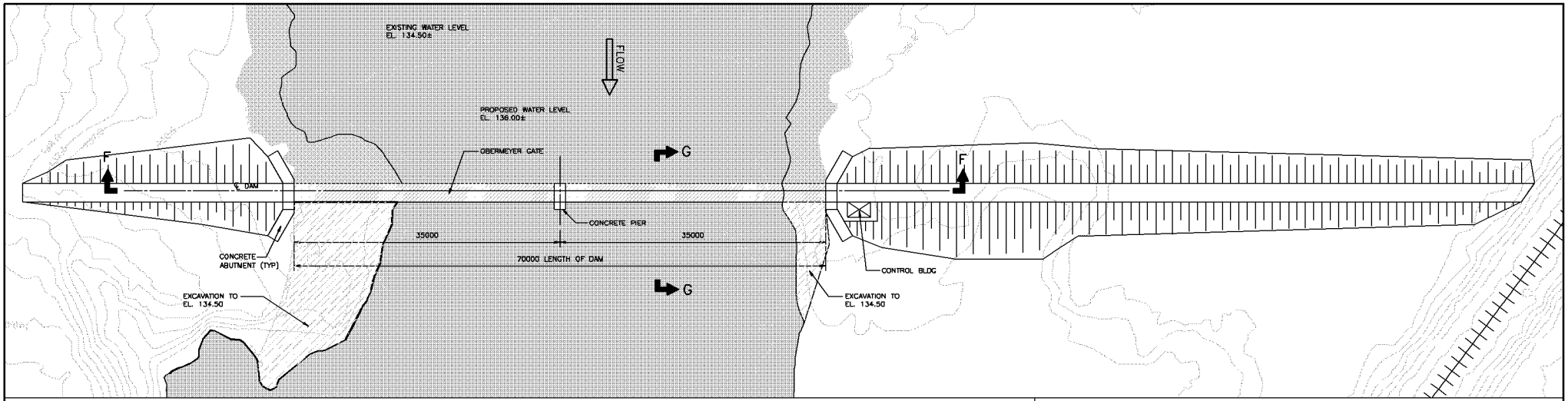
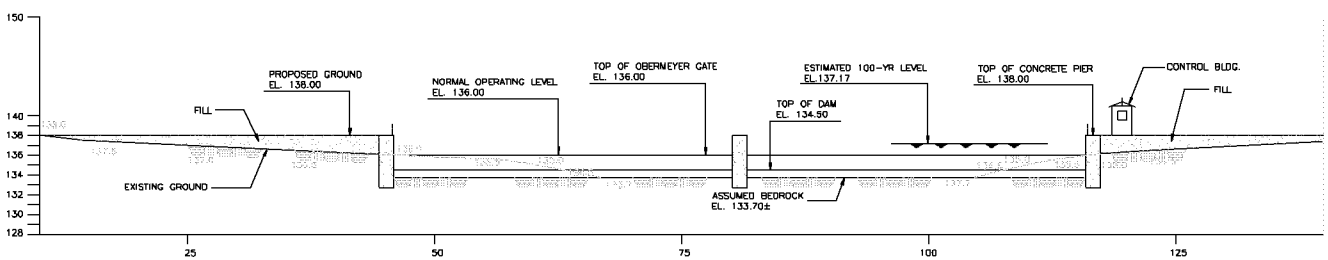


PLAN – PROPOSED DAM

SCALE: 1:500



SECTION F–F

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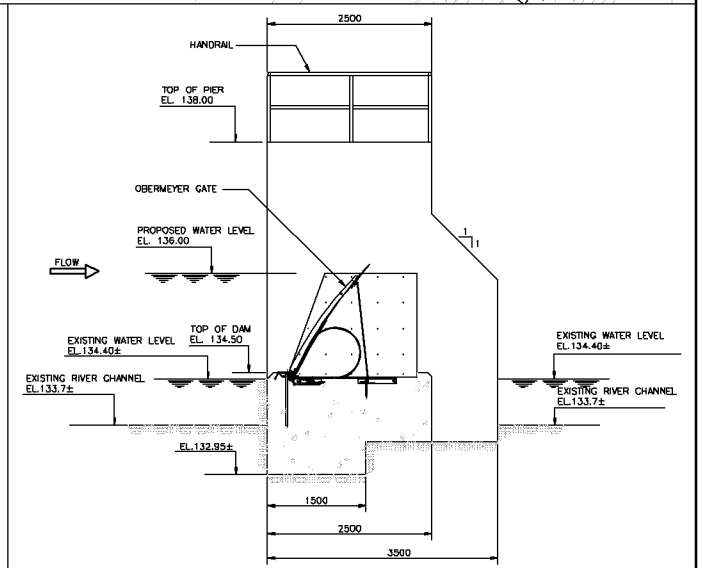

SECTION G–G

SCALE: 1:75

Xeneca Power Development Inc.

PLATE 2

XENECA POWER DEVELOPMENT INC.

BIG EDDY RAPIDS HYDROPOWER DEVELOPMENT

HATCH

CONCEPTUAL DAM PLAN AND SECTIONS

A0108489_63-000063

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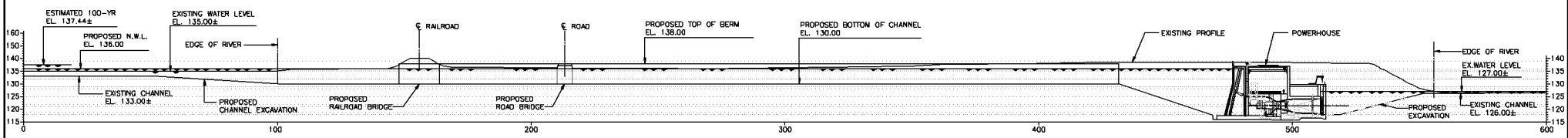
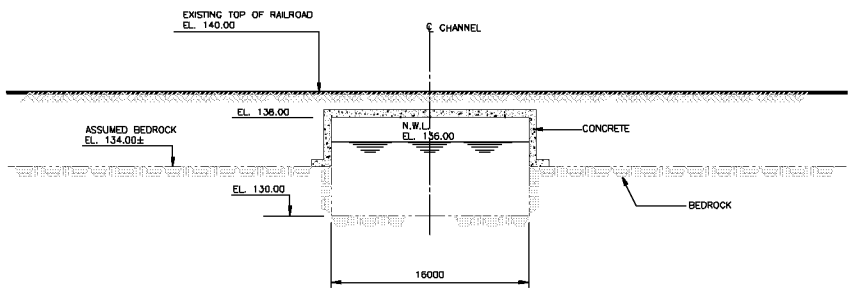


SECTION A–A – APPROACH CHANNEL AND POWERHOUSE
SCALE: 1:300



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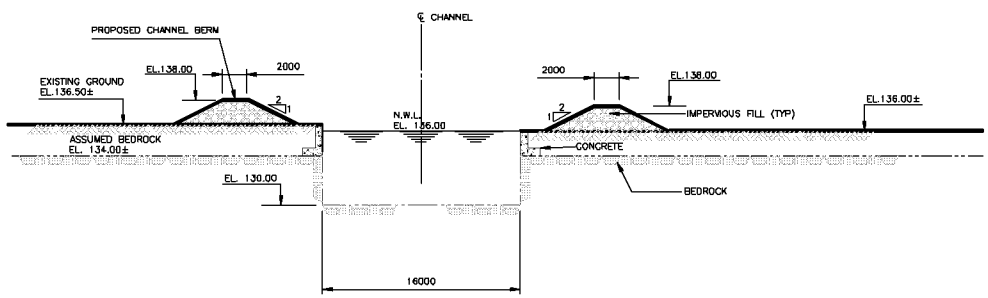

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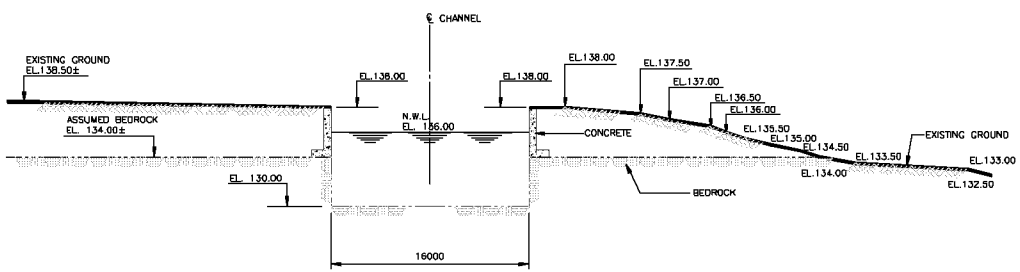

SECTION D–D
SCALE: 1:400

XENECA POWER DEVELOPMENT INC.
BIG EDDY RAPIDS HYDROPOWER DEVELOPMENT

CONCEPTUAL INTAKE CHANNEL AND SECTIONS

PLATE 3

A0108489_64-000064

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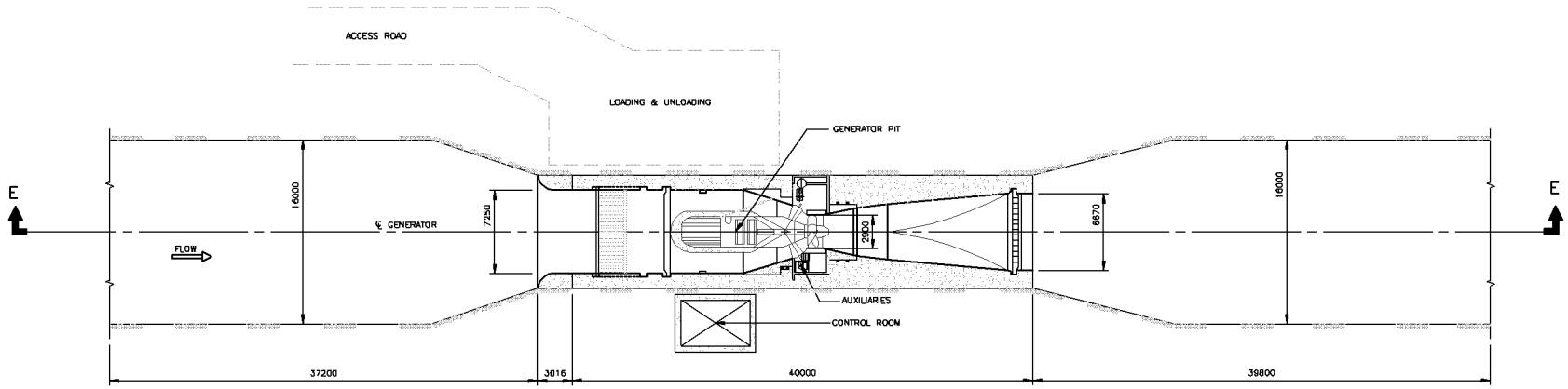
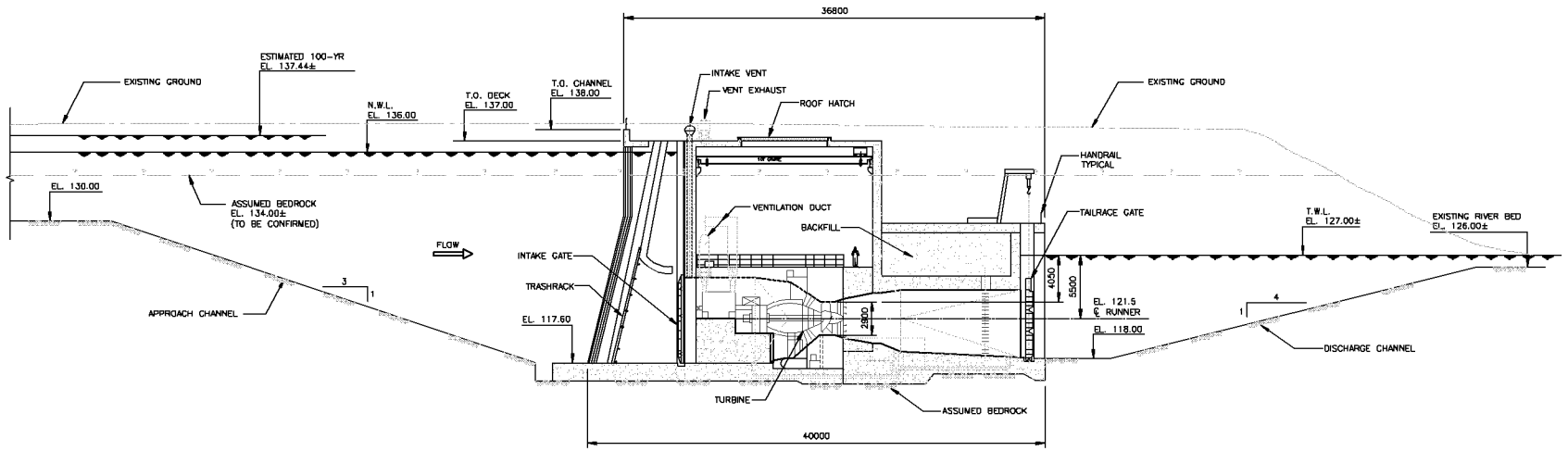


PLAN OF PROPOSED POWERHOUSE
SCALE: 1:400



SECTION E-E
SCALE: 1:400

PLATE 4

XENECA POWER DEVELOPMENT INC.
BIG EDDY RAPIDS HYDROPOWER DEVELOPMENT

HATCH

CONCEPTUAL POWERHOUSE PLAN AND SECTION

A0108489_65-000065

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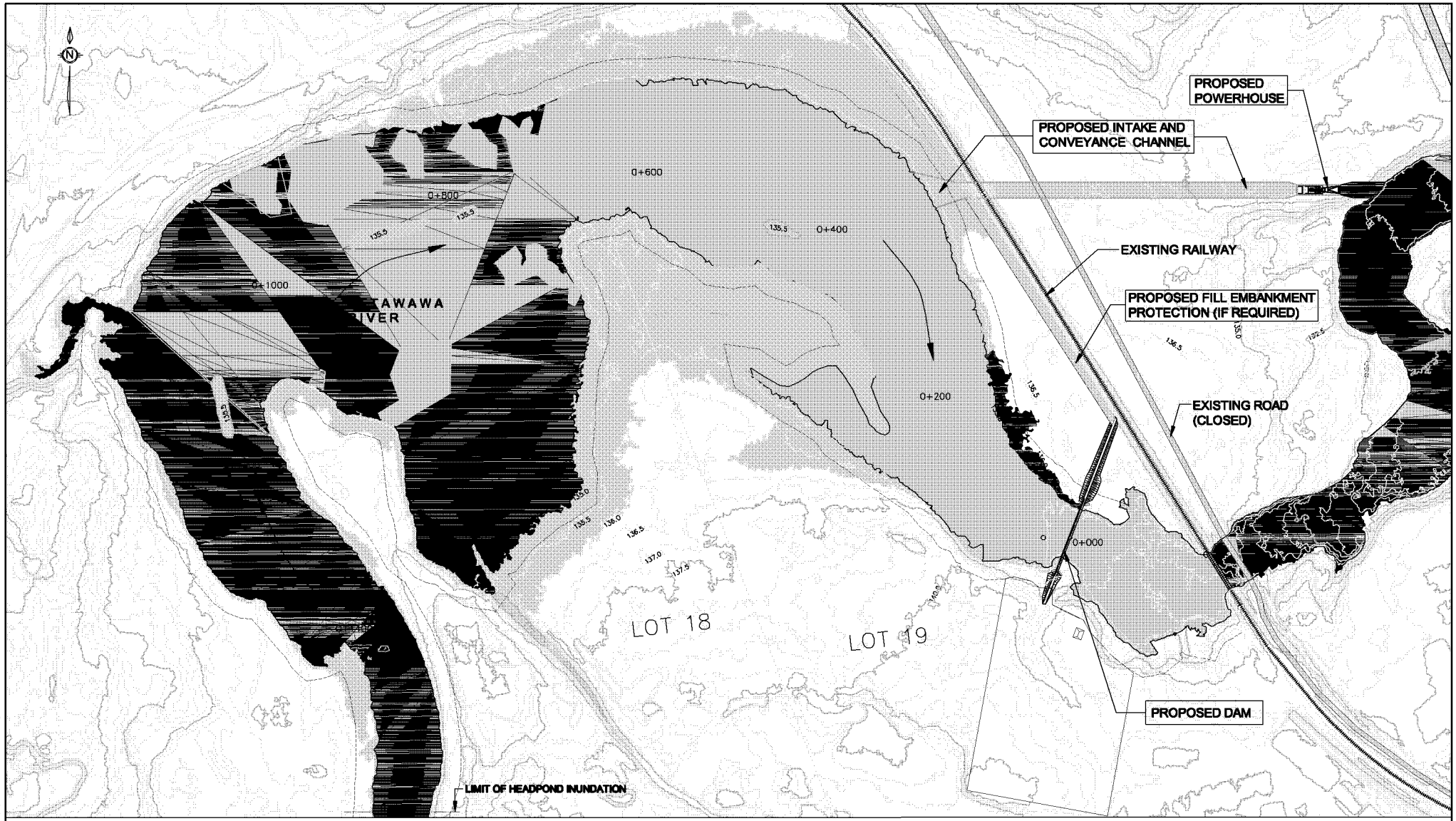

NOTE:

1. TOPOGRAPHIC BASE MAPPING PREPARED BY AIRBORNE LIDAR BY TERRAPOINT, SPRING 2009. CONTOUR INTERVAL IS 0.5 METRES. PROJECT COORDINATE SYSTEM IS NAD1983, UTM ZONE 18N.
2. CONTOURS SITUATED WITHIN RIVER CORRESPOND TO WATER SURFACE ELEVATIONS.
3. MUNICIPAL ROAD ALLOWANCE AND PROPERTY BOUNDARIES ESTIMATED AND ADJUSTED FROM TOWN OF PETAWAWA PROPERTY MAP BLOCK 57095.
4. HEADPOND EL.136.0 ASSUMED LEVEL POOL BASED ON LOW FLOW CONDITION (SEE PLATE 6 FOR 100-YR FLOOD PLAIN)

SCALE 1:3300 Metric

LEGEND:

- MUNICIPAL ROAD ALLOWANCE
- PROPERTY BOUNDARY
- EXISTING WATER LEVEL (APPROXIMATE)
- PROPOSED INCREMENTAL HEADPOND INUNDATION AREA (WATER LEVEL EL.136.0)

Xeneca Power Development Inc.

PLATE 5

XENECA POWER DEVELOPMENT INC.

BIG EDDY RAPIDS HYDROPOWER DEVELOPMENT

HATCH

ESTIMATED HEADPOND INUNDATION

A0108489_66-000066

Plot Scale
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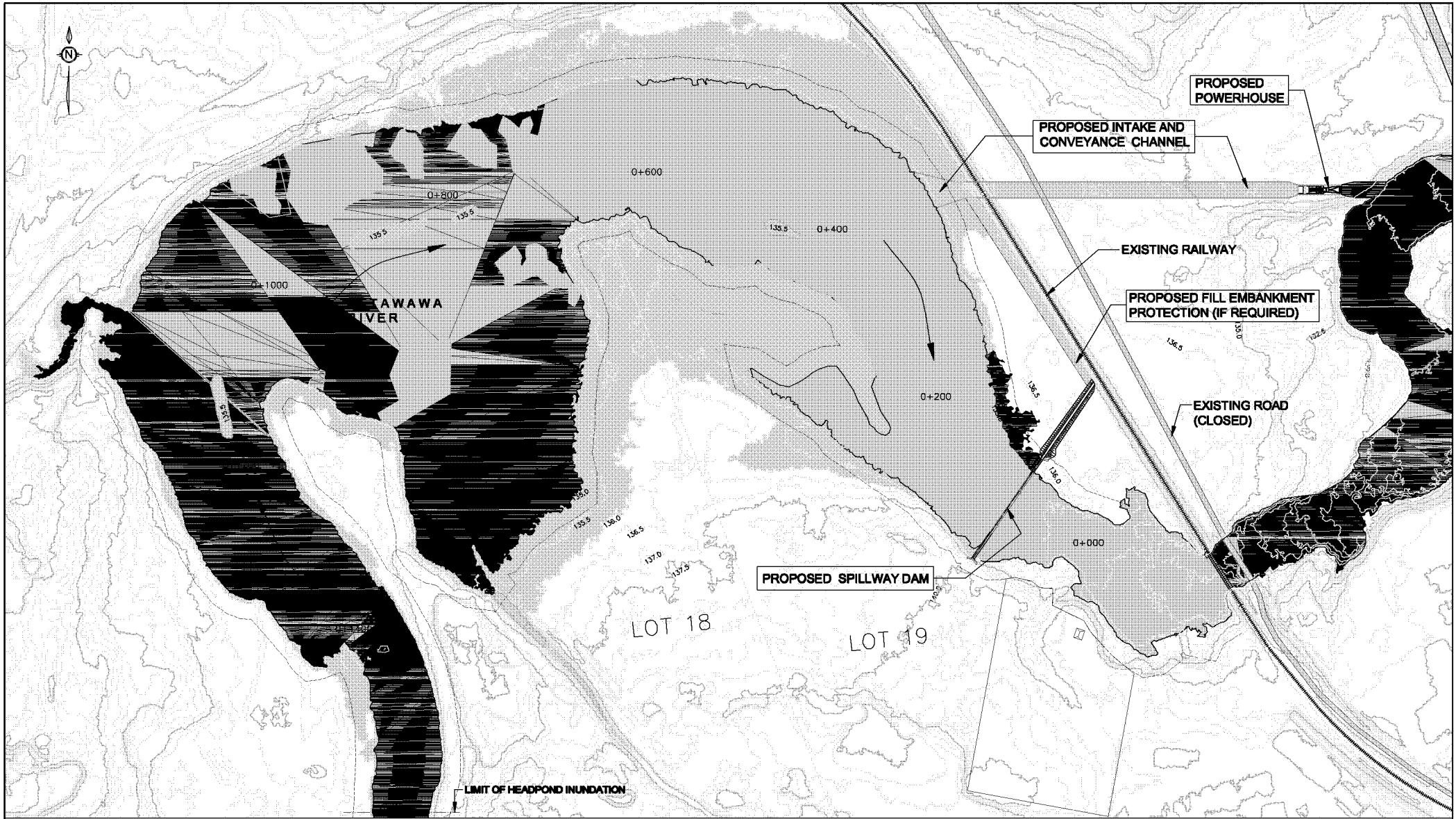
Drawing Name: P:\XENECA\330921\CAD\C\PLATE - 5 - With Dam.dwg



NOTE:

1. TOPOGRAPHIC BASE MAPPING PREPARED BY AIRBORNE LIDAR BY TERRAPOINT, SPRING 2009. CONTOUR INTERVAL IS 0.5 METRES. PROJECT COORDINATE SYSTEM IS NAD1983, UTM ZONE 18N.
2. CONTOURS SITUATED WITHIN RIVER CORRESPOND TO WATER SURFACE ELEVATIONS.
3. MUNICIPAL ROAD ALLOWANCE AND PROPERTY BOUNDARIES ESTIMATED AND ADJUSTED FROM TOWN OF PETAWAWA PROPERTY MAP BLOCK 57095.
4. HEADPOND EL.136.0 ASSUMED LEVEL POOL BASED ON LOW FLOW CONDITION (SEE PLATE 6 FOR 100-YR FLOOD PLAIN)

SCALE 1:2500 Metric

LEGEND:

- MUNICIPAL ROAD ALLOWANCE
- PROPERTY BOUNDARY
- EXISTING WATER LEVEL (APPROXIMATE)
- PROPOSED INCREMENTAL HEADPOND INUNDATION AREA (WATER LEVEL EL.136.0)

Xeneca Power Development Inc.

XENECA POWER DEVELOPMENT INC.

BIG EDDY RAPIDS HYDROPOWER DEVELOPMENT

HATCH™

PLATE 5 - REV 1

REVISED DAM LOCATION - ESTIMATED HEADPOND INUNDATION

A0108489_67-000067

Plot Scale
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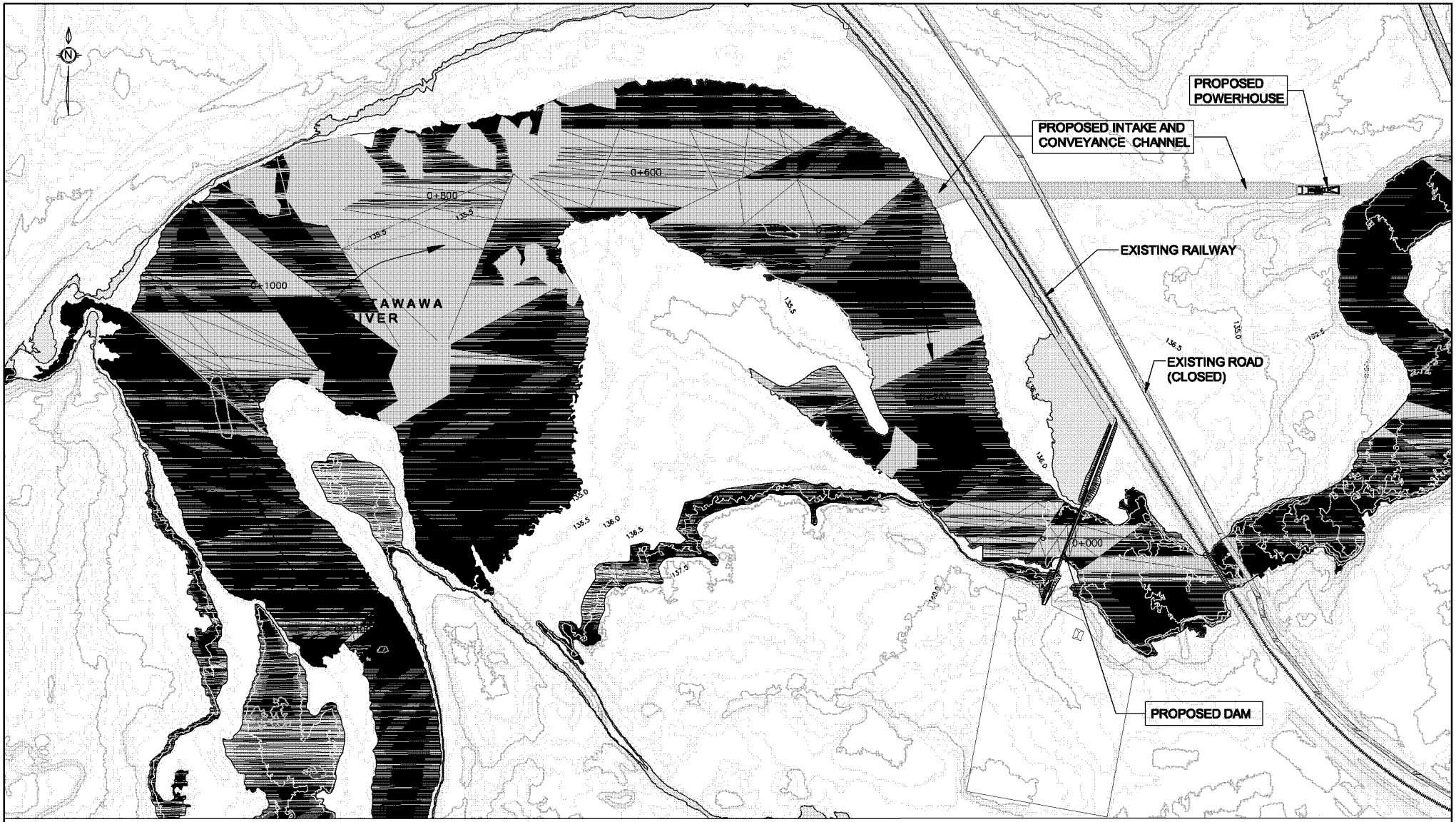
Drawing Name: P:\XENECA\33921\CAD\C\PLATE - 5 -Rev- With Dam.dwg



NOTE:

1. TOPOGRAPHIC BASE MAPPING PREPARED BY AIRBORNE LIDAR BY TERRAPOINT, SPRING 2009. CONTOUR INTERVAL IS 0.5 METRES. PROJECT COORDINATE SYSTEM IS NAD1983, UTM ZONE 18N.
2. CONTOURS SITUATED WITHIN RIVER CORRESPOND TO WATER SURFACE ELEVATIONS.
3. MUNICIPAL ROAD ALLOWANCE AND PROPERTY BOUNDARIES ESTIMATED AND ADJUSTED FROM TOWN OF PETAWAWA PROPERTY MAP BLOCK 57095.

SCALE 1:3500 Metric

LEGEND:

- PROPERTY BOUNDARY
- EXISTING WATER LEVEL (APPROXIMATE)
- SIMULATED INCREMENTAL 100-YR INUNDATION AREA (DIFFERENCE BETWEEN 100-YR EXISTING AND PROPOSED)

Xeneca Power Development Inc.

PLATE 6

XENECA POWER DEVELOPMENT INC.

BIG EDDY RAPIDS HYDROPOWER DEVELOPMENT

HATCH

ESTIMATED FLOOD PLAIN LIMITS

A0108489_68-000068

Plot Scale
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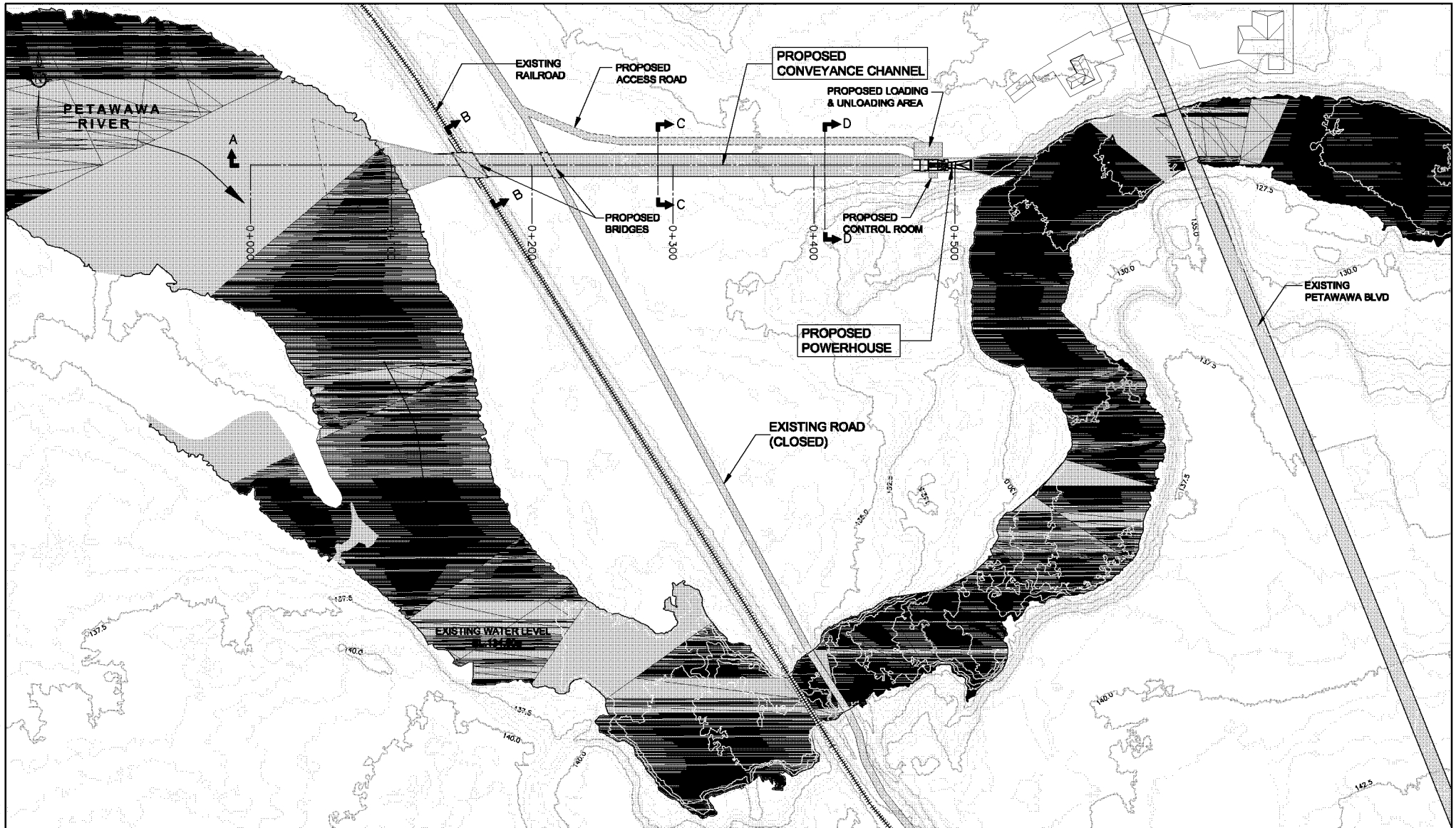
Drawing Name: P:\XENECA\330921\CAD\CPLATE - 6 - With Dam.dwg



NOTE:

1. TOPOGRAPHIC BASE MAPPING PREPARED BY AIRBORNE LIDAR BY TERRAPOINT, SPRING 2009. CONTOUR INTERVAL IS 0.5 METRES. PROJECT COORDINATE SYSTEM IS NAD1983, UTM ZONE 18N.
2. CONTOURS SITUATED WITHIN RIVER CORRESPOND TO WATER SURFACE ELEVATIONS.
3. MUNICIPAL ROAD ALLOWANCE AND PROPERTY BOUNDARIES ESTIMATED AND ADJUSTED FROM TOWN OF PETAWAWA PROPERTY MAP BLOCK 57095.

SCALE 1:2500 Metric
0 25 50 75 100 Metres

LEGEND:

- EXISTING WATER LEVEL (APPROXIMATE)

Xeneca Power Development Inc.

PLATE 7

XENECA POWER DEVELOPMENT INC.

BIG EDDY RAPIDS HYDROPOWER DEVELOPMENT

HATCH

CONCEPTUAL SITE DEVELOPMENT LAYOUT (No Dam)

A0108489_69-000069

Plot Scale
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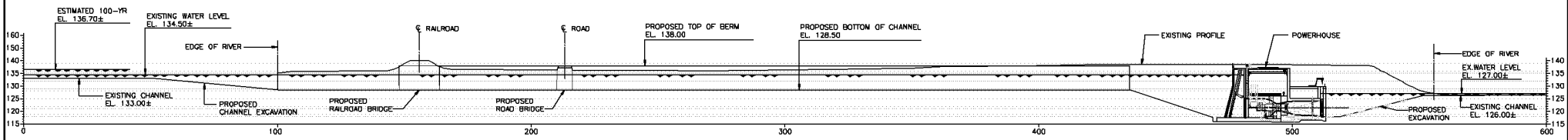
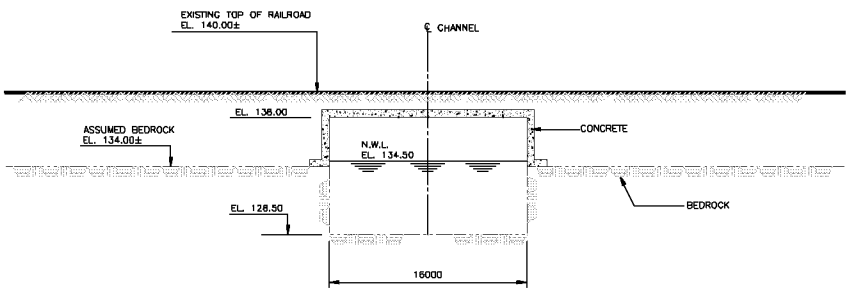
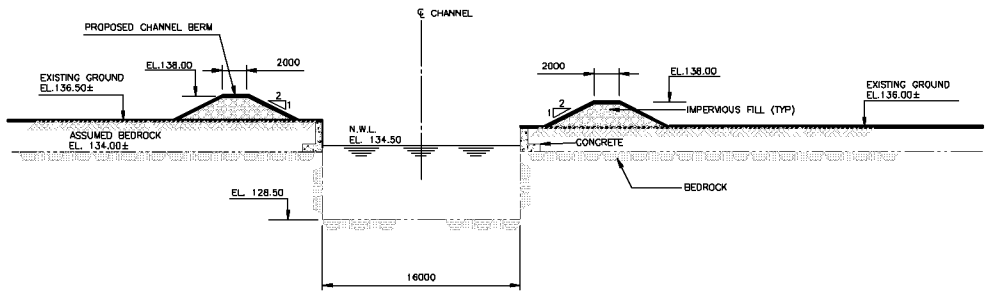
Drawing Name: P:\XENECA\330921\CAD\CP\PLATE - 7- No Dam.dwg



SECTION A–A – APPROACH CHANNEL AND POWERHOUSE
SCALE: 1:300



SECTION B–B
SCALE: 1:400



SECTION C–C
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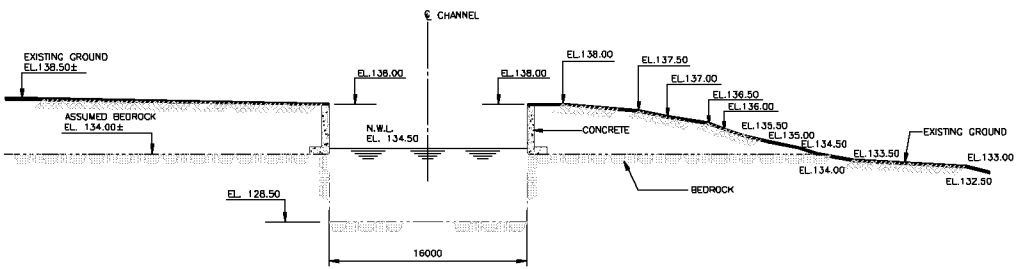


SECTION D–D
SCALE: 1:400

Plot Scale
Sep 04 , 2009 - 10:14am Login name: yuza50093
Drawing Name: P:\XENECA\330921\CAD\CP\PLATE - 8 - 9 - No Dam.dwg

Xeneca Power Development Inc.

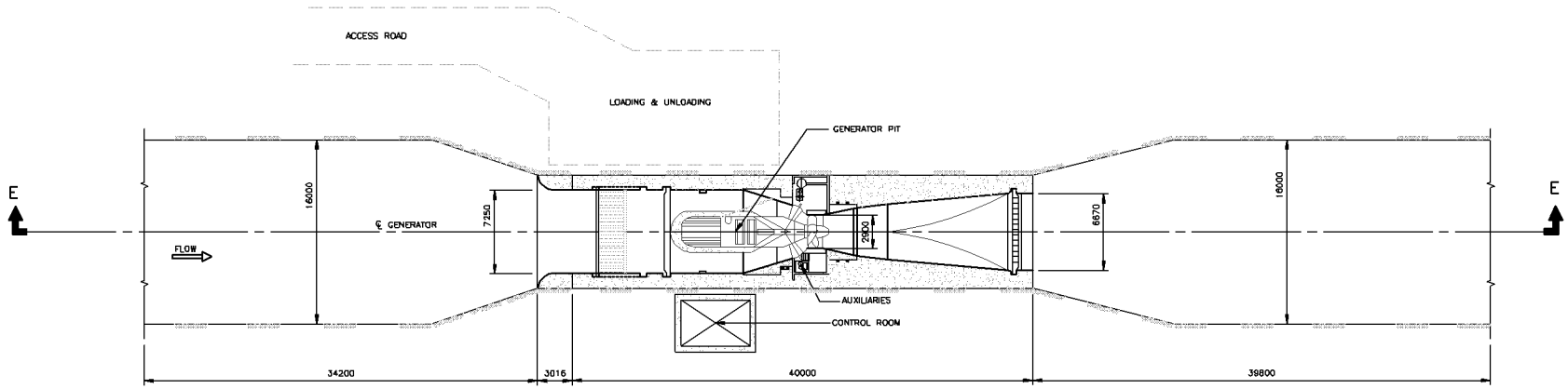
PLATE 8

XENECA POWER DEVELOPMENT INC.
BIG EDDY RAPIDS HYDROPOWER DEVELOPMENT

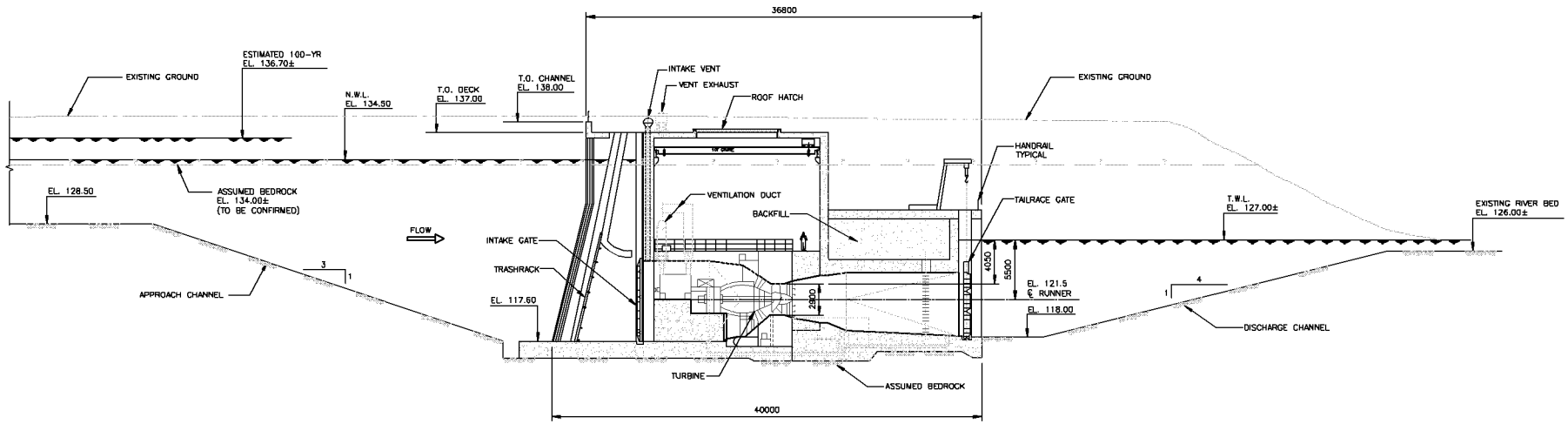
HATCH

CONCEPTUAL INTAKE CHANNEL AND SECTIONS (No Dam)

A0108489_70-000070



PLAN OF PROPOSED POWERHOUSE
SCALE: 1:400



SECTION E-E
SCALE: 1:400

PLATE 9

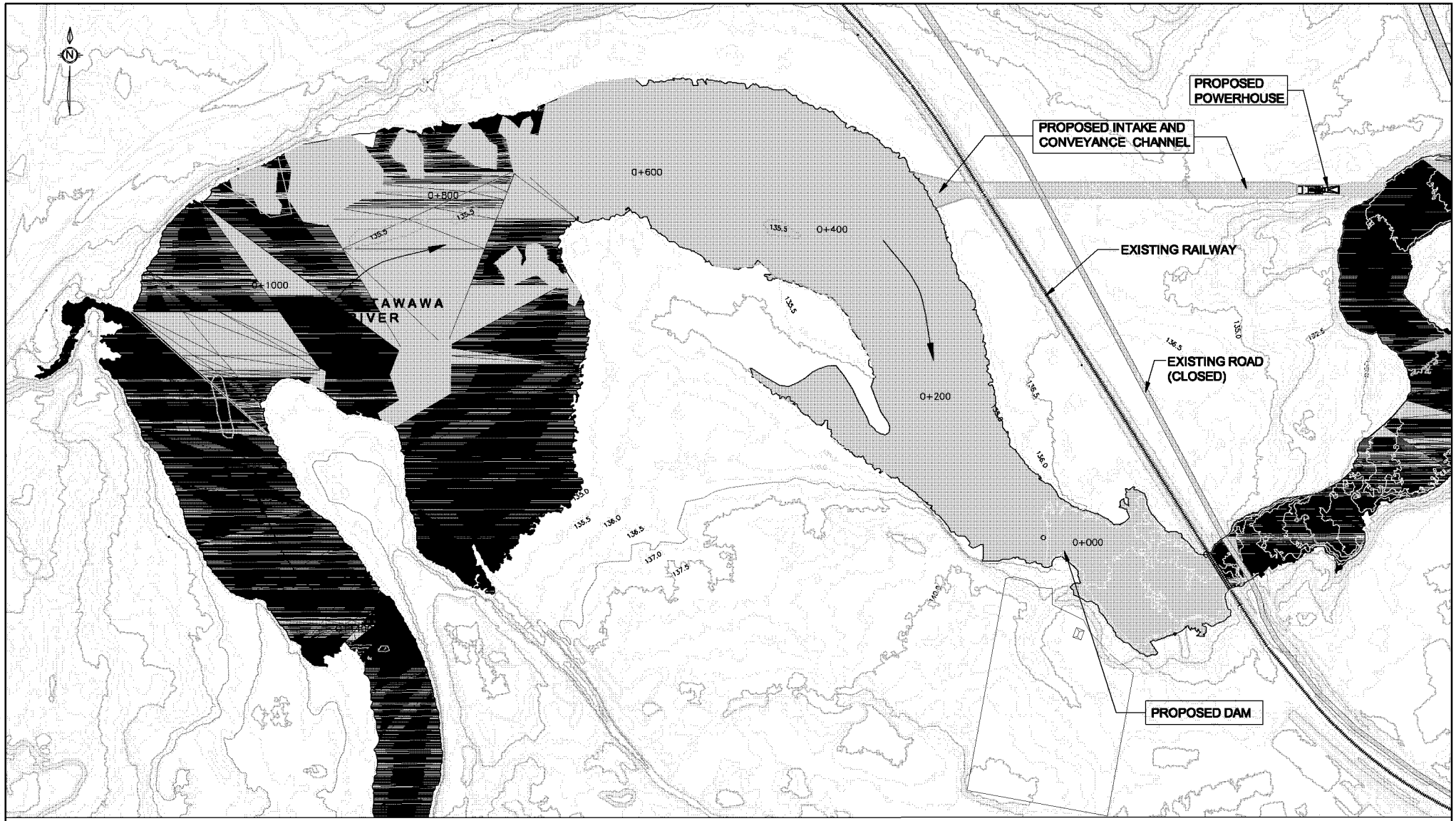
XENECA POWER DEVELOPMENT INC.
BIG EDDY RAPIDS HYDROPOWER DEVELOPMENT

HATCH

CONCEPTUAL POWERHOUSE PLAN AND SECTION (No Dam)

A0108489_71-000071

Plot Scale
Sep 04 , 2009 , 10:14am Login name: yuzo50093
Drawing Name: P:\XENECA\330921\CAD\C\PLATE - 8 - 9 - No Dam.dwg



NOTE:

1. TOPOGRAPHIC BASE MAPPING PREPARED BY AIRBORNE LIDAR BY TERRAPOINT, SPRING 2009. CONTOUR INTERVAL IS 0.5 METRES. PROJECT COORDINATE SYSTEM IS NAD1983, UTM ZONE 18N.
2. CONTOURS SITUATED WITHIN RIVER CORRESPOND TO WATER SURFACE ELEVATIONS.
3. MUNICIPAL ROAD ALLOWANCE AND PROPERTY BOUNDARIES ESTIMATED AND ADJUSTED FROM TOWN OF PETAWAWA PROPERTY MAP BLOCK 57095.

SCALE 1:3300 Metric

LEGEND:

- PROPERTY BOUNDARY
- EXISTING WATER LEVEL (APPROXIMATE)
- 100-YR FLOOD LINE (No Dam)

Xeneca Power Development Inc.

PLATE 10

XENECA POWER DEVELOPMENT INC.

BIG EDDY RAPIDS HYDROPOWER DEVELOPMENT

HATCH

ESTIMATED FLOOD PLAIN LIMITS (No Dam)

A0108489_72-000072

Plot Scale
Sep 04 , 2009 , 10:35am Login name: yuzo50093
Drawing Name: P:\XENECA\330921\CAD\C\PLATE - 10 - No Dam.dwg

Appendix A
Waterpower Site Strategy Statutory Declaration Form

Waterpower Site Strategy Statutory Declaration of Applicant

PROVINCE OF ONTARIO

TO WIT

IN THE MATTER OF a proposal dated _____, 20__ to which this Declaration forms an integral part (the "Proposal") prepared by (the "Applicant"), regarding a Waterpower Site Release Opportunity _____ (Application Number).

I, Patrick W. Gillett

OF THE City of Toronto IN THE Province of Ontario

SOLEMNLY DECLARE THAT

1. I am an authorized agent of the Applicant in the position of President and as such, have knowledge of the matters declared below, and am duly authorized by the Applicant to execute this declaration. All capitalized terms used in this declaration, unless otherwise stated, have the meanings ascribed to them in any document related to this Site Release Opportunity.
2. All statements, specifications, data, confirmations, and information that have been set out in the proposal, including, without limitation, the technical and financial information, are complete and accurate in all material respects.
3. The Applicant has consented, pursuant to subsection 17(3) of the Freedom of Information and Protection of Privacy Act (Ontario), to the disclosure, on a confidential basis, of the proposal by the MNR and the MNR's other advisers retained for the purpose of reviewing or participating in the review of the proposal.
4. Neither the Applicant, the proposed waterpower facility described in the proposal, nor any member of the Applicant Team is the subject of any bona fide legal proceedings, investigation or regulatory hearings that could materially impact the financial condition of the Applicant or any of the entities involved in financing and operations for the proposed waterpower facility.
5. There is not nor was there any actual or potential Conflict of Interest relating to the preparation of the proposal

AND I make this solemn declaration conscientiously believing it to be true, and knowing that it is of the same force and effect as if made under oath.

DECLARED BEFORE ME at the office

of Aird & Berlis LLP, in the ~~county~~ City region of Toronto

on the 8th day of September, 2009

Name

Signed at Toronto, this 8th day of September, 2009

witness

Kruger Green Energy Inc.

Applicant

Appendix B
Hatch Hydrology Review,
Hatch Capital Costs letter
and
History of Past Project Capital Costs

HATCH™

Xeneca Power Development Inc.

Hydrology Review

For

Petawawa Hydropower Sites
Half Mile Rapids and Big Eddy Hydropower Projects

H333385
Rev. A
August 24, 2009

Project Report

August 24, 2009

Xeneca Power Development Inc.
Petawawa Hydropower Sites
Hydrology Review

DISTRIBUTION

Xeneca	Attention: Mr. Patrick Gillette Xeneca Power Development Inc. 5160 Yonge Street, Suite 520 Toronto, Ontario M2N 6L9	1 electronic copy
Jim Law/File H333385	Hatch, Oakville	1 hard copy

Xeneca Power Development Inc.
Petawawa Hydropower Sites

Hydrology Review

Prepared by: _____ _____
Mark Orton Date

Approvals

Hatch

Approved by: _____ _____
Jim Law Date

Xeneca Power

Approved by: _____ _____
Patrick Gillette Date

Report Disclaimer

This report has been prepared by Hatch Ltd. for the sole and exclusive use of Xeneca Power (the "Client") for the purpose of assisting the management of the Client in making decisions with respect to the Half Mile Rapids and Big Eddy Rapids Hydropower Projects and shall not be (a) used for any other purpose, or (b) provided to, relied upon or used by any third party.

This report contains opinions, conclusions and recommendations made by Hatch Ltd. (Hatch), using its professional judgment and reasonable care. Any use of or reliance upon this report and estimate by Client is subject to the following conditions:

a) the report being read in the context of and subject to the terms of the agreement between Hatch and the Client including any methodologies, procedures, techniques, assumptions and other relevant terms or conditions that were specified or agreed therein;

b) the report being read as a whole, with sections or parts hereof read or relied upon in context;

c) the conditions of the sites may change over time (or may have already changed) due to natural forces or human intervention, and Hatch takes no responsibility for the impact that such changes may have on the accuracy or validity of the observations, conclusions and recommendations set out in this report; and

d) the report is based on information made available to Hatch by the Client or by certain third parties; and unless stated otherwise in the Agreement, Hatch has not verified the accuracy, completeness or validity of such information, makes no representation regarding its accuracy and hereby disclaims any liability in connection therewith.

HATCH™

1235 North Service Road West
Oakville, Ontario, Canada L6M 2W2
Tel. 905 469 3400 • Fax: 905 469 3404 • www.hatch.ca

March 17, 2008

Mr. Patrick W. Gillette
President
Xeneca Power Development Inc.
2395 Speakman Drive
Mississauga, Ontario
L5K 1B3

Dear Patrick:

Subject: Nominal Capital Costs for Small Hydro - Xeneca

Further to your letter of March 4th, 2008, I am pleased to outline our perspective on the above issues of estimating capital costs for small hydro projects in Ontario such as those being contemplated by Xeneca Power Development Inc.

1. The capital cost references shown in the attached table, as prepared by ORTECH Power, is consistent with typical values for capitals costs for recent waterpower projects, planned and built, that I am familiar with. The cost range of $0.7 million to $7.3 million per MW installed capacity is indicative of the wide range of values that can result on a project specific basis. The average of $2.8 million per MW was a reasonable average several years ago. However, given market pressures, increased metals prices and labour pressures created by the tar sands projects in Alberta, construction costs have continued to rise over the last few years and it is my opinion this is now not a reasonable average cost. Given this trend, future cost projections need to take the ongoing cost pressures into account.

2. The projects being contemplated by Xeneca cover a variety of location specific conditions that may or may not be similar to those that my past project experience applies to. Based on my recent experiences with Engineering Procurement Construction ("EPC") style hydroelectric projects, for the type of small waterpower projects that Xeneca has been looking at, I would suggest that a cost range between $3.5 million to $5.0 million per MW is more appropriate with most recent EPC type projects trending towards the upper end of this range. The cost range applies to typical single waterpower sites with 5 to 30 metres of head and 1 MW to 10 MW of installed capacity constructed according to the EPC or design-build approach (EPC or Turn Key project where the engineering contractor is fully responsible at a set cost for the construction of the project until mechanical completion. Often done to transfer risk from the Developer to the Engineering firm).

3. In my opinion, the planned approach for the Xeneca projects can result in some cost savings over the EPC style of contract packaging. Some reasons include:

   - The use of an Engineering Procurement Construction Management ("EPCM," which means the company is only contracted to provide engineering, procurement and construction management

services) style of contract allows the project to be defined to the point that the risk premium charged by contractors can be reduced. As well, this approach opens the bidding process to increased numbers of bidders;

- The use of innovative procurement strategies will reduce equipment costs;
- The adoption of a "pipeline" of projects in which "volume discounts" for equipment can be obtained and economies of scale in the construction itself can be achieved; and
- The use of typical small hydro cost saving measures such as the elimination of a powerhouse crane and other types of cost reduction measures;

In my opinion this should result in all-in costs towards the lower end of the above range provided that there are no significant transmission and distribution expenses that are typically not included in the price range indicated above. These values should be re-evaluated on an ongoing basis as additional information about the individual sites becomes available.

This information is being provided as general information only and is not to be relied on for financing purposes or by third parties. Although our staff have been involved in certain reconnaissance site visits and preliminary deliberations as your engineering consultant, we have not analyzed the preliminary information from a feasibility perspective; therefore, this information should not be viewed as a statement about specific sites.

I trust that the above provides the information that you asked for.

Yours very truly,

C. Richard Donnelly
Director - Water and Wind Power
Atlantic and Central Canada

CRD/ll
Attachment

cc: Uwe Roeper
Andrew Chant

Table of Contents

List of Tables

List of Figures

1. Introduction

The objective of this report is to develop flow series for the Petawawa River that can be used to assess the hydroelectric generating potential of the following sites:

- Half Mile Rapids
- Big Eddy Rapids

Flows in the Petawawa River have been measured in the past at the Big Eddy Rapids site, but not at Half Mile Rapids. As such, long term flow series at the Half Mile Rapids location must be synthesized from flow records at other gauge(s) on the Petawawa River and on other rivers in the region.

Figure 1 shows the Petawawa River watershed at the two project sites. Figure 2 shows the Petawawa River watershed as well as the locations of Water Survey of Canada (WSC) streamflow gauges and the annual average precipitation distribution in the region.

Flow synthesis generally follows these steps:

- Estimation of the expected mean annual runoff at the site
- Definition of the seasonal flow pattern
- Assessing the variability of runoff from year to year
- Synthesis of a long term daily flow record that meets the above parameters.

2. Mean Annual Runoff

Mean annual runoff (MAR) describes how much of the rainfall and snowmelt runoff in the basin drains past the site on average each year. MAR is usually expressed in units of mm over the drainage basin, for ease of comparison with precipitation (rain and snow) and evaporation, which are also expressed in mm.

The estimation of MAR for an ungauged site depends on the extent of regional information available and whether a water level monitoring gauge has been installed at the site. MAR estimation makes use of the following approaches, depending on the level of information available:

- A regional water balance analysis using precipitation and evapotranspiration data.
- Estimation of the long term average flow (LTAF) at a gauge on the same river.
- Regional runoff trends from a network of established streamflow stations.
- Flow synthesis from the gauged record on the same river.

2.1 Regional Water Balance

Where regional flow data is very limited MAR must be estimated from regional isohyets of equal precipitation and estimates of evapotranspiration, which tends to decrease from south to north across

Ontario. MAR is then estimated as the difference between long term average precipitation and evapotranspiration loss.

The streamflow station network in and around the Petawawa River basin is extensive and this simplistic approach was not used directly to estimate the MAR at the two sites. However, a calibrated water balance within the Petawawa River basin has been used to model the variation in runoff between the sites. This is described in Section 6.

2.2 Long Term Flow in the Petawawa River

Flows have been measured on the Petawawa River near Petawawa, since November 1915 and are published by the Water Survey of Canada (WSC) as station 02KB001. At this location, the river has a drainage area of 4,120 km^2 according to Water Survey of Canada. The mean annual flow for the period 1916 to 2007 was 47.4 m^3/s. The flows at this station are classified as "Regulated" by WSC due to the presence of dams on a number of the lakes and tributaries within the Petawawa River basin. The main purpose of the regulation of the river appears to be recreational.

To confirm this assumption it is necessary to screen the flow record for consistency and to compare the flow data for station 02KB001 with other streamflow stations in the region.

2.3 Flow Data Screening

The WSC flow series at Petawawa gives a flow record of 92 years to analyse the generation potential of the site. However, before using such a lengthy flow record it is important to screen the data for non-stationarity. A stationary flow series is a flow series that is free of trends or other statistical anomalies that might have resulted from influences such as deforestation, climate change, upstream development or changes in the flow monitoring cross-section. The annual flow series for 02KB001 was screened for randomness, trend, serial correlation and homogeneity. The record exhibits slight positive trend from 1916 to 2007, but this is not significant at the 5% level. If the record is split in half and tested periods with negative trends appear. This occurs when natural high and low cycles appear in a long flow record.

As a result of this screening it was decided that the full 92-year record for the Petawawa River is stationary and should be adopted for flow synthesis to capture the complete range of historical variation in the flow sequence. Table 1 shows monthly flows for the Petawawa River near Petawawa [02KB001] for 1916 to 2007.

2.4 Regional Runoff

Between Temiscaming and Ottawa, the Ottawa River is fed by a series of rivers draining east from basins in Ontario drain and south from basins in Quebec. The MAR in the Ottawa River drops from 442 mm at Des Joachims [02KA002] upstream of Petawawa to 409 mm at Chats Falls [02KF009] below Arnprior. The major tributaries in this reach from Quebec are the Coulonge River and the Noire River, which have MARs of ±450 mm. The major tributaries in this reach from Ontario are the Petawawa River near Petawawa [02KB001] with a MAR of 363 mm, the Bonnechere River near Castleford [02KC009], MAR = 252 mm, and the Madawaska River near Arnprior [02KE002], MAR = 341 mm.

The large variation in runoff between the Petawawa River and the adjacent Bonnechere River is

Table 1 Mean Monthly Flows for the Petawawa River near Petawawa (02KB001)

Year	January	February	March	April	May	June	July	August	September	October	November	December	Year
1916	17.9	21.6	21.6	79.0	123.4	101.4	62.3	28.1	19.6	20.9	30.9	34.6	47.9
1917	35.2	27.1	18.5	86.6	144.0	88.7	73.9	58.8	19.3	15.2	18.4	18.3	49.4
1918	14.2	13.3	13.7	92.2	69.6	57.5	35.6	20.0	16.5	33.9	51.5	53.2	36.1
1919	64.7	34.5	39.4	116.5	138.5	113.9	62.4	27.1	17.9	19.2	32.7	29.9	55.4
1920	26.9	22.5	25.2	82.7	75.7	46.5	51.1	30.4	19.8	16.9	18.2	19.7	34.8
1921	19.6	18.2	39.7	132.1	86.4	51.2	41.1	19.2	10.7	9.4	31.9	13.9	36.0
1922	13.3	13.1	16.3	146.6	114.2	64.1	50.3	40.1	24.0	13.5	17.4	20.3	44.7
1923	16.0	13.2	13.0	49.7	191.5	95.3	58.5	25.7	23.9	14.3	12.2	18.7	44.6
1924	19.2	16.6	15.7	60.5	163.3	119.6	74.9	35.8	15.3	12.6	10.7	12.6	48.7
1925	11.6	11.2	14.6	95.7	98.8	90.0	73.0	33.4	15.5	10.9	15.3	21.6	40.8
1926	18.6	15.0	13.5	35.2	134.3	97.5	63.3	35.6	20.3	15.1	36.4	49.0	48.3
1927	31.1	25.2	30.3	58.1	90.6	98.6	67.9	58.5	28.9	19.2	28.7	42.1	49.0
1928	39.3	32.6	29.1	183.4	206.6	87.9	66.4	27.0	61.6	86.4	102.6	61.6	69.9
1929	56.8	57.1	60.0	208.6	214.6	100.8	60.6	18.2	51.2	7.9	9.7	9.2	68.0
1930	8.6	10.9	13.9	44.9	102.5	62.6	57.7	34.2	13.6	9.5	8.7	8.4	31.5
1931	7.9	7.7	7.5	25.1	46.5	49.2	35.0	16.0	9.1	6.4	7.0	11.6	16.5
1932	24.1	32.9	27.6	64.6	111.9	67.8	28.6	20.8	25.5	36.2	72.6	67.7	49.4
1933	54.6	41.4	31.4	118.9	121.6	65.6	29.2	20.5	13.0	11.4	10.6	12.8	44.2
1934	13.1	12.0	12.2	93.9	156.4	73.6	55.4	35.6	12.1	9.7	19.1	20.1	40.1
1935	24.1	17.6	16.1	65.4	78.8	65.2	62.7	36.4	19.1	13.9	15.2	16.9	30.4
1936	16.9	16.0	19.3	88.5	175.6	99.9	57.5	29.8	13.6	10.3	29.6	28.1	47.2
1937	36.1	37.9	33.2	63.9	135.5	75.7	57.2	33.6	14.0	13.8	27.6	33.0	46.8
1938	27.5	27.5	45.2	193.9	137.6	78.7	64.5	26.8	22.7	26.9	21.8	20.4	57.0
1939	20.5	20.5	21.3	41.3	136.2	58.2	51.7	45.2	15.5	13.7	16.3	15.4	38.2
1940	13.2	12.9	13.0	29.8	98.2	88.7	49.8	30.0	21.8	20.6	27.0	33.8	36.6
1941	33.4	30.0	30.8	118.8	81.7	40.3	33.6	12.2	7.0	9.1	28.3	29.5	37.3
1942	26.0	23.2	28.7	126.2	112.6	73.3	46.1	24.6	13.2	16.2	14.9	23.1	43.7
1943	22.7	20.3	23.7	62.4	222.5	103.6	51.3	28.3	32.2	26.7	31.9	27.7	54.8
1944	22.4	19.6	18.2	33.8	87.0	55.8	39.1	16.8	11.4	15.1	19.1	22.9	30.0
1945	21.0	17.9	45.3	118.8	365.5	71.1	44.8	22.2	15.8	17.7	23.7	23.1	42.1
1946	24.1	25.6	45.8	93.0	57.3	52.5	30.7	14.3	10.8	10.9	14.9	20.3	33.4
1947	25.2	28.4	31.8	136.2	247.1	148.9	78.5	49.4	46.9	49.0	38.7	45.9	77.0
1948	46.6	45.3	53.9	158.3	135.2	65.3	34.8	22.5	13.9	12.1	17.7	27.1	50.6
1949	30.3	33.4	32.5	155.0	135.8	62.2	33.8	15.3	9.8	8.3	8.2	10.5	45.3
1950	16.9	27.2	21.9	72.2	90.9	53.4	28.9	16.2	19.0	17.9	37.7	53.3	38.1
1951	41.8	36.3	39.6	232.1	193.1	61.3	44.7	23.6	17.2	28.2	56.4	59.7	69.2
1952	44.5	37.0	31.5	144.6	146.6	70.4	50.4	20.0	15.2	11.3	10.2	20.2	48.4
1953	20.4	20.2	50.3	106.5	66.8	35.5	19.1	11.1	9.0	7.6	8.5	14.5	30.6
1954	19.9	19.0	29.6	110.3	109.7	101.8	64.0	35.6	30.3	61.5	67.4	53.2	57.6
1955	43.3	33.7	27.9	166.6	94.8	39.6	22.2	13.5	8.5	10.9	25.4	24.6	42.5
1956	21.1	17.8	18.9	60.2	132.9	79.9	48.1	37.5	46.2	39.4	33.3	40.6	47.7
1957	33.3	28.6	25.2	47.5	97.0	46.3	35.3	36.9	30.9	35.3	66.5	65.2	48.2
1958	57.3	42.0	33.0	90.1	83.2	49.2	58.0	34.0	24.4	22.2	24.1	22.8	45.0
1959	21.6	19.7	16.1	80.7	126.1	57.8	27.8	22.8	26.5	31.8	53.6	71.3	46.5
1960	48.0	36.8	31.2	170.0	185.2	82.0	51.0	32.3	15.3	14.7	16.3	18.6	55.0
1961	13.6	13.3	14.8	56.6	90.2	92.1	53.0	50.8	25.3	19.2	18.9	27.9	36.3
1962	25.4	21.6	19.6	78.6	114.2	48.0	19.5	10.3	8.7	7.5	12.0	19.1	31.5
1963	16.0	10.5	8.2	115.1	80.4	46.8	22.6	12.3	16.1	12.2	21.7	25.1	32.6
1964	20.7	16.9	20.2	64.1	64.8	29.3	13.4	7.3	6.9	7.2	7.7	13.4	23.1
1965	16.7	15.4	15.9	47.5	175.0	49.7	20.7	20.7	22.9	55.6	68.7	65.7	47.7
1966	57.6	39.9	44.7	132.2	127.6	89.1	26.5	14.4	10.1	10.5	31.6	112.7	56.4
1967	50.5	35.4	28.5	145.4	110.1	69.5	42.5	15.9	15.0	50.9	93.0	54.9	59.2
1968	37.4	27.4	32.6	143.5	85.7	35.6	32.0	17.2	19.4	18.1	15.8	24.1	39.6
1969	25.9	22.8	19.6	118.0	160.0	75.7	36.5	18.9	23.7	21.1	51.1	47.4	52.3
1970	25.3	19.9	18.6	78.6	153.4	83.4	54.2	49.5	24.1	31.2	34.0	40.8	48.7
1971	31.9	28.5	28.6	134.1	155.6	94.5	76.5	9.6	8.4	9.1	10.3	23.5	42.1
1972	25.7	22.2	25.5	60.4	248.3	92.7	74.5	59.9	47.5	54.9	68.7	54.7	70.9
1973	47.4	42.6	71.1	230.2	132.2	94.0	65.3	39.4	19.8	22.8	28.7	45.7	70.1
1974	34.5	33.2	36.8	155.4	218.8	78.6	32.9	16.2	13.7	25.1	42.2	41.7	60.7
1975	29.0	24.9	25.0	70.3	140.6	41.5	16.6	12.2	9.2	10.4	19.6	36.6	37.2
1976	27.9	22.3	42.4	219.8	195.2	49.5	50.6	16.9	12.2	13.3	14.9	15.4	49.5
1977	15.3	13.2	29.8	140.3	70.8	23.8	13.7	7.7	10.9	29.8	42.9	50.5	37.3
1978	33.4	25.3	17.9	76.8	178.4	52.1	17.2	12.0	17.8	29.2	28.2	25.7	42.6
1979	26.5	20.2	32.6	186.5	158.3	53.1	27.2	25.6	19.8	36.6	60.6	63.6	58.9
1980	39.3	25.1	27.9	170.1	102.4	61.1	71.3	58.2	41.6	67.5	68.6	52.2	65.5
1981	33.5	49.1	58.1	174.6	98.2	62.8	33.0	26.7	93.7	88.7	50.6	36.1	68.7
1982	29.4	28.4	24.2	108.0	116.7	46.0	26.1	10.3	15.2	22.6	40.6	77.4	45.6
1983	78.3	36.9	46.6	119.4	189.1	74.3	25.4	10.5	13.2	20.3	49.6	50.4	59.6
1984	32.6	36.4	50.7	197.8	135.2	87.9	40.7	21.0	14.1	15.1	36.5	44.2	59.2
1985	46.2	31.0	47.3	175.4	160.0	39.7	26.0	19.6	22.2	18.4	26.6	37.4	54.4
1986	27.0	21.4	25.7	159.9	90.2	61.1	22.9	19.0	9.7	18.6	19.2	19.9	41.2
1987	17.6	16.5	21.4	128.9	63.0	61.0	18.8	8.3	7.1	9.4	22.8	29.1	35.7
1988	25.5	24.3	21.8	148.4	97.3	28.2	12.5	24.8	23.5	44.8	66.8	45.6	46.9
1989	29.1	23.3	24.9	99.5	123.3	64.3	32.1	10.3	8.4	8.9	22.2	38.0	35.2
1990	25.1	24.7	56.0	129.4	115.5	47.9	29.9	10.0	5.3	20.5	38.9	70.8	47.9
1991	38.8	27.6	42.8	205.2	81.1	31.2	11.5	10.3	10.1	20.5	41.9	51.9	47.1
1992	35.8	25.9	28.5	85.2	146.9	58.0	31.3	18.5	35.0	64.2	93.8	82.8	54.8
1993	43.6	32.1	23.4	115.3	83.4	67.3	33.1	14.5	13.3	63.2	55.2	44.1	47.3
1994	24.9	21.3	18.3	66.9	95.7	68.4	65.7	32.7	18.1	20.6	43.2	46.1	42.9
1995	47.0	41.5	59.2	77.6	96.4	55.1	24.5	21.6	12.4	21.4	72.8	62.2	48.5
1996	38.2	49.5	36.9	132.5	203.9	68.5	53.3	35.8	24.3	22.9	44.4	47.5	62.4
1997	45.7	63.6	42.7	142.9	221.1	92.8	23.9	8.6	10.3	10.3	28.4	25.7	54.3
1998	21.6	19.5	31.2	227.6	49.4	21.2	18.5	7.8	6.4	9.4	12.8	29.2	37.6
1999	24.4	20.1	24.3	100.2	41.5	34.1	39.5	14.0	8.1	29.4	56.5	74.7	39.6
2000	39.3	23.6	59.1	151.5	110.9	53.5	35.8	31.3	17.1	8.2	12.8	19.6	43.6
2001	20.4	19.9	21.6	97.8	70.5	57.1	24.7	8.3	9.3	28.9	69.5	78.1	42.1
2002	45.9	32.8	52.1	178.2	122.4	98.2	36.0	9.1	9.4	8.0	11.0	15.1	50.7
2003	15.5	12.9	16.2	99.7	93.7	89.1	24.2	23.9	9.5	38.9	90.2	64.3	48.8
2004	56.8	35.5	46.7	180.1	136.4	57.5	28.1	12.9	8.3	5.5	9.6	18.6	48.1
2005	30.4	27.0	18.3	169.5	111.0	46.2	18.6	9.7	5.4	13.2	27.0	51.1	45.0
2006	40.0	38.9	39.7	135.2	92.4	42.3	27.3	26.3	17.7	49.3	92.1	101.2	65.5
2007	70.5	38.7	34.5	126.6	80.4	57.7	38.9	17.4	15.3	17.3	28.7	35.1	47.3
Mean	30.6	28.2	30.3	118.1	121.9	64.3	41.7	25.1	18.3	23.0	34.4	37.8	47.4

initially a cause for concern. However, this difference in runoff can be explained by the location of the Bonnechere River basin within the lowest precipitation zone in Figure 2 and by an examination of the runoff in the Madawaska River, south of the Bonnechere River, as it flows east out of Algonquin Provincial Park to the Ottawa River. Table 2 shows the variation of total and incremental runoff in the Madawaska River.

Table 2 Runoff Variation along the Madawaska River

WSC Streamflow Station		Drainage Area (km^2)	Runoff (mm)	
WSC No.	Name		Total	Incremental
02KD001	Madawaska R at Madawaska	1,370	422	422
02KD004	Madawaska R at Palmer Rapids	5,800	374	359
02KE002	Madawaska R near Arnprior	8,260	341	263

The Bonnechere River basin lies in a similar longitudinal zone as the Madawaska River between Palmer Rapids and Arnprior, has a similar drainage area, 2380 km^2 vs 2460 km^2, and similar MAR, 252 mm vs 263 mm. Similarly, the Petawawa River basin lies in a similar longitudinal zone as the Madawaska River between Madawaska and Palmer Rapids, has a similar drainage area, 4120 km^2 vs 4430 km^2, and similar MAR, 363 mm vs 359 mm.

Thus the long term MAR for the Petawawa River, 363 mm, is consistent with runoff values and trends observed at other WSC streamflow stations in the region.

3. Seasonal Flow Pattern

A run-of-river hydroelectric project uses natural river flows, without the benefit of storage regulation through a reservoir. Thus it is important to know not only how much flow passes the dam, but also the distribution and timing of flows. This means that it is important to examine the seasonal flow pattern of streamflow stations that might be considered as a base for simulating a daily flow record at the dam.

The seasonal runoff patterns for the regulated Petawawa, Bonnechere and Madawaska Rivers and the "Natural" Indian River near Pembroke [02KC014] have been compared to examine the impacts of location, drainage area and natural lake regulation. Figure 3 shows the seasonal flow pattern for the streamflow records, with each month expressed as a ratio to the LTAF.

All four rivers exhibit similar seasonal pattern, with minimum flows of 25-40% LTAF occurring in summer and maximum flows of 200-400% LTAF occurring in the spring. The largest seasonal variation is seen in station 02KC014, the Indian River near Pembroke, which has the least natural lake coverage in proportion to its drainage area and is unregulated. The Bonnechere and Petawawa Rivers show the affects of regulation for recreation, where the lakes are filled during the spring freshet and flow is released in the summer and fall, drawing the lakes down for the winter ahead of the next spring inflow. The Petawawa River basin has greater regulated lake coverage than the

Bonnechere and provides a greater amount of seasonal regulation. The least seasonal variation is seen in station 02KD004, the Madawaska River at Palmer Rapids, where the river is regulated for hydropower as well as recreation and some of the spring runoff is stored for energy generation in the winter months.

The Petawawa River exhibits the expected seasonal flow patterns of a river regulated for recreation.

4. Annual Flow Variability

The third component of a long term flow record required for generation analysis is flow variability from year to year. The LTAF and the seasonal flow pattern summarize the long term average characteristics of the flow series expected at the dam site. However, these flows will vary from year to year and will influence the generating potential of the site.

Figure 4 shows the variation in long term annual flow for the four streamflow stations in Figure 3, expressed as ratios of the LTAF at each site. This figure demonstrates the importance of synthesizing a multi-year flow record to capture the full range of flow variation that could be expected over the life of the project. Although there is some variation between stations extreme low flow sequences, such as 1961 to 1964, it is generally low at all stations for other years, and the record for the Petawawa River fits this regional pattern.

The complete records for the period show that sequences of up to six years with below average flow could be expected in the future.

5. Turbinable Flow

The run-of-river plants proposed for the two Petawawa River hydropower sites must use river flows as they arrive, without the use of reservoir storage to regulate flows. The principal hydrological tool used to evaluate run-of-river plants is the flow duration curve. This curve ranks all flows from lowest to highest and plots them against the percent of time they are exceeded. This enables the analyst to compute the volume of flow on average that will pass through the turbine(s) for a given turbine discharge capacity.

Figure 5 shows the flow duration curves for the four streamflow stations compared above with flows expressed as ratios of the LTAF at each site.

The seasonal variation in flows seen at the selected streamflow stations is reflected in the flow duration curves. The natural flow in the Indian River [02KC014] is less than the LTAF for ±75% of the year because a large part of the annual runoff is the result of snowmelt, which generally occurs in only two to four months of the year. The river record with the highest degree of regulation and the lowest seasonal variation coverage, the Madawaska River at Palmer Rapids [02KD004] is less than the LTAF for ±63% of the time. The Petawawa River at Petawawa [02KB001] flow duration curve lies between these two extremes, as expected from its lake coverage and seasonal regulation.

6. Long Term Daily Flow Synthesis

Synthesis of a long-term daily flow series at an ungauged site requires selection of an historic streamflow record that has the same characteristics as those expected at the dam to prorate to the site. Here the availability of flow data for the Petawawa River at Petawawa [02KB001] makes this the obvious choice as the representative gauge. Furthermore, the previous sections have demonstrated that the 02KB001 record fits the runoff and low patterns expected from review of the flow records of adjacent rivers in the region.

Daily flows at the two Petawawa River hydropower sites can be synthesized by prorating 02KB001 flows by the drainage area at each site. However, as Figure 2 shows, the drainage area of the Petawawa River lies in an area where precipitation drops from ±1000 mm at its source Algonquin Provincial Park to ±840 mm at Petawawa. Since the whole basin is at approximately the same latitude evaporation loss should be very similar throughout the basin. This means that unit runoff is likely to be higher at Half Mile Rapids than at Big Eddy Rapids.

As noted in Section 2.1, the long term runoff can be estimated as:

Runoff = Precipitation – Evaporation Loss

Annual average precipitation over each sub-basin can be estimated from Figure 2. Annual average lake evaporation loss in Ontario is well correlated with latitude, thus:

Annual average lake evaporation = -36.123*Latitude + 2296.6 mm

Actual evaporation loss can be estimated as a constant (=0.806 from calibration) times lake evaporation.

By accumulating annual average precipitation and evaporation loss for each sub-basin the runoff at each hydropower site and at the WSC streamflow station near Petawawa can be estimated. Here we know the long term average runoff at station 02KB001 is 363 mm, so the runoff equation can be calibrated. Table 3 shows the runoff calculations for each site.

Table 3 Petawawa Hydropower Sites – Estimated Mean Annual Runoff

Precipitation		Latitude	Evap Et	PPT-Et	Area	Area*(PPT-Et)	∑Area	∑Area*(ppt-Et)	Location	Runoff
Sub-basin	mm	dec N	mm	mm	km^2	mm.km^2	km^2	mm.km2		mm
1	985	45.7	520	465	319	146176	319	146176		464.5
2	990	45.75	519	471	179	84301	498	232478		466.8
3	955	45.88	515	440	413	181614	911	414092		454.5
4	925	46.1	509	416	192	79900	1103	493992		447.9
5	875	45.95	513	362	467	168952	1570	662944		422.3
6	885	45.9	515	370	247	91470	1817	754414		415.2
7	860	46.1	509	351	182	63909	1999	818323		409.4
8	835	45.85	516	319	505	161029	2504	979352		391.1
9	835	46	512	323	522	166730	3026	1146082	Half Mile Rapids	379.4
10	835	45.85	516	319	1012	322696	4038	1470778		364.2
11	835	45.88	515	320	82	26219	4120	1496997	WSC 02KB001	363.3
	835	45.87	516	319	35	11181	4155	1508177	Big Eddy	363.0

Thus the MAR at the Half Mile Rapids hydropower site is 379 mm ±4% higher than the runoff at station 02KB001 and Big Eddy Rapids.

Daily flows at each site have been prorated from the 02KB001 gauge flows by the ratios of runoff*drainage area, giving LTAF values of 36.4 m^3/s and 47.8 m^3/s at Half Mile Rapids and Big Eddy Rapids, respectively.

7. Results

The principal output of this hydrology review is two 92-year, daily flow series that can be used in the generation potential analysis of the Half Mile Rapids and Big Eddy Rapids hydropower sites on the Petawawa River. These datasets are too large to include in this report, but the following characteristics of the flow series are reproduced here to confirm their adherence to the objectives stated throughout the report:

- Tables 4-5 Monthly flow summary tables for each site
- Figure 6 Seasonal flow patterns for the two sites
- Figure 7 An annual flow variation diagram for the sites
- Figure 8 Daily flow duration curves for the sites.

In addition to the above Hatch has prepared Flow Metrics for each site using the synthesized 92-year daily flow series.

The Flow Metrics sheets have been attached as Appendix A.

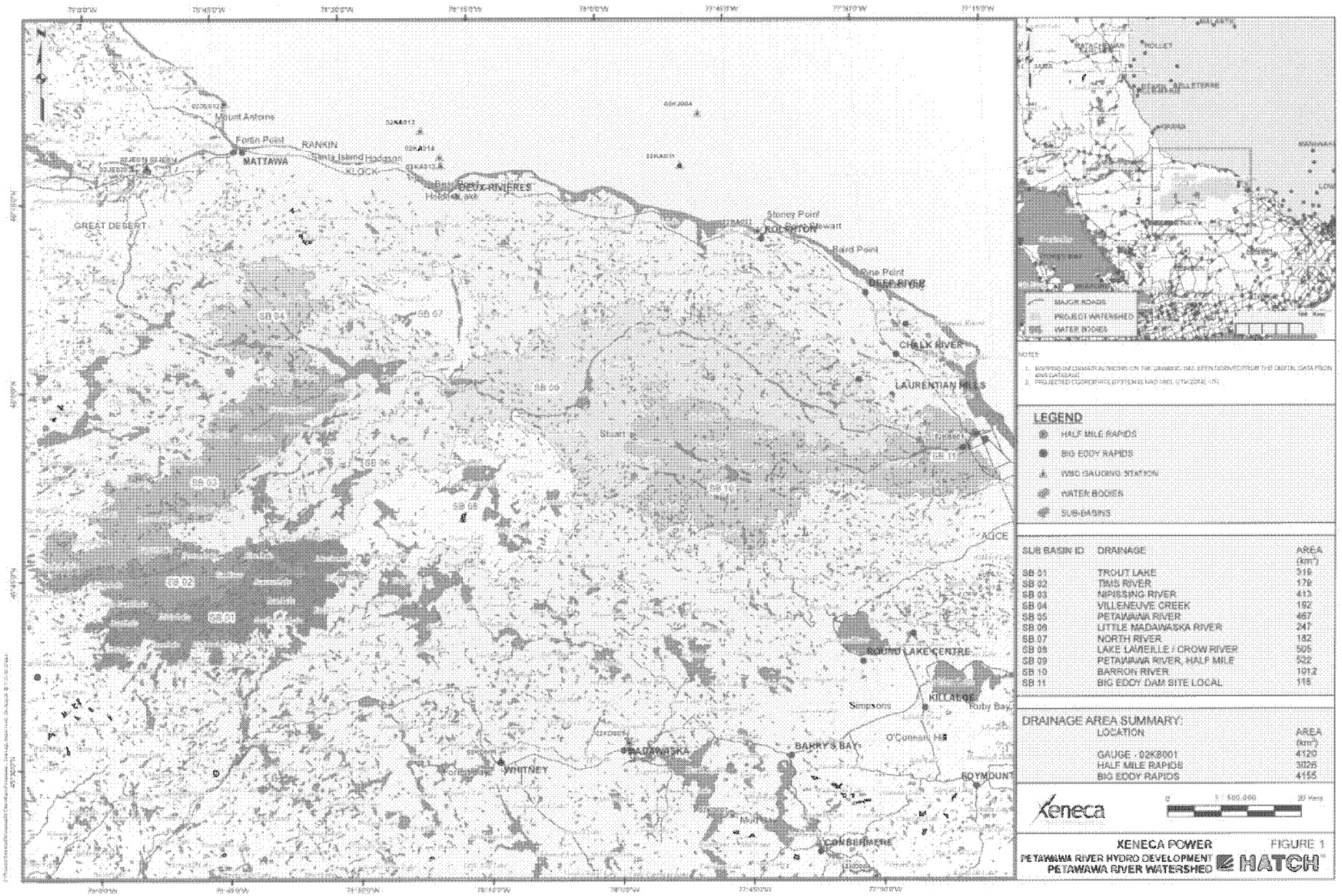
Table 4 Mean Monthly Flows in the Petawawa River at Half Mile Rapids

Year	January	February	March	April	May	June	July	August	September	October	November	December	Year
1910	13.7	16.5	16.9	80.6	94.6	77.7	47.8	21.6	15.0	16.0	28.0	26.5	38.1
1911	27.0	29.6	14.1	75.8	110.5	52.7	55.7	45.1	14.8	11.6	12.6	11.7	37.9
1912	10.8	10.2	10.3	40.0	53.3	44.1	27.5	18.3	12.6	26.0	39.5	40.8	27.6
1913	34.2	29.3	25.6	64.7	105.2	67.6	47.6	28.7	13.7	14.7	25.1	22.9	42.5
1914	20.8	17.3	19.2	48.1	58.1	34.8	39.2	21.3	15.2	12.8	14.0	15.1	28.5
1915	15.0	13.9	30.5	101.3	87.6	39.2	31.5	14.7	8.2	7.2	9.2	10.6	29.1
1916	10.2	10.1	10.5	112.4	87.6	49.2	38.6	30.8	18.4	11.9	13.3	15.6	34.3
1923	12.3	10.1	9.9	38.1	148.9	76.1	42.5	18.7	17.9	13.0	9.4	14.3	34.2
1924	14.7	14.4	14.4	48.4	125.2	69.8	50.0	27.5	11.8	9.7	8.2	9.8	35.8
1925	8.9	8.6	11.3	73.4	73.3	59.0	55.9	25.6	11.9	8.3	11.7	16.6	31.3
1926	14.2	11.6	10.4	19.4	103.0	74.8	58.5	30.3	19.7	15.9	27.9	35.8	37.0
1927	28.8	19.3	23.3	43.0	61.8	75.6	67.4	44.8	20.6	14.7	22.8	32.3	37.8
1928	30.2	28.0	22.3	125.3	158.4	75.1	78.7	56.1	47.3	66.3	78.7	82.7	68.9
1929	45.2	43.8	46.0	159.9	164.7	77.3	46.5	13.9	8.6	6.1	7.4	7.0	52.2
1930	7.4	6.4	10.6	36.5	76.6	48.0	44.2	28.2	10.5	7.3	6.7	8.4	24.2
1931	6.1	5.6	5.8	19.2	35.6	30.9	26.8	13.8	7.0	4.9	5.4	8.5	14.2
1932	16.5	25.2	21.2	65.1	85.8	52.6	22.2	15.8	19.8	29.3	55.7	44.3	37.8
1933	42.0	31.8	24.0	91.2	93.1	50.3	22.4	15.7	10.0	8.7	8.1	9.8	33.9
1934	10.0	9.2	9.4	41.4	121.5	56.4	42.5	27.5	9.3	7.4	12.4	20.0	30.8
1935	18.5	13.6	13.9	50.1	98.8	50.0	63.4	43.3	14.7	10.7	11.6	12.9	30.2
1936	13.0	12.9	14.8	58.9	134.7	76.8	44.1	19.8	10.5	14.8	22.2	20.0	38.2
1937	29.3	29.1	25.4	64.5	104.7	58.0	43.9	25.7	10.8	10.4	21.2	26.3	37.6
1938	21.1	21.1	34.7	148.7	105.5	60.4	41.8	25.5	13.4	20.6	18.7	15.8	43.7
1939	15.7	15.7	16.3	31.7	104.5	44.7	39.6	34.6	11.9	10.5	12.5	11.8	29.3
1940	10.1	9.5	9.9	22.8	75.3	68.0	38.2	23.0	16.7	15.8	20.7	22.9	25.1
1941	25.6	23.0	23.0	82.7	82.6	30.9	25.8	9.4	5.5	7.0	19.4	22.6	28.6
1942	21.5	17.8	20.5	86.7	88.3	56.2	30.8	15.8	10.1	12.5	11.4	17.7	33.5
1943	17.6	15.6	18.2	47.8	170.7	80.9	39.3	21.7	24.7	20.5	24.4	21.2	42.1
1944	17.1	15.2	13.9	25.8	68.7	42.8	29.2	12.9	8.7	14.5	13.9	17.5	23.0
1945	16.1	13.8	34.7	88.4	86.5	54.5	34.3	17.0	13.1	13.8	18.2	17.7	32.9
1946	18.5	19.6	35.9	71.3	43.9	40.1	23.5	11.0	8.3	8.4	11.4	15.5	25.8
1947	19.3	20.2	24.4	104.4	189.5	112.0	60.2	37.9	35.9	37.8	29.7	26.2	59.0
1948	35.7	30.9	41.4	129.1	81.5	50.0	26.7	17.2	10.7	9.1	13.6	20.8	38.8
1949	23.3	25.6	24.5	126.5	104.1	47.7	25.9	11.8	7.5	8.4	6.3	8.0	34.7
1950	14.5	20.8	16.8	55.0	59.6	40.9	26.6	13.9	14.5	13.7	28.9	40.9	29.2
1951	32.1	27.8	27.3	178.0	148.1	47.0	34.3	18.1	13.2	21.7	43.2	45.4	53.1
1952	34.2	28.4	24.2	110.8	112.4	54.0	23.3	15.4	11.7	8.7	7.8	15.5	37.1
1953	15.6	15.4	38.6	81.7	50.5	26.0	14.6	8.5	6.9	5.6	8.1	11.4	23.4
1954	15.3	14.8	22.7	44.6	84.1	78.0	41.4	27.3	23.2	47.2	51.7	40.8	44.3
1955	33.2	26.9	21.4	127.8	72.7	30.5	17.0	10.4	6.5	8.5	19.5	18.9	32.6
1956	18.2	13.7	12.9	46.2	101.7	61.0	36.9	28.8	37.0	27.1	25.5	31.2	36.6
1957	25.5	21.9	19.3	36.4	51.4	35.5	73.1	27.0	23.7	27.0	51.0	50.0	36.9
1958	43.9	32.2	25.3	89.5	63.8	37.7	44.6	26.1	16.7	17.9	18.5	17.3	34.5
1959	16.7	15.1	13.9	61.9	96.9	64.9	21.5	12.5	20.3	24.2	41.1	34.7	35.7
1960	30.4	28.3	23.9	136.4	126.7	47.6	39.1	24.8	11.4	11.2	12.5	12.8	42.1
1961	19.4	19.2	11.3	43.6	69.2	39.9	40.6	39.0	19.4	14.7	13.0	21.4	27.9
1962	19.5	16.5	15.1	80.3	87.5	53.0	15.0	7.9	5.1	5.7	9.2	14.7	24.1
1963	12.3	8.9	8.3	86.8	69.7	35.7	37.5	9.4	12.3	9.3	16.6	22.3	24.8
1964	15.9	14.5	15.5	82.2	48.7	22.5	16.3	5.6	5.0	5.6	5.9	10.9	17.7
1965	12.8	11.8	12.2	36.4	104.2	33.5	15.9	15.8	17.6	42.5	52.7	50.4	36.5
1966	44.1	30.6	34.3	101.3	97.8	52.2	20.4	11.0	7.7	9.1	24.4	66.4	43.3
1967	38.7	27.2	21.8	111.5	84.5	53.3	32.6	12.2	11.5	38.5	71.3	42.1	45.4
1968	28.7	21.0	25.0	110.0	48.8	27.3	24.5	13.2	14.9	12.3	12.1	18.5	29.6
1969	19.9	17.5	15.2	80.5	126.5	59.1	28.8	14.5	14.2	18.2	39.2	36.8	40.1
1970	19.4	15.2	14.2	60.3	117.7	48.6	41.5	38.0	18.5	23.9	26.6	31.3	38.1
1971	24.3	21.8	22.8	87.5	127.1	41.8	15.0	7.5	6.4	7.0	7.9	18.0	32.3
1972	19.7	17.1	15.7	46.3	188.9	71.1	57.1	45.2	36.4	39.8	66.0	41.9	54.1
1973	38.4	36.0	34.5	178.5	101.4	72.1	50.0	30.2	15.2	17.5	22.9	35.1	53.8
1974	26.5	25.5	29.6	119.2	166.0	57.2	25.2	13.9	10.5	19.2	32.4	32.0	46.5
1975	22.3	19.1	19.2	53.9	107.8	31.8	12.7	9.4	7.1	12.5	15.1	30.5	28.5
1976	21.4	17.1	32.5	155.4	80.6	38.0	38.5	18.5	9.4	10.2	11.4	14.1	37.9
1977	11.8	10.1	22.9	107.9	54.3	18.1	10.5	5.9	5.0	22.9	32.6	38.7	26.6
1978	25.6	19.4	13.8	58.9	136.8	49.0	13.2	9.2	13.6	22.4	17.8	19.7	32.6
1979	20.3	19.9	25.0	143.0	121.4	40.9	20.8	19.8	15.2	29.8	66.4	48.9	45.9
1980	30.2	19.3	21.4	130.5	78.6	48.9	54.7	44.8	32.1	51.4	53.4	45.0	50.2
1981	25.7	27.7	66.3	133.9	75.3	48.6	25.3	26.5	64.1	69.5	38.8	29.2	52.7
1982	22.5	20.2	14.8	62.8	89.5	58.8	20.0	7.9	11.7	17.4	30.7	59.3	34.8
1983	59.5	29.9	37.3	90.8	138.9	67.0	15.6	8.1	10.1	19.4	38.0	38.6	48.3
1984	25.2	27.9	38.9	151.7	103.7	67.4	31.2	18.1	10.8	11.5	28.0	33.9	45.4
1985	38.8	29.5	38.3	136.8	122.7	38.4	19.9	15.2	17.0	12.8	20.4	28.7	41.7
1986	20.7	18.4	19.7	122.6	89.1	47.3	17.5	14.8	7.4	14.4	14.7	15.2	31.6
1987	13.5	12.8	16.4	96.5	40.7	31.5	12.9	8.4	5.5	7.2	17.3	22.3	23.5
1988	19.5	18.7	16.8	113.8	74.8	21.6	9.6	16.6	18.0	34.3	51.2	39.7	36.0
1989	22.3	17.6	19.1	76.3	64.8	49.3	24.6	7.9	4.9	4.8	17.0	21.4	30.0
1990	17.7	16.9	42.9	99.2	68.6	36.7	18.9	7.7	4.1	15.7	30.5	54.3	36.4
1991	28.2	20.7	32.6	153.5	82.2	28.5	8.9	7.9	7.8	15.7	32.1	39.3	36.1
1992	27.3	19.8	21.9	71.5	112.8	29.2	24.0	14.1	26.8	93.8	71.9	48.2	41.7
1993	33.4	24.6	18.0	88.4	63.9	51.6	25.4	13.0	19.2	33.1	42.3	33.8	35.3
1994	19.1	16.3	14.8	51.3	73.4	44.9	30.4	35.1	12.9	15.8	33.1	35.4	32.9
1995	36.0	31.9	45.4	59.4	73.9	42.2	18.9	16.5	9.5	16.6	55.6	40.0	37.2
1996	26.3	35.0	28.3	94.0	150.3	52.5	40.9	27.4	16.6	17.5	34.1	36.5	47.8
1997	35.0	33.4	32.7	109.6	169.5	40.5	18.3	8.8	7.9	7.9	21.8	15.9	41.6
1998	16.6	14.2	29.9	174.5	37.9	16.2	14.2	6.0	4.8	7.2	9.8	22.4	28.9
1999	18.7	22.3	18.7	78.8	31.8	26.2	30.3	10.7	6.2	22.6	44.9	57.3	30.5
2000	30.1	18.1	45.4	85.5	85.0	41.0	27.5	26.0	13.1	8.3	9.8	15.1	33.6
2001	15.7	15.3	16.6	75.0	83.9	43.8	19.0	4.8	7.1	22.8	53.3	59.9	32.3
2002	35.2	25.2	40.0	135.1	83.9	75.3	26.8	7.9	4.1	6.8	8.4	15.8	38.9
2003	11.7	9.9	12.4	69.8	71.8	61.4	18.6	18.3	7.4	29.2	73.8	64.7	37.4
2004	43.6	27.5	35.8	122.8	104.6	44.1	21.6	9.9	6.4	4.2	7.5	15.2	38.9
2005	23.3	20.7	16.8	144.6	85.1	34.6	12.9	5.1	4.2	10.1	20.7	39.2	34.5
2006	30.7	28.8	30.5	149.7	70.8	32.4	20.9	20.1	13.6	37.8	70.9	77.5	48.7
2007	34.1	28.1	26.4	97.0	81.6	51.9	28.8	13.3	12.5	13.1	22.0	24.6	36.2
Mean	23.5	20.1	23.2	88.2	93.5	49.3	32.0	19.3	14.1	17.6	26.4	29.0	38.4

Table 5 Mean Monthly Flows in the Petawawa River at Big Eddy Rapids

Year	January	February	March	April	May	June	July	August	September	October	November	December	Year
1916	18.0	21.7	21.6	79.6	124.3	102.1	62.8	28.3	19.7	21.1	34.1	34.6	47.4
1917	35.4	27.3	16.5	99.3	145.1	69.2	74.4	59.2	19.5	15.3	16.5	15.4	48.8
1918	14.4	13.4	13.6	62.6	70.1	58.0	36.1	20.2	16.6	34.1	51.9	53.6	36.3
1919	45.0	34.6	33.7	151.3	139.5	114.8	62.8	27.3	18.0	19.4	33.0	30.1	55.8
1920	27.1	22.7	25.2	89.2	76.3	45.6	51.5	30.7	19.9	17.0	16.4	16.9	34.9
1921	15.8	15.3	46.0	133.1	89.0	51.6	41.4	19.4	10.8	9.5	12.0	14.0	38.3
1922	13.4	13.2	16.4	147.8	115.1	64.6	56.7	40.4	24.2	15.6	17.5	20.8	45.9
1923	16.1	13.3	13.1	59.1	193.0	100.0	65.9	25.5	23.5	14.4	12.3	16.6	44.9
1924	19.3	18.9	18.9	60.9	164.5	117.7	74.6	38.1	15.4	12.7	10.6	12.9	47.0
1925	11.7	11.3	14.9	96.4	96.3	90.7	73.5	33.5	15.8	11.0	15.4	21.6	41.1
1926	18.7	15.1	13.6	25.4	135.3	58.3	56.2	66.1	20.7	15.2	35.7	48.3	48.6
1927	31.3	25.4	38.5	56.5	81.2	99.4	68.6	58.3	27.1	19.4	29.9	42.5	49.4
1928	39.6	32.9	29.3	164.6	208.1	98.7	99.5	77.6	62.1	87.1	103.3	82.4	90.6
1929	59.4	57.6	60.4	250.1	216.4	101.5	61.2	18.3	11.3	8.0	9.6	9.3	68.5
1930	9.7	11.0	14.0	45.9	103.3	63.0	58.1	34.4	13.7	9.5	8.8	8.4	31.8
1931	8.0	7.7	7.3	25.2	46.8	40.5	35.5	18.2	9.1	6.4	7.1	11.7	15.7
1932	24.3	19.1	27.9	85.5	192.6	88.3	29.1	20.8	25.7	36.5	19.1	58.1	49.7
1933	58.2	41.7	31.6	159.8	122.3	66.1	28.4	20.8	13.1	11.5	10.7	12.9	46.5
1934	13.2	12.1	12.9	94.3	159.6	74.1	55.8	35.5	12.2	9.6	16.3	26.3	46.6
1935	24.3	17.9	19.2	65.8	77.2	65.7	63.9	36.6	19.3	14.0	15.3	17.0	38.7
1936	17.1	16.1	19.4	66.0	176.9	100.7	57.9	26.9	13.7	19.4	29.2	26.3	47.5
1937	38.4	35.2	33.4	84.4	137.5	76.3	51.6	33.8	14.1	13.7	27.8	33.9	48.1
1938	27.7	27.7	46.8	195.3	138.6	76.9	54.8	26.9	22.9	27.1	21.9	20.6	57.4
1939	20.6	20.6	21.4	41.6	137.2	56.7	52.1	45.5	15.7	13.8	16.9	15.6	38.5
1940	13.2	12.4	13.0	30.0	98.9	89.4	58.2	30.2	22.0	20.7	27.2	34.0	36.8
1941	33.6	30.9	30.2	116.5	82.3	40.6	33.8	12.3	7.3	9.2	25.5	28.7	37.8
1942	28.2	23.4	26.9	129.6	113.4	73.8	40.6	24.7	13.3	16.4	15.0	23.3	44.1
1943	22.9	20.4	23.9	82.8	224.2	108.3	51.7	26.5	32.4	26.9	32.1	27.9	58.2
1944	22.9	20.0	18.3	33.9	87.6	56.2	38.3	16.9	11.5	15.2	18.3	25.9	30.2
1945	21.2	18.1	46.6	117.5	96.1	71.6	45.1	22.6	16.6	17.6	29.9	25.3	42.4
1946	24.2	25.8	47.1	93.6	57.2	32.7	30.9	14.4	10.8	11.0	15.0	20.4	33.8
1947	25.4	25.6	32.0	137.2	248.9	147.1	79.1	49.8	47.2	49.4	39.0	48.2	77.6
1948	46.9	40.6	54.3	169.6	107.0	62.7	35.1	22.6	14.0	12.2	17.6	27.3	51.9
1949	30.8	33.6	32.2	166.2	136.8	62.6	34.1	16.5	9.8	6.4	6.2	10.5	45.6
1950	19.1	27.4	22.0	72.7	90.7	53.8	27.1	16.3	19.1	16.0	36.0	53.7	38.3
1951	42.1	35.5	35.6	233.8	194.5	61.8	45.8	23.7	17.3	28.4	56.8	60.1	69.7
1952	44.9	37.3	31.6	145.6	147.7	71.0	30.8	20.2	16.4	11.4	10.2	20.3	48.8
1953	20.6	20.3	50.7	107.3	66.3	34.2	15.2	11.2	9.0	7.8	8.0	14.9	30.8
1954	20.1	19.1	29.9	111.1	110.5	102.5	54.3	35.8	30.5	82.0	87.9	53.6	56.2
1955	43.6	34.0	28.1	167.8	95.5	40.2	22.3	13.6	8.6	10.9	25.6	24.8	42.8
1956	21.3	18.0	17.0	60.7	133.5	80.1	48.5	37.8	48.6	35.6	35.8	41.1	48.0
1957	33.5	26.8	25.4	47.8	67.5	46.6	96.0	38.5	31.1	35.5	67.0	65.6	48.5
1958	37.7	42.3	39.0	80.7	60.8	49.6	56.4	34.2	24.6	22.4	24.3	22.8	40.4
1959	22.0	19.9	18.2	61.3	126.0	56.2	28.0	22.9	26.7	31.8	53.9	71.0	46.9
1960	46.4	37.2	31.4	171.3	164.4	62.8	51.4	32.6	15.5	14.8	18.4	16.8	55.4
1961	13.7	13.4	14.9	57.2	90.8	52.6	59.4	51.2	25.6	19.3	17.1	28.1	36.6
1962	25.6	21.7	19.8	79.2	115.0	43.8	19.8	10.2	6.7	7.5	10.1	19.3	31.7
1963	16.2	10.6	8.2	114.9	91.0	46.9	23.0	12.4	16.2	12.2	21.8	28.3	32.6
1964	20.8	19.0	20.3	58.6	65.3	29.5	13.5	7.4	6.9	7.3	7.6	13.5	23.3
1965	16.8	15.5	16.0	47.9	176.3	44.0	20.8	20.8	23.1	58.0	69.2	66.2	48.0
1966	58.0	40.2	45.0	133.1	126.5	68.6	28.8	14.5	10.1	10.6	32.1	113.5	56.6
1967	50.9	35.7	28.7	146.4	111.0	70.0	42.8	16.1	15.1	50.6	93.7	55.5	59.6
1968	37.7	27.6	32.8	144.6	96.1	35.9	32.2	17.3	19.5	16.2	18.9	24.3	38.9
1969	26.1	23.0	20.0	118.6	166.2	76.3	36.8	19.1	23.9	21.2	51.6	48.3	52.7
1970	25.4	20.0	18.6	79.2	154.6	63.9	54.5	49.9	24.3	31.4	34.9	41.1	50.1
1971	31.9	28.7	30.0	114.9	167.0	55.0	19.7	9.9	6.4	9.1	10.4	23.7	42.4
1972	25.8	22.4	20.6	60.8	248.1	93.6	75.0	39.4	47.6	52.3	58.3	55.1	73.1
1973	47.8	46.0	71.6	231.9	133.2	94.7	65.7	39.7	19.9	23.0	29.0	46.0	70.7
1974	34.8	33.6	39.1	156.5	216.1	75.1	33.1	18.3	13.6	26.3	42.5	42.0	61.1
1975	28.2	25.1	25.2	70.9	141.6	46.8	16.7	12.3	9.3	15.5	19.8	40.1	37.5
1976	26.2	32.5	42.7	221.2	105.9	49.9	51.0	19.0	12.3	13.4	15.0	18.5	49.8
1977	19.4	18.3	30.1	141.4	71.3	23.8	13.8	7.8	10.5	30.0	42.8	50.9	37.6
1978	33.7	28.5	18.1	77.3	179.7	52.5	17.3	12.1	17.9	25.4	25.4	25.9	42.9
1979	26.7	25.4	32.8	187.5	159.4	93.7	27.4	25.0	20.0	38.9	61.0	64.5	60.3
1980	39.6	25.3	28.1	171.4	103.2	61.6	71.8	58.6	42.1	67.6	70.1	52.6	56.9
1981	33.8	49.5	60.7	175.6	96.9	63.1	33.2	25.9	84.3	87.4	50.9	38.4	69.2
1982	29.6	26.6	24.4	108.8	117.6	48.3	28.3	10.3	15.3	22.8	40.3	77.9	45.8
1983	76.9	39.2	48.9	119.3	152.5	74.8	20.5	10.6	13.3	25.5	50.0	50.8	59.5
1984	35.1	36.8	61.1	196.2	136.2	66.8	41.0	21.2	14.2	19.2	36.8	44.8	59.7
1985	47.3	31.3	47.6	179.7	181.1	40.0	26.2	19.9	22.3	16.5	28.8	37.7	56.8
1986	27.2	21.6	25.8	181.1	90.8	62.1	23.0	19.1	9.6	19.0	19.3	20.8	41.5
1987	17.8	16.8	21.6	126.7	53.4	41.3	16.9	8.4	7.2	9.4	22.7	29.3	30.9
1988	25.7	24.6	22.0	149.6	99.0	28.4	12.8	24.6	23.7	45.1	67.2	47.0	47.3
1989	29.3	23.5	25.0	100.2	124.2	64.6	32.4	10.3	6.4	8.3	22.4	28.2	39.5
1990	23.3	24.9	56.4	130.3	116.3	48.3	26.1	10.1	8.3	20.6	40.1	71.4	47.9
1991	37.1	27.2	42.9	201.6	81.7	33.5	11.6	10.4	10.2	28.7	42.2	51.7	47.5
1992	26.9	26.0	28.7	93.9	148.0	38.3	31.5	18.6	35.2	44.5	93.6	63.3	54.8
1993	43.9	32.3	23.6	116.2	84.0	57.8	33.4	14.6	13.6	43.5	66.6	44.4	47.7
1994	25.1	21.5	19.5	67.4	96.4	59.0	66.2	33.0	16.2	20.7	43.5	46.6	43.2
1995	47.3	41.9	58.6	78.0	97.1	55.5	24.8	21.7	12.5	22.9	73.3	52.6	48.9
1996	38.5	49.9	37.2	123.4	205.4	89.0	53.7	36.0	24.4	23.0	44.8	47.5	62.8
1997	46.0	43.9	43.0	144.0	212.7	53.2	24.0	9.7	10.4	10.4	28.5	20.8	54.7
1998	21.7	18.6	21.4	229.3	48.7	21.3	18.6	7.9	6.5	9.5	12.8	29.4	37.9
1999	24.6	29.3	24.5	100.9	41.8	34.4	39.8	14.1	8.2	29.8	59.0	75.3	40.1
2000	39.5	29.8	59.6	112.8	111.7	93.9	36.1	31.5	17.3	8.9	12.3	19.8	49.9
2001	20.6	20.1	21.8	98.8	70.9	57.6	24.9	8.3	9.4	30.1	70.0	78.7	42.4
2002	46.2	33.1	52.5	177.5	123.3	98.9	35.2	9.2	5.4	6.1	11.1	15.2	51.0
2003	15.4	13.0	16.3	91.4	94.4	80.7	24.4	26.1	9.7	98.3	96.3	54.9	49.2
2004	57.2	36.1	47.0	181.3	137.4	57.9	28.3	13.0	8.4	8.6	9.9	19.9	48.5
2005	30.6	27.2	19.4	189.9	111.6	45.5	19.9	9.7	5.5	13.3	27.2	51.4	45.4
2006	40.3	39.2	43.0	196.7	93.1	42.6	27.5	28.4	17.8	49.7	92.8	101.9	63.9
2007	71.0	38.9	34.7	127.5	81.0	58.2	39.2	17.5	16.5	17.2	28.9	32.3	47.6
Mean	30.9	26.4	30.5	115.9	122.8	64.8	42.0	26.3	18.5	23.1	34.7	38.1	47.6

FIGURES



SUB BASIN ID	DRAINAGE	AREA (km²)
SB 01	TROUT LAKE	316
SB 02	TIMS RIVER	176
SB 03	NIPISSING RIVER	413
SB 04	VILLENEUVE CREEK	152
SB 05	PETAWAWA RIVER	467
SB 06	LITTLE MADAWASKA RIVER	247
SB 07	NORTH RIVER	182
SB 08	LAKE LAVIELLE / CROW RIVER	505
SB 09	PETAWAWA RIVER, HALF MILE	522
SB 10	BARRON RIVER	1012
SB 11	BIG EDDY DAM SITE LOCAL	116

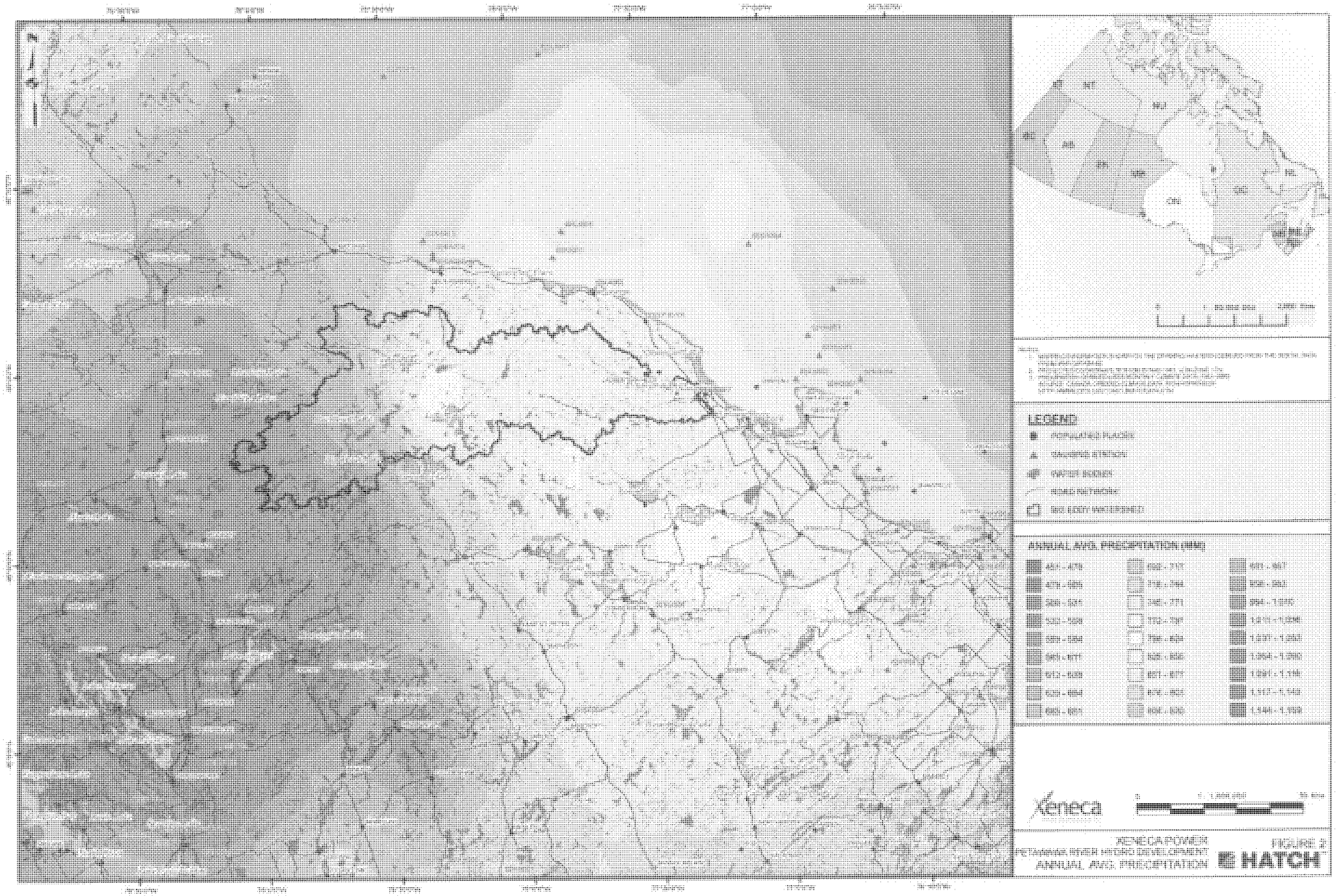
DRAINAGE AREA SUMMARY:

LOCATION	AREA (km²)
GAUGE - 02KB001	4120
HALF MILE RAPIDS	3026
BIG EDDY RAPIDS	4155

Xeneca

XENECA POWER FIGURE 1
PETAWAWA RIVER HYDRO DEVELOPMENT
PETAWAWA RIVER WATERSHED HATCH

A0108489_95-000095



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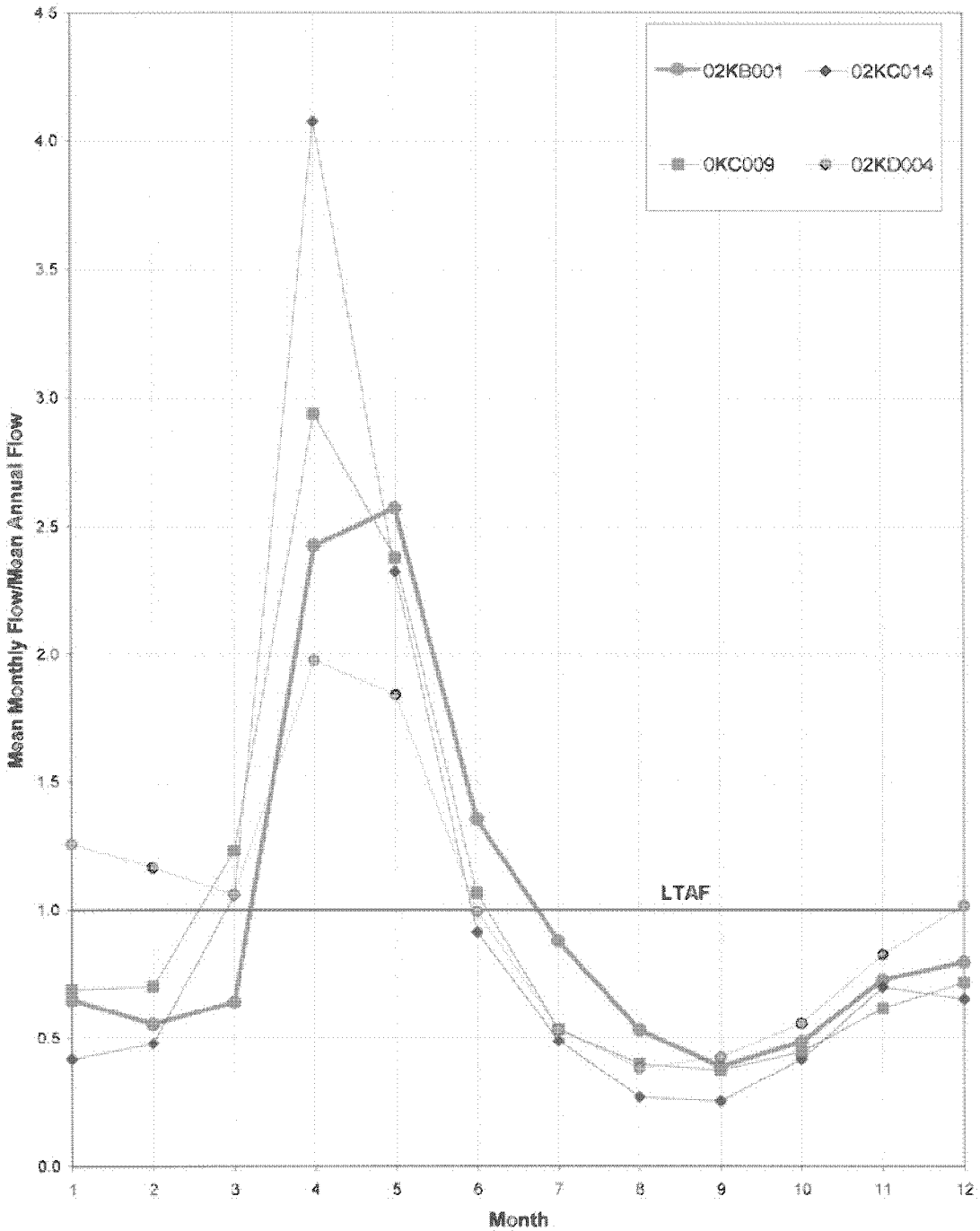


Figure 3
Xeneca Power
Petawawa Hydropower Sites
Seasonal Flow Patterns

HATCH™

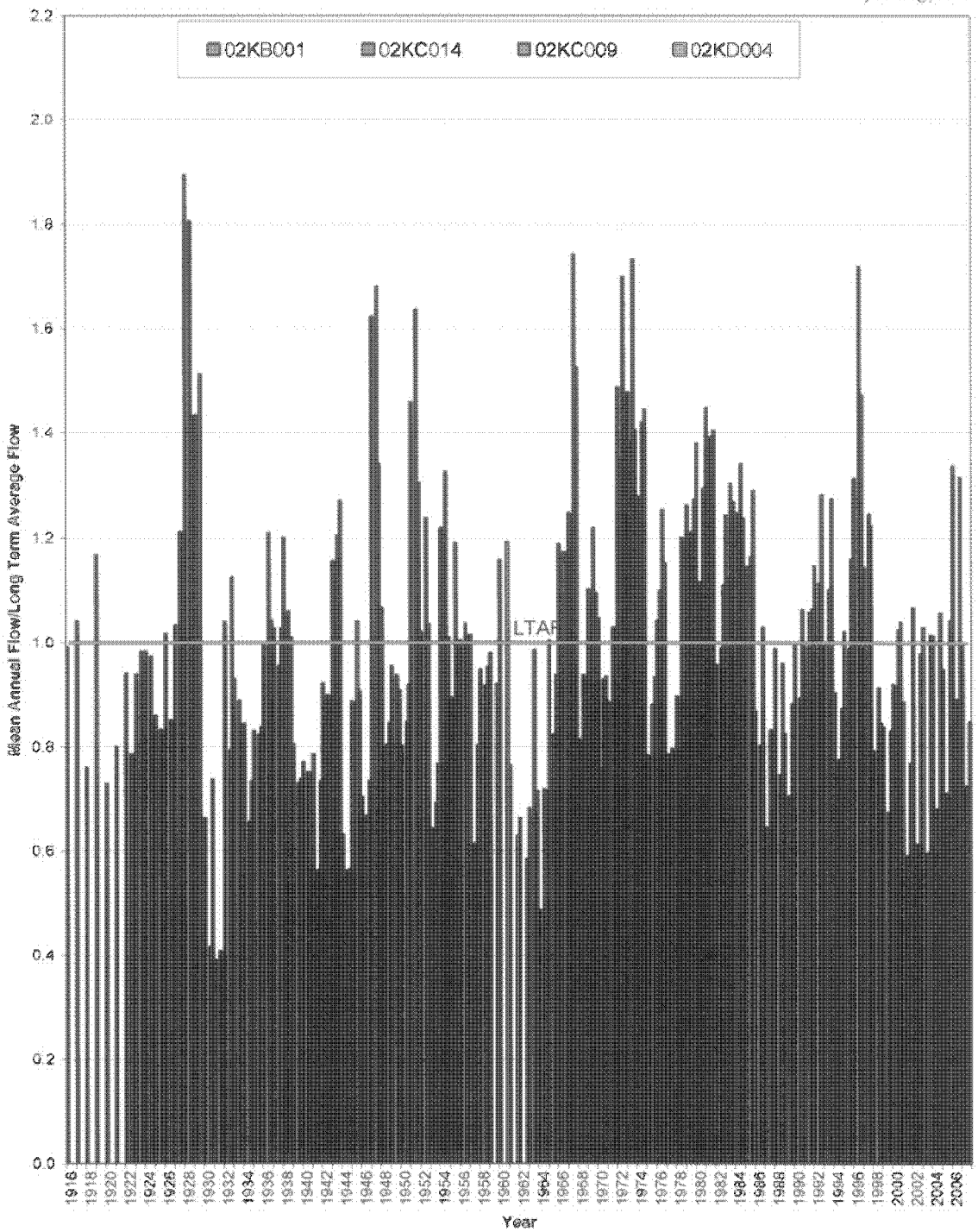


Figure 4
Xeneca Power
Petawawa Hydropower Sites
Annual Flow Variability

HATCH™

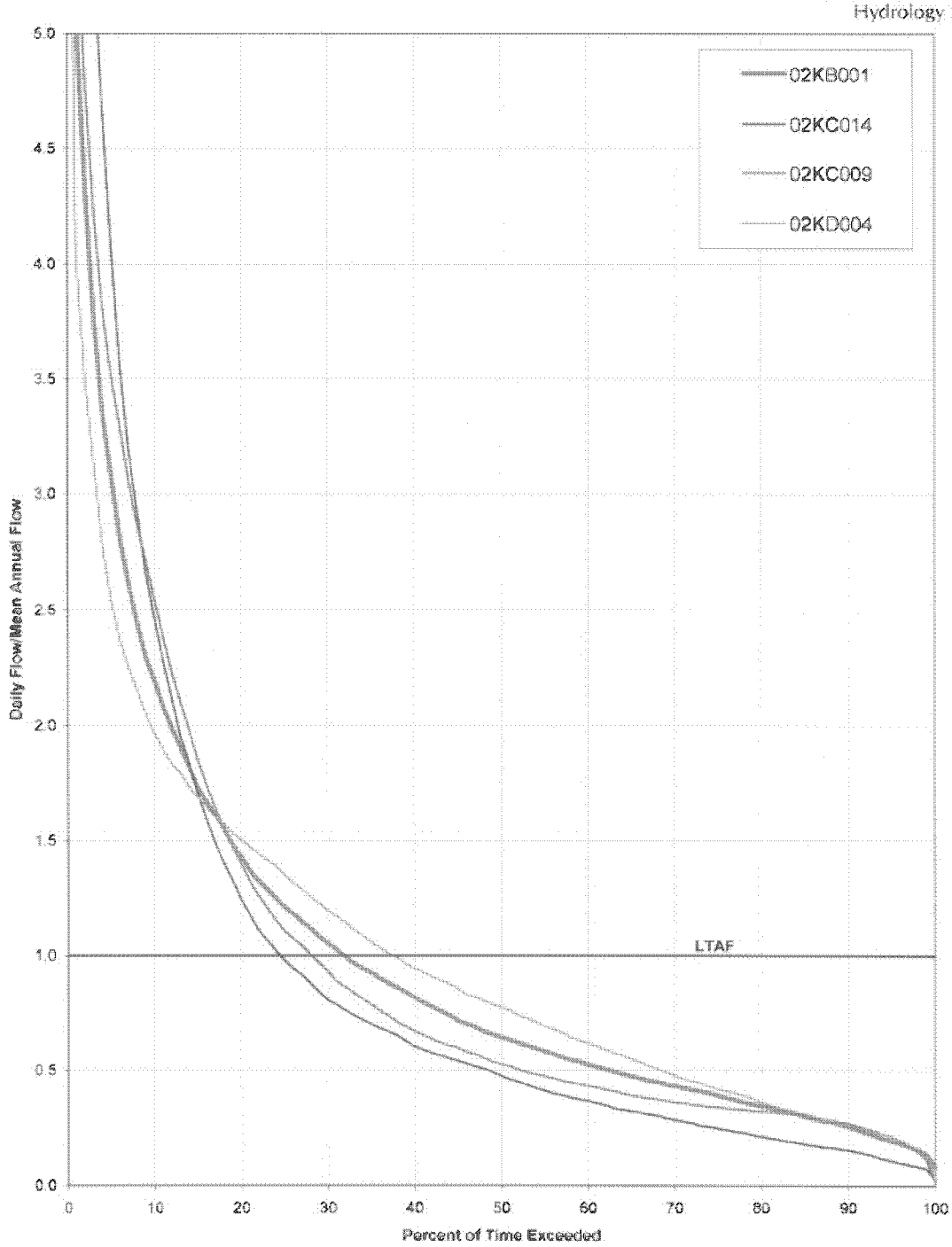


Figure 5
Xeneca Power
Petawawa Hydropower Sites
Daily Flow Duration Curves

HATCH™

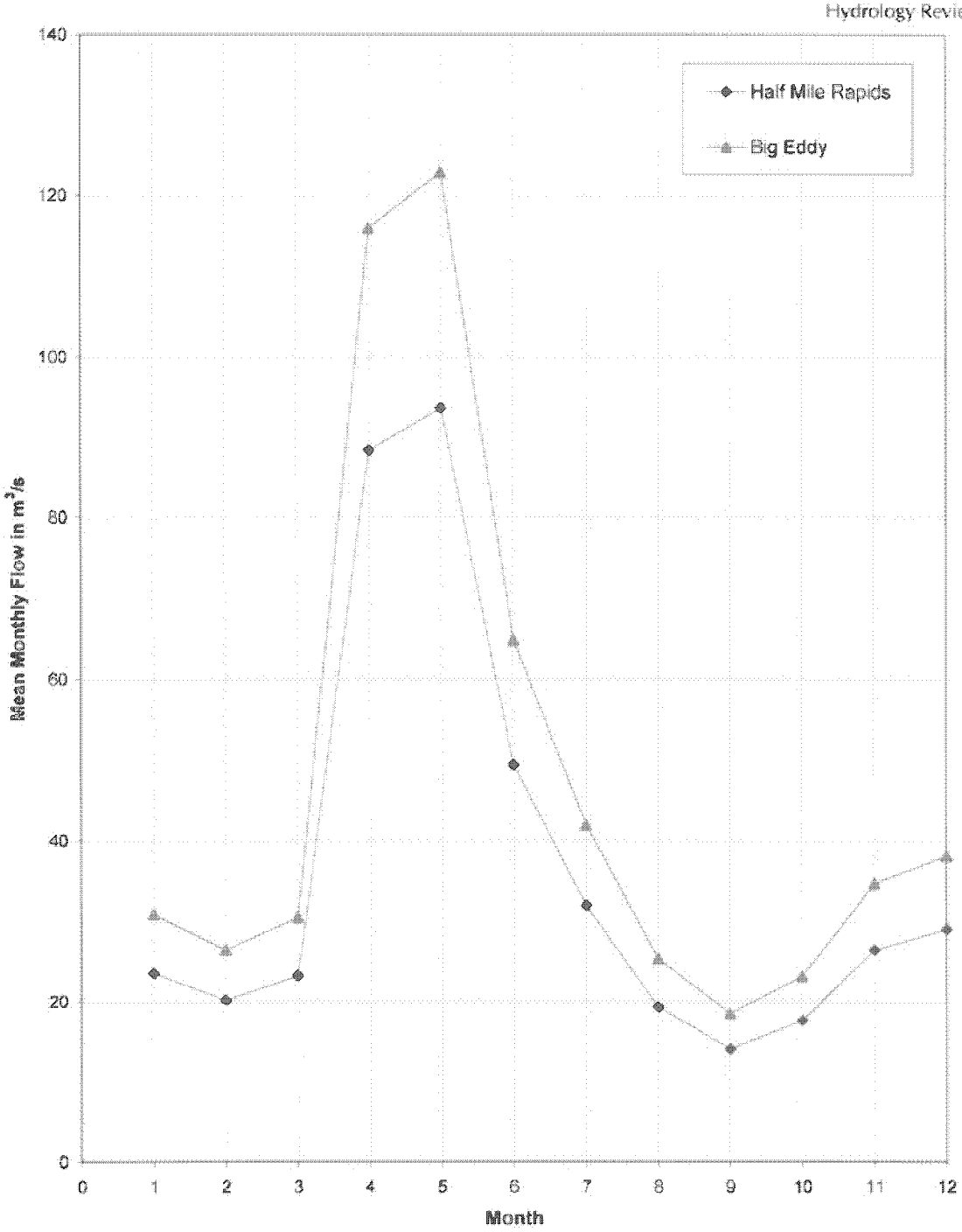


Figure 6
Xeneca Power
Petawawa Hydropower Sites
Petawawa River Hydropower Sites – Seasonal Flow Pattern

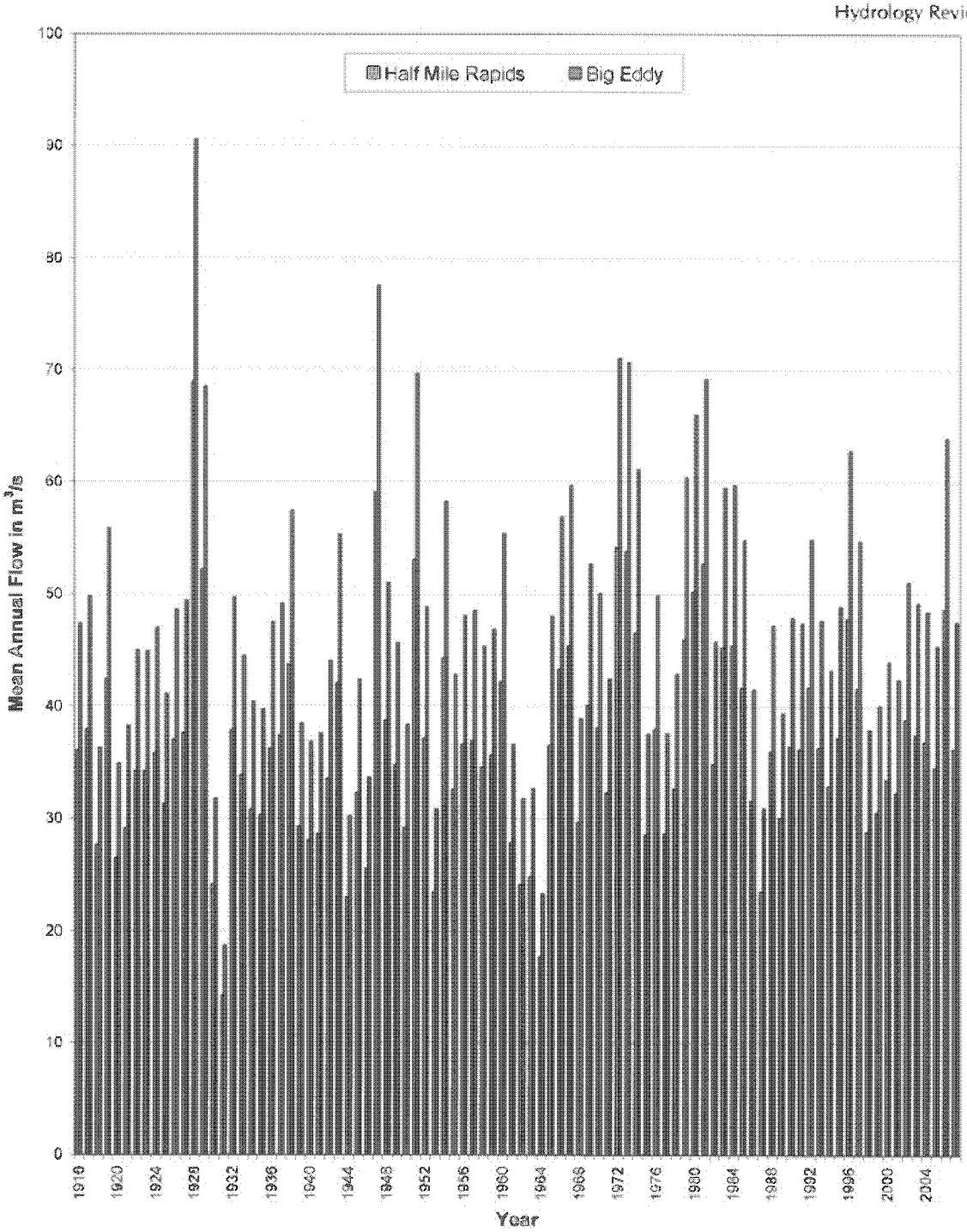


Figure 7
Xeneca Power
Petawawa Hydropower Sites
Petawawa River at Hydropower Sites – Annual Flow Variability

HATCH™

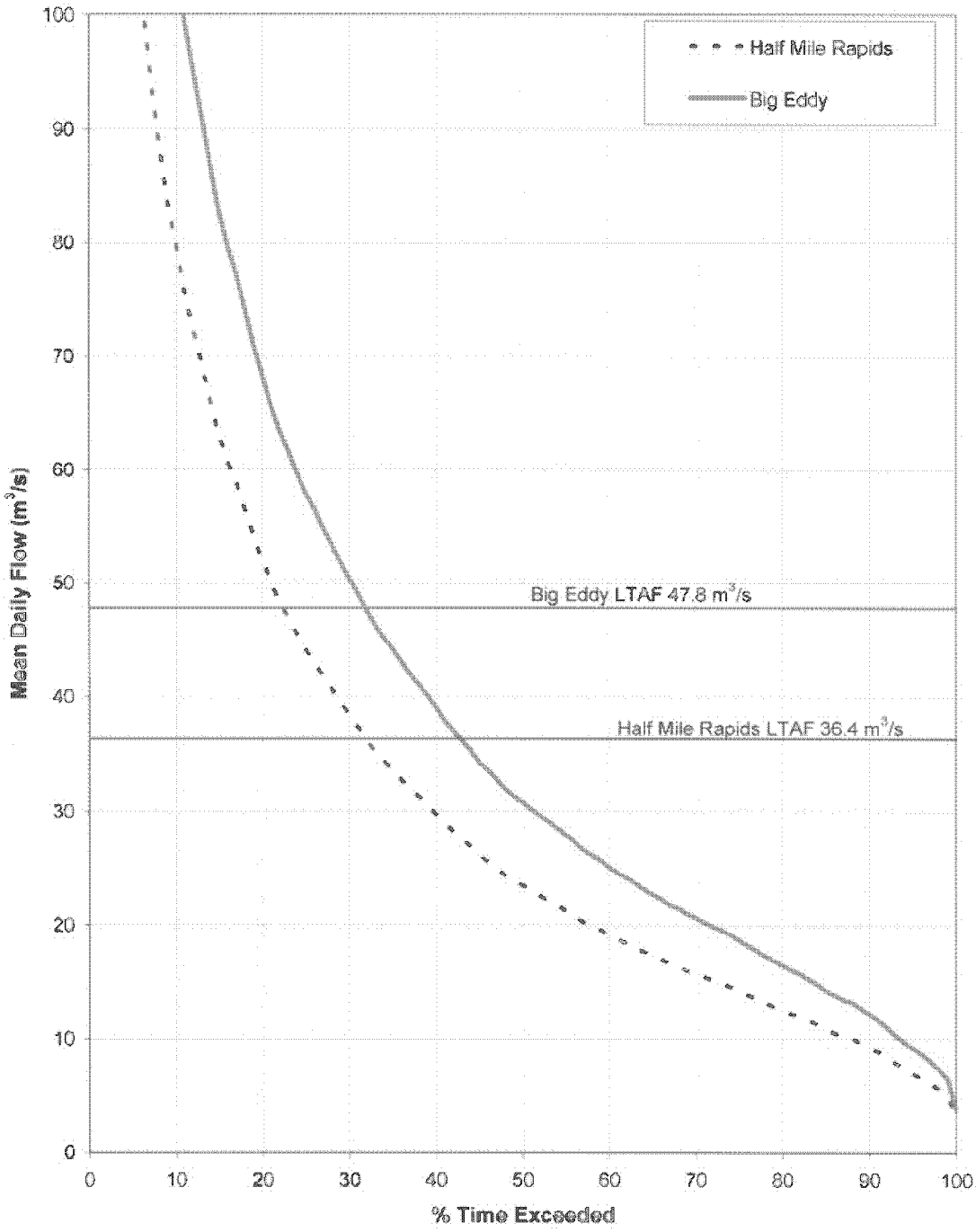


Figure 8
Xeneca Power
Petawawa Hydropower Sites
Petawawa River at Hydropower Sites – Daily Flow Duration Curve

APPENDIX A
Flow Metrics

HATCH

BIG EDDY - PETAWAWA RIVER
NATURAL FLOW METRICS DATA SHEET

STATION INFORMATION	
SITE ID	0
RIVER NAME	PETAWAWA RIVER
SITE NAME	BIG EDDY
REGION	SOUTHERN
DISTRICT	PEMBROKE
DRAINAGE AREA	4155 km^2
OWNER	XENECA POWER

These metrics are provided for the potential redevelopment site based on the Water Survey of Canada (WSC) gauging station Petawawa River near Petawawa (02KB001). Metrics are based on WSC flows from 1916 to 2007 (92 years).

The flow records for the site have been synthesized by prorating gauge flows by the ratio of natural drainage areas. Other descriptive metrics have been included in this data sheet to provide a more complete description of the ranges of anomalies on the river system and to facilitate comparisons between river systems.

Annual (1916 - 2007):

1. Streamflow Time Series

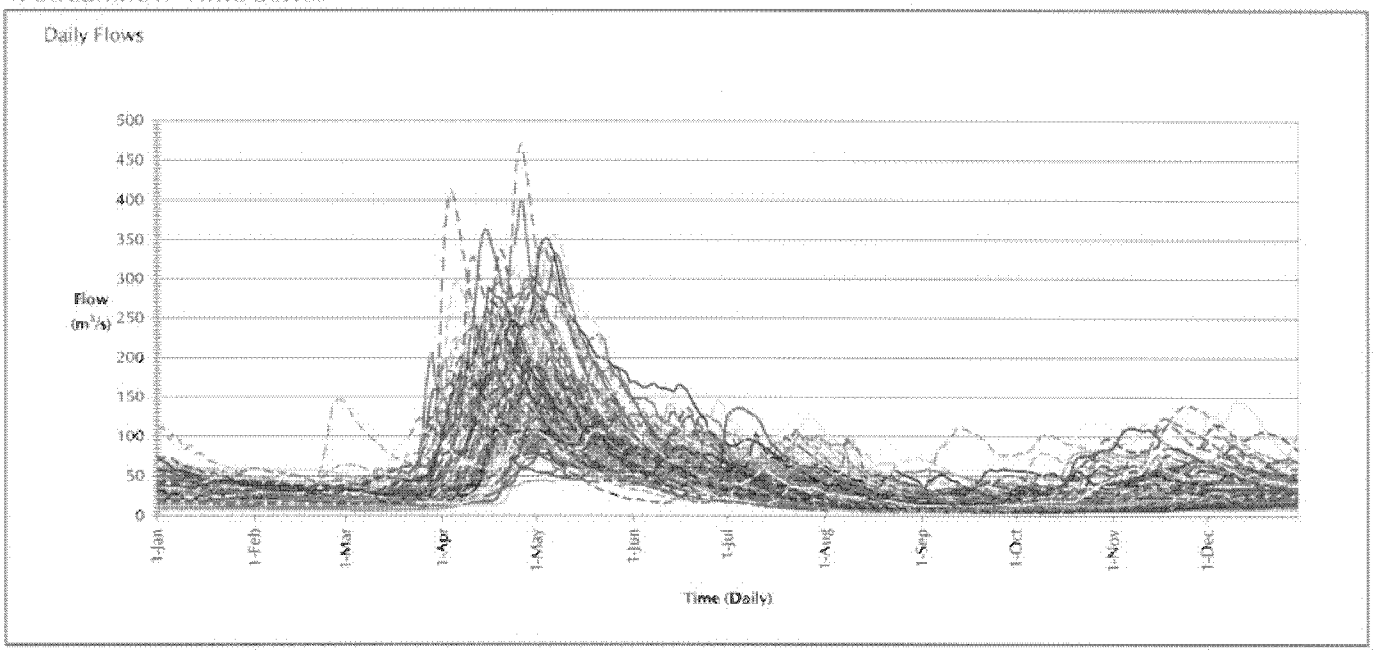


Figure 1 : Annual Daily flow hydrographs from 1916 to 2007.

Table 1 : Annual flow metrics based on 92 years of data.

Descriptive Metric		
Mean Annual Flow	47.79	m^3/s
20% Time Exceeded Flow	68.06	m^3/s
Median Flow	30.82	m^3/s
80% Time Exceeded Flow	16.42	m^3/s
Mean Rising Rate of Change of Flow	3.06	m^3/s/day
Mean Falling Rate of Change of Flow	-1.93	m^3/s/day
Extreme Low Flow Conditions:		
7-day-avg. low flow in 2-yr return period, $7Q_2$	11.68	m^3/s
7-day-avg. low flow in 10-yr return period, $7Q_{10}$	5.71	m^3/s
7-day-avg. low flow in 20-yr return period, $7Q_{20}$	4.35	m^3/s
Target Metric		
Riparian Flows (Q_2 - Q_{20})	208 -372	m^3/s
Bankfull Flows ($Q_{1.5}$ - $Q_{1.7}$)	178 -192	m^3/s

II. Flow Duration

Time Exceeded %	Flow (m^3/s)
0%	470.4
1%	243.8
5%	147.1
10%	104.8
20%	68.2
30%	50.4
40%	39.1
50%	30.8
60%	25.1
70%	20.7
80%	16.4
90%	12.2
95%	9.2
99%	6.5
100%	4.8

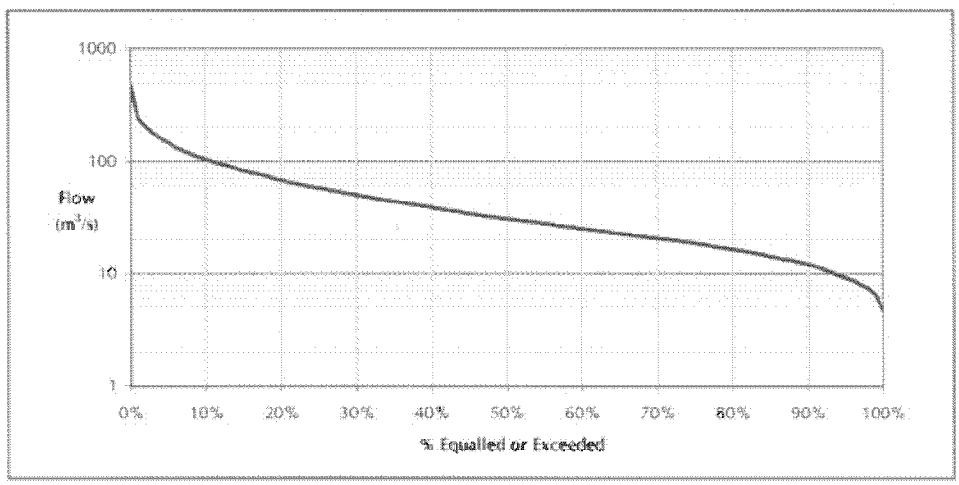


Table 2 & Figure 2 : Flow duration table and curve displaying flow vs. percent time exceeded over 92 years.

III. Flood Frequency Analysis

Return Period (years)	Flow (m^3/s)
1.05	113.8
1.25	154.1
1.5	178.3
1.7	191.9
2	207.5
5	279.3
10	326.8
20	372.4
50	431.5
100	475.7

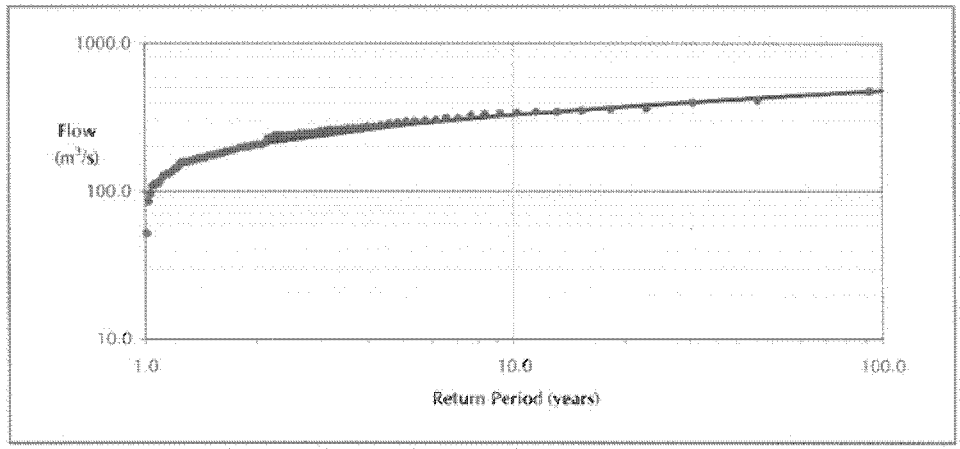


Table 3 & Figure 3 : Flood frequency analysis and curve fitted by the Gumbel probability distribution.

IV. Low Flow Frequency Analysis (Performed using 7-day-average low flow)

Return Period (years)	Flow (m^3/s)
1.005	25.30
1.01	24.00
1.11	18.46
1.25	16.09
2	11.68
5	7.60
10	5.71
20	4.35
50	3.05
100	2.34

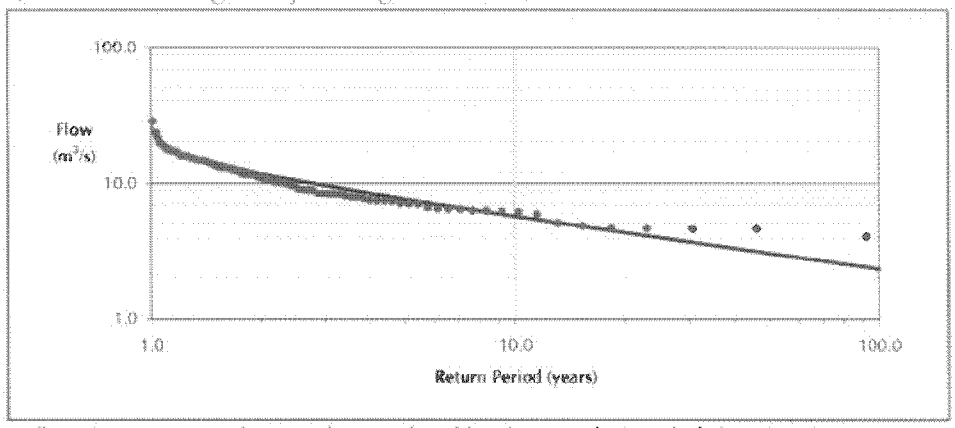


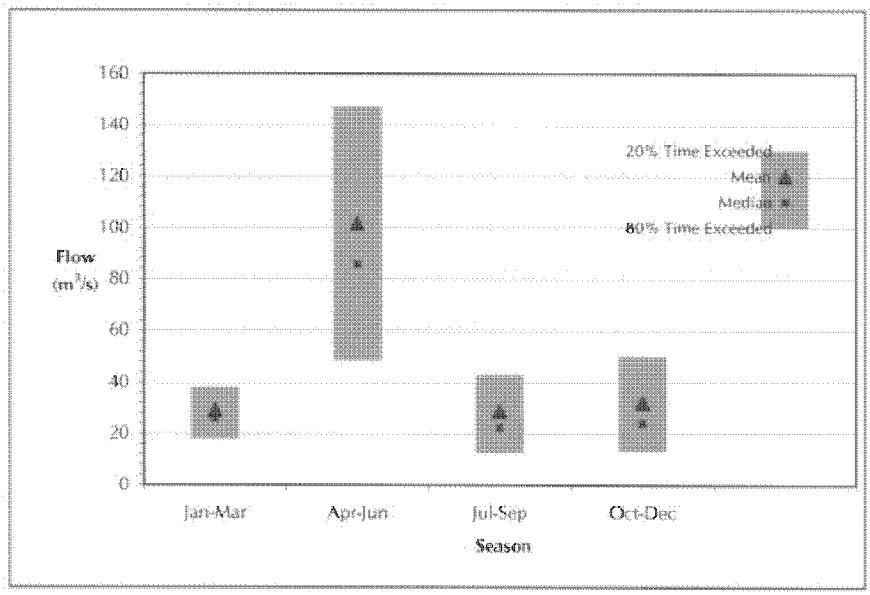
Table 4 & Figure 4 : 7-day-average low flow frequency analysis and curve fitted by the Gumbel probability distribution.

Seasonal :

I. Flow Duration

Table 5 & Figure 5 : Seasonal median flow duration for determining minimum flow targets.

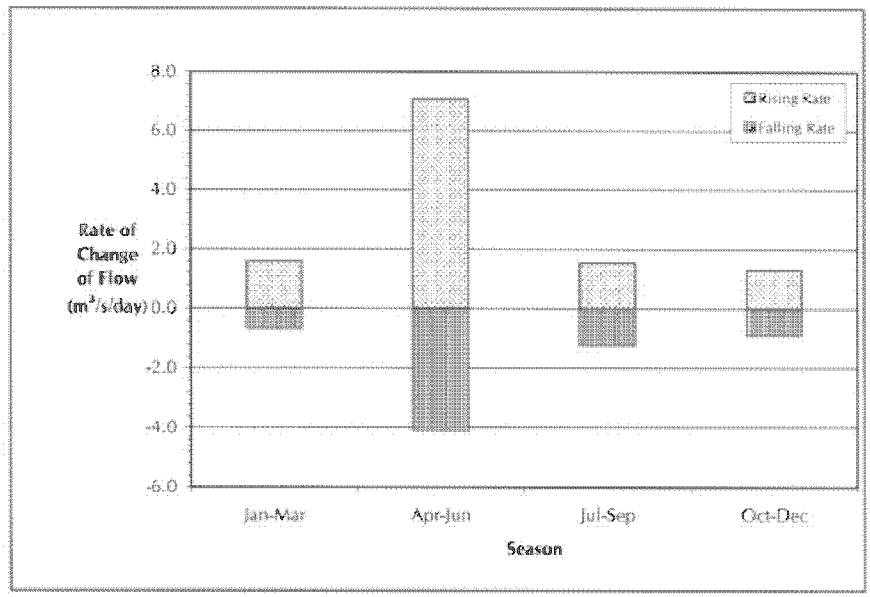
Season	20% Time Exceeded (m^3/s)	Median (m^3/s)	80% Time Exceeded (m^3/s)
Jan-Mar	38.0	25.7	17.9
Apr-Jun	147.1	85.6	48.5
Jul-Sep	42.9	22.3	12.4
Oct-Dec	50.0	24.0	13.2



II. Rate of Change of Flow

Table 6 & Figure 6 : Seasonal rising and falling rates of change of flow for determining ramping rate targets.

Season	Rising Rate ($m^3/s/day$)	Falling Rate ($m^3/s/day$)
Jan-Mar	1.60	-0.67
Apr-Jun	7.09	-4.08
Jul-Sep	1.54	-1.22
Oct-Dec	1.31	-0.89

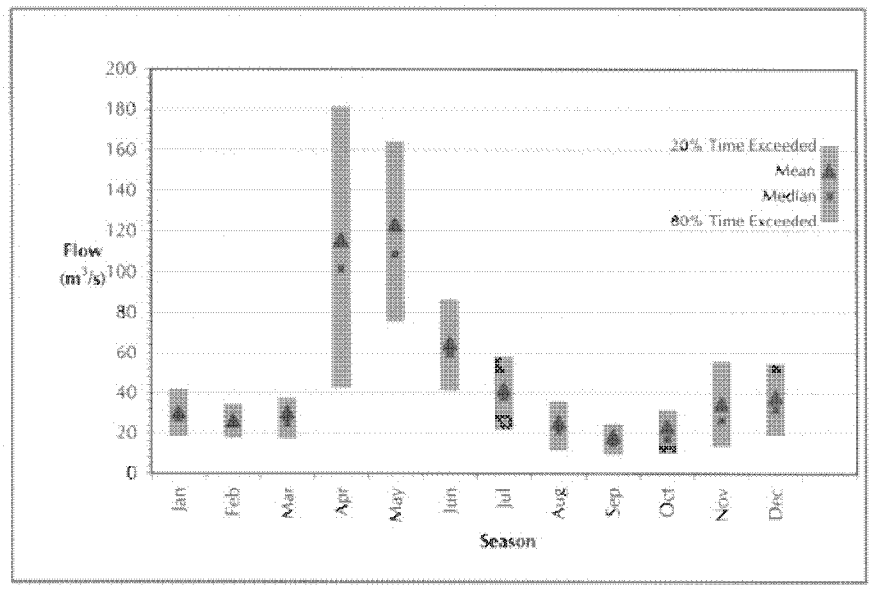


Monthly :

I. Flow Duration

Table 7 & Figure 7 : Monthly median flow duration for determining minimum flow targets.

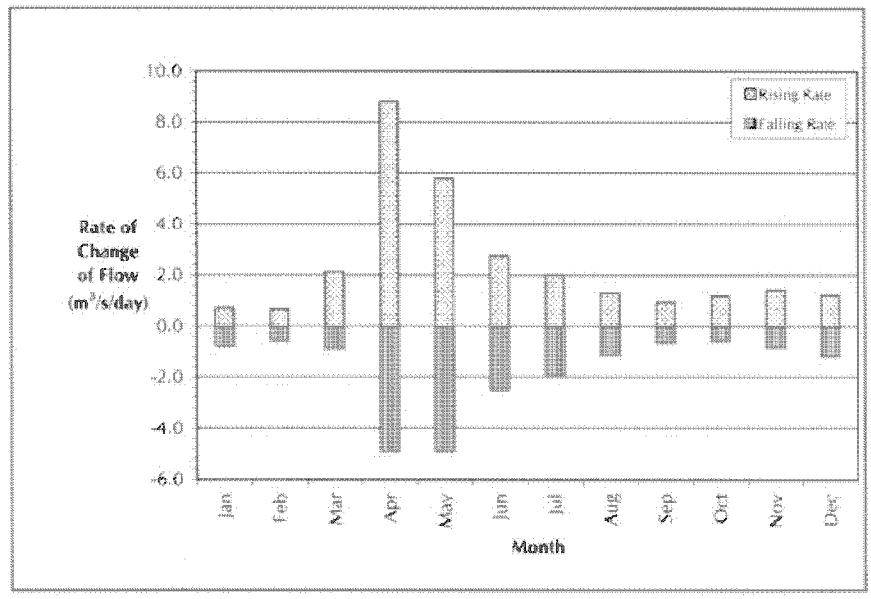
Month	20% Time Exceeded (m^3/s)	Median (m^3/s)	80% Time Exceeded (m^3/s)
Jan	41.9	27.5	18.8
Feb	34.6	24.8	17.9
Mar	37.7	24.8	17.5
Apr	181.5	101.7	42.4
May	164.2	108.8	75.6
Jun	86.4	59.4	41.3
Jul	58.3	38.0	22.0
Aug	36.0	21.0	11.9
Sep	24.6	15.1	9.5
Oct	31.6	17.2	10.0
Nov	55.9	26.3	13.6
Dec	54.7	31.9	19.1



II. Rate of Change of Flow

Table 8 & Figure 8 : Monthly rising and falling rates of change of flow for determining ramping rate targets.

Month	Rising Rate ($m^3/s/day$)	Falling Rate ($m^3/s/day$)
Jan	0.72	-0.76
Feb	0.67	-0.56
Mar	2.13	-0.86
Apr	8.80	-4.88
May	5.78	-4.88
Jun	2.76	-2.49
Jul	2.01	-1.88
Aug	1.30	-1.09
Sep	0.94	-0.63
Oct	1.18	-0.55
Nov	1.44	-0.81
Dec	1.22	-1.14



HALF MILE RAPIDS - PETAWAWA RIVER NATURAL FLOW METRICS DATA SHEET

STATION INFORMATION	
SITE ID	0
RIVER NAME	PETAWAWA RIVER
SITE NAME	HALF MILE RAPIDS
REGION	SOUTHERN
DISTRICT	PEMBROKE
DRAINAGE AREA	3026 km^2
OWNER	SENECA POWER

Flow metrics are provided for the potential subproject site based on the Water Survey of Canada (WSC) gauging station: Petawawa River near Petawawa (02KB001). Metrics are based on WSC flows from 1916 to 2007 (92 years).

The flow records for the site have been synthesized by prorating gauge flows by the ratio of drainage areas. Other flow options could have been included in the data sheet to provide a more complete description of the ranges of streamflow on the river system and for facilitating comparisons between river systems.

Annual (1916 - 2007):

1. Streamflow Time Series

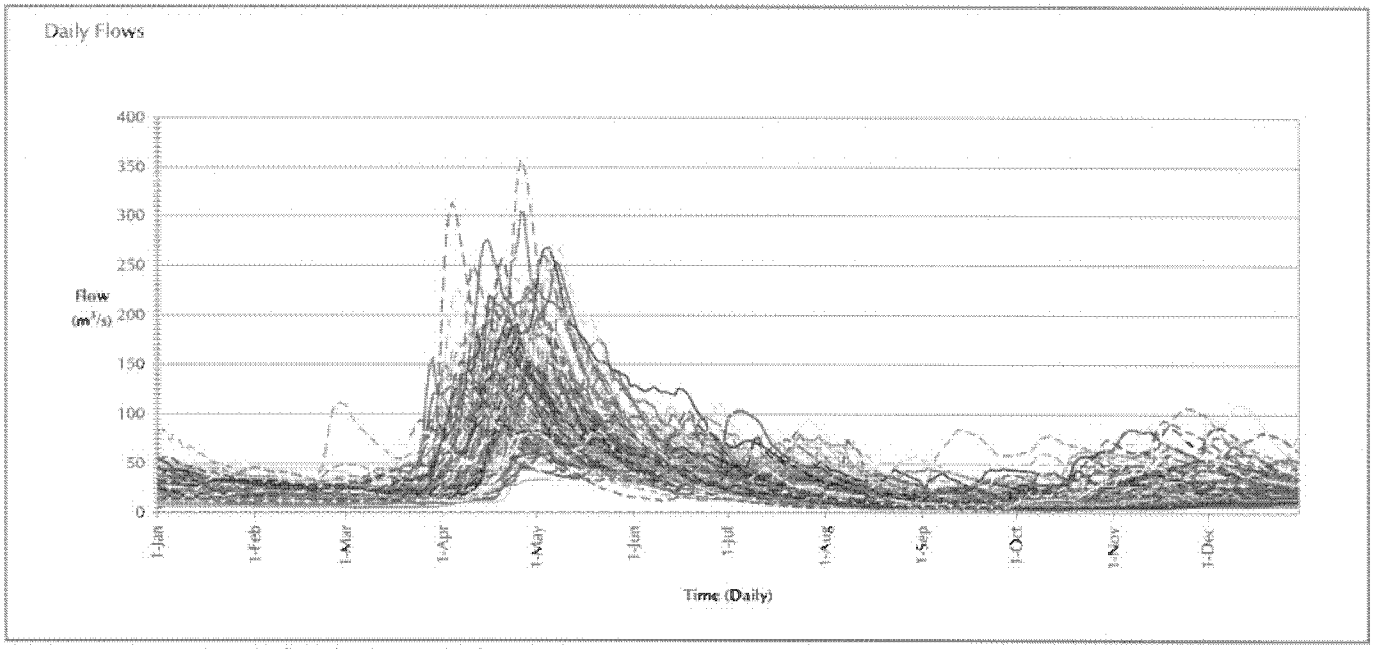


Figure 1 : Annual Daily flow hydrographs from 1916 to 2007.

Table 1 : Annual flow metrics based on 92 years of data.

Descriptive Metric		
Mean Annual Flow	36.38	m^3/s
20% Time Exceeded Flow	51.81	m^3/s
Median Flow	23.47	m^3/s
80% Time Exceeded Flow	12.50	m^3/s
Mean Rising Rate of Change of Flow	2.33	$m^3/s/day$
Mean Falling Rate of Change of Flow	-1.47	$m^3/s/day$
Extreme Low Flow Conditions:		
7-day-avg. low flow in 2-yr return period, $7Q_2$	8.89	m^3/s
7-day-avg. low flow in 10-yr return period, $7Q_{10}$	4.35	m^3/s
7-day-avg. low flow in 20-yr return period, $7Q_{20}$	3.31	m^3/s
Target Metric		
Riparian Flows (Q_2 - Q_{20})	158 -284	m^3/s
Bankfull Flows ($Q_{1.5}$ - $Q_{1.7}$)	136 -146	m^3/s

II. Flow Duration

Time Exceeded %	Flow (m^3/s)
0%	358.1
1%	185.6
5%	112.0
10%	79.8
20%	51.9
30%	38.3
40%	29.8
50%	23.5
60%	19.1
70%	15.7
80%	12.5
90%	9.3
95%	7.0
99%	5.0
100%	3.7

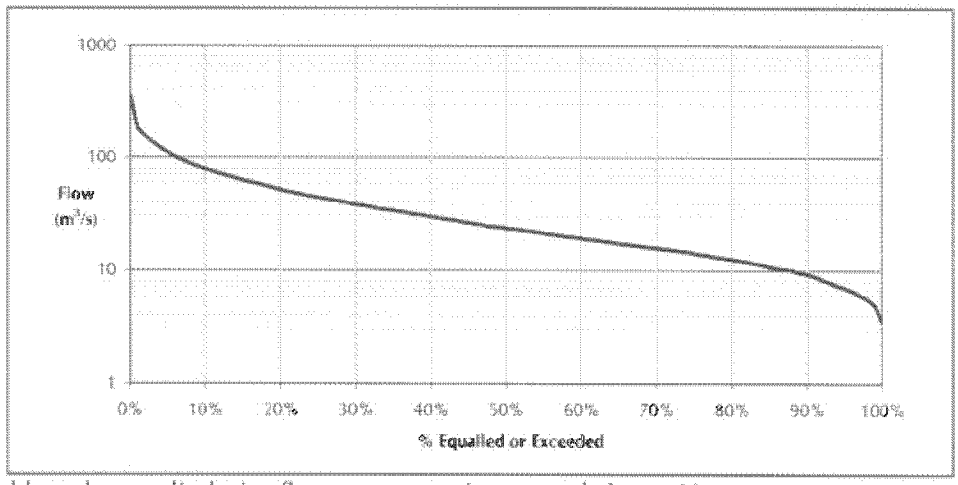


Table 2 & Figure 2 : Flow duration table and curve displaying flow vs. percent time exceeded over 92 years.

III. Flood Frequency Analysis

Return Period (years)	Flow (m^3/s)
1.05	86.6
1.25	117.3
1.5	135.8
1.7	146.1
2	158.0
5	212.6
10	248.8
20	283.5
50	328.4
100	362.1

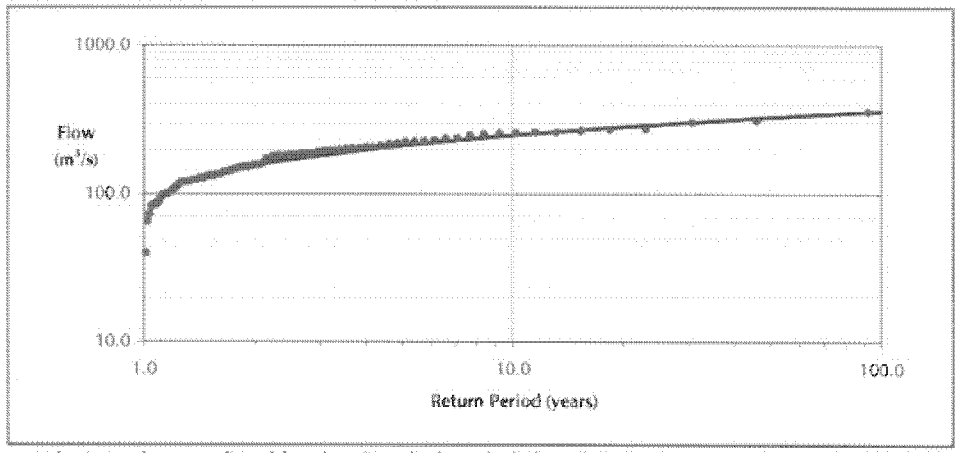


Table 3 & Figure 3 : Flood frequency analysis and curve fitted by the Gumbel probability distribution.

IV. Low Flow Frequency Analysis (Performed using 7-day-average low flow)

Return Period (years)	Flow (m^3/s)
1.005	19.26
1.01	18.27
1.11	14.05
1.25	12.24
2	8.89
5	5.78
10	4.35
20	3.31
50	2.32
100	1.78

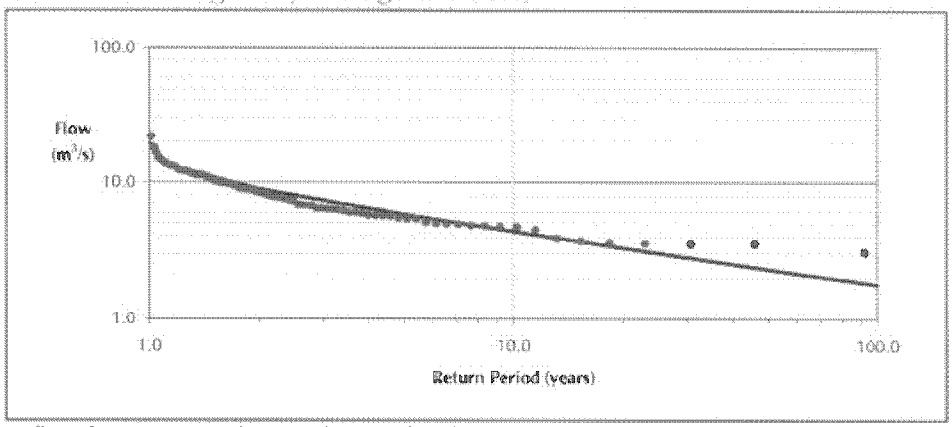


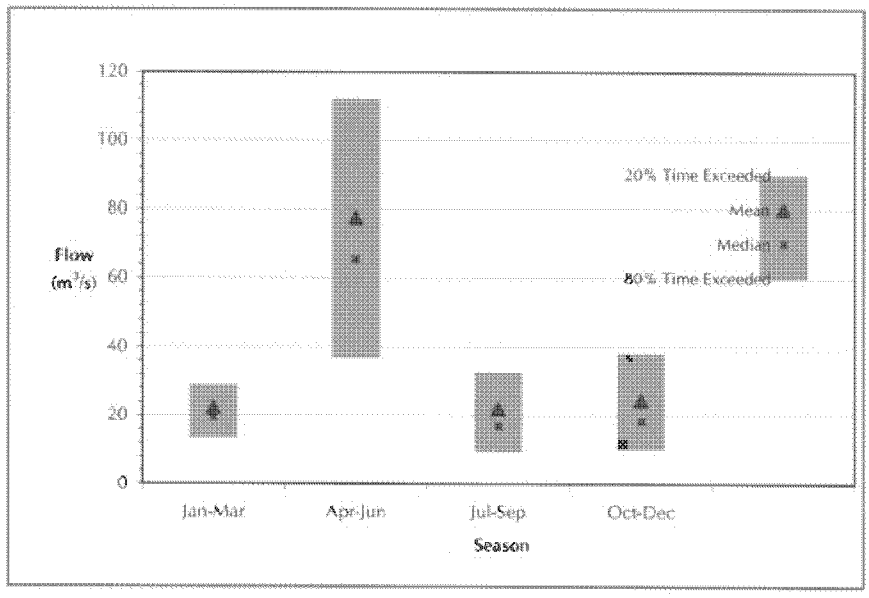
Table 4 & Figure 4 : 7-day-average low flow frequency analysis and curve fitted by the Gumbel probability distribution.

Seasonal :

I. Flow Duration

Table 5 & Figure 5 : Seasonal median flow duration for determining minimum flow targets.

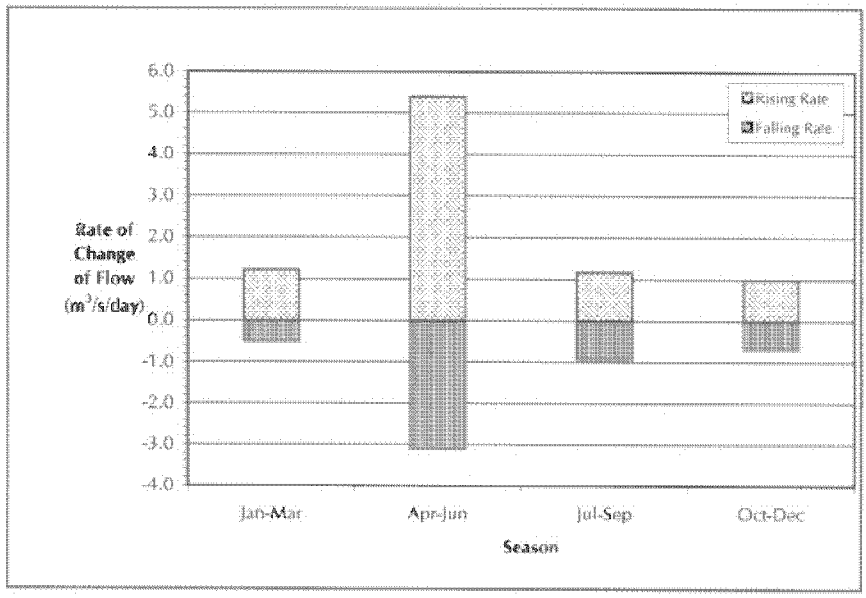
Season	20% Time Exceeded (m^3/s)	Median (m^3/s)	80% Time Exceeded (m^3/s)
Jan-Mar	28.9	19.6	13.6
Apr-Jun	112.0	65.2	36.9
Jul-Sep	32.7	16.9	9.4
Oct-Dec	38.0	18.3	10.0



II. Rate of Change of Flow

Table 6 & Figure 6 : Seasonal rising and falling rates of change of flow for determining ramping rate targets.

Season	Rising Rate ($m^3/s/day$)	Falling Rate ($m^3/s/day$)
Jan-Mar	1.22	-0.51
Apr-Jun	5.40	-3.11
Jul-Sep	1.17	-0.93
Oct-Dec	0.99	-0.67

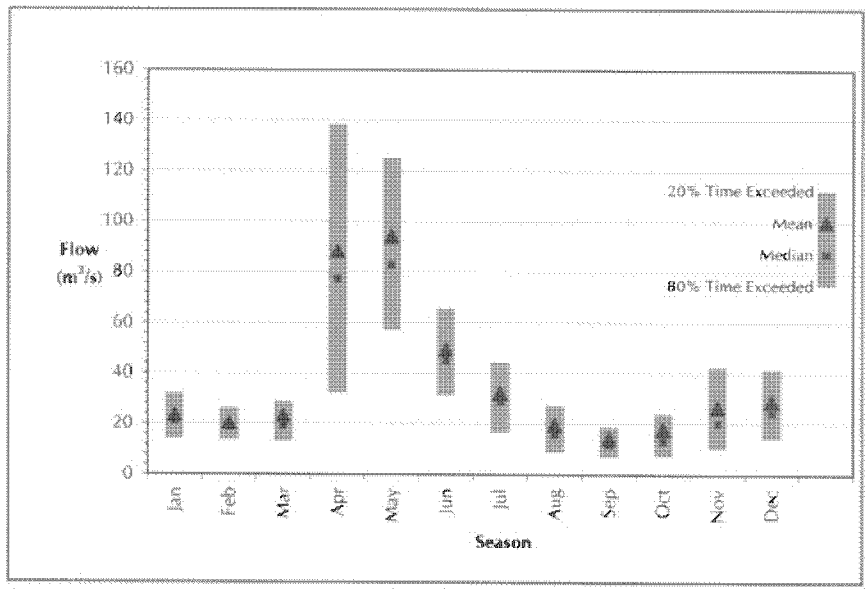


Monthly :

I. Flow Duration

Table 7 & Figure 7 : Monthly median flow duration for determining minimum flow targets.

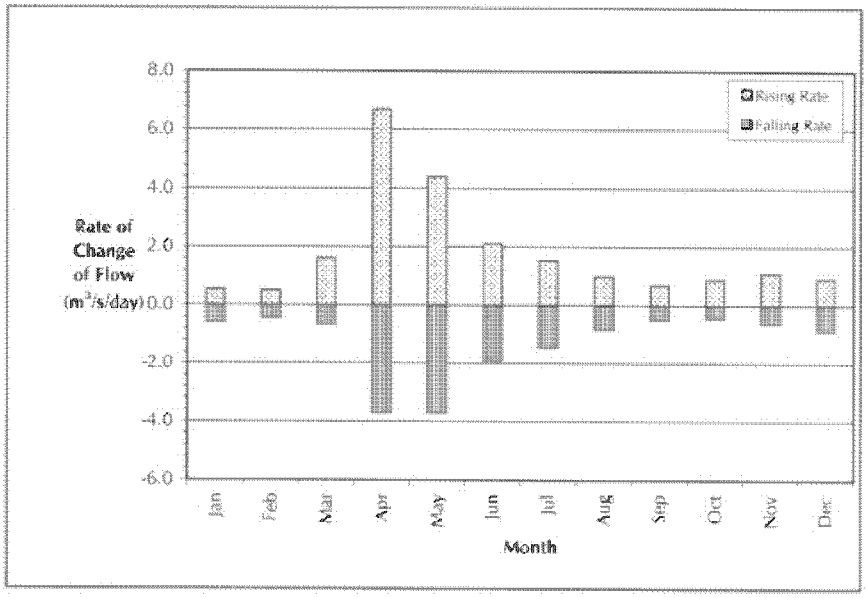
Month	20% Time Exceeded (m^3/s)	Median (m^3/s)	80% Time Exceeded (m^3/s)
Jan	31.9	20.9	14.3
Feb	26.3	18.9	13.6
Mar	28.7	18.9	13.3
Apr	138.2	77.5	32.3
May	125.0	82.8	57.5
Jun	65.8	45.2	31.4
Jul	44.4	28.9	16.7
Aug	27.4	16.0	9.0
Sep	18.7	11.5	7.2
Oct	24.1	13.1	7.6
Nov	42.6	20.0	10.4
Dec	41.6	24.3	14.6



II. Rate of Change of Flow

Table 8 & Figure 8 : Monthly rising and falling rates of change of flow for determining ramping rate targets.

Month	Rising Rate ($m^3/s/day$)	Falling Rate ($m^3/s/day$)
Jan	0.55	-0.58
Feb	0.51	-0.43
Mar	1.62	-0.65
Apr	6.70	-3.71
May	4.40	-3.71
Jun	2.10	-1.90
Jul	1.53	-1.43
Aug	0.99	-0.83
Sep	0.71	-0.48
Oct	0.90	-0.42
Nov	1.10	-0.61
Dec	0.93	-0.87



HATCH

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HATCH™

Patrick W. Gillette
Xeneca Power Development Inc.
March 17, 2008

CAPITAL COST REFERENCES

Project Name	CapEx ($mill)	Size (MW)	Energy (GWh/yr)	By Size ($mill/MW)	By Energy ($mill/GWh)	COD
Peace River Site C	$6,600	900.0		$7.3		
Eastmain-1/Rupert/La Sarre QC	$5,000	893.0	8500	$5.6	$0.59	2012
Sainte-Marguerite-3, QC	$2,500	884.0		$2.8		
Peribonka, QC	$1,300	385.0	2200	$3.1	$0.65	
Rocher-de-Grand-Mere,QC	$500	230.0		$2.2		
Wuskwatim GS, MB	$1,300	200.0	1500	$6.5	$0.87	2012
East Toba / Montrose	$650	196.0	725	$3.3	$0.90	2010
Cnt. Allard / Rap.-d.-Coeurs, QC	$690	138.0	900	$4.9	$0.76	2006
Brilliant Expansion, BC	$205	120.0	500	$1.7	$0.41	2007
Dunvegan, AB	$300	100.0	600	$3.0	$0.50	
Canada Glacier / Howser / East	$240	90.5	341	$2.7	$0.70	2009
Kwalea Energy	$321	85.9	384	$3.7	$0.84	
Anyox & Kitsault River	$185	58.5	242	$3.3	$0.76	2007
Upper Stave	$204	54.7	264	$3.7	$0.77	
Mercier, QC	$140	50.5	282	$2.8	$0.50	2008
Kwoiek Creek	$90	49.9	147	$1.8	$0.61	
Ashlu Creek, BC	$125	49.0	265	$2.6	$0.47	2008
Magpie, QC	$75	40.6	180	$1.8	$0.42	2007
Blue River, BC	$90	36.0	112	$2.2	$0.71	2010
Upper Memquam, BC	$39	25.0	98	$1.6	$0.40	
Umbata Falls	$60	23.0	109	$2.6	$0.55	2008
Island Falls, ON	$71	20.0	93	$3.6	$0.76	2009
Bone Creek, BC	$46	20.0	81	$2.3	$0.57	2008
Kap North, ON, 4 x 5MW	$70	20.0	87	$3.5	$0.80	2012
Songhees Creek, BC	$30	15.0	61	$2.0	$0.49	
Rainy River, BC	$40	15.0	51	$2.7	$0.78	
Crazy Creek, BC	$21	10.0	31	$2.1	$0.68	2010
Chute Bell, QC	$7	10.0	66	$0.7	$0.11	
Lower Clowhom, BC	$20	10.0	48	$2.0	$0.42	
Upper Clowhom, BC	$20	10.0	46	$2.0	$0.44	
Kookipi Creek, BC	$20	10.0	39	$2.0	$0.51	2007
Log Creek, BC	$20	10.0	38	$2.0	$0.53	2007
Clemina Creek, BC	$22	10.0	30	$2.2	$0.73	2009
Tamihi Creek, BC	$20	9.9	52	$2.0	$0.38	2008
Serpentine Creek, BC	$22	9.6	29	$2.3	$0.76	2009
Victoria Lake, BC	$18	9.5	39	$1.9	$0.46	
Upper White R., ON, Site 1.6	$26	7.7	51	$3.4	$0.51	2010
Upper White R., ON, Site 3.2	$22	5.7	37	$3.9	$0.60	2010
English Creek, BC	$10	5.0	19	$2.0	$0.53	2009
Donnacona, QC	$7	4.7		$1.5		
La Pulpe, QC	$6	3.5		$1.8		
Missema, ON	$7	3.2	14	$2.2	$0.51	2004
McLeod Dam, ON	$4	1.0	5	$4.0	$0.80	
Eldorado Reservoir, BC	$2	0.8	4	$2.5	$0.50	
			Average	$3.6		

This table contains a compilation of publicly available information on planned and completed waterpower projects, prepared by ORTECH Power, January, 2008.

Appendix C
Hatch RETScreen

RETScreen

RETScreen was developed using the current price modeling from the Ontario Power Authority ("OPA") Feed-In-Tariff ("FIT") program.

If the Project is awarded a FIT contract the base price will be $13.1 cents per kWh, which will increase by 35% during peak periods ("Run-of-River" will receive the Peak premium 24% of the time annually). There is also a price adder for First Nation participation. The contract is fully indexed to inflation until after commissioning.

Project will likely reach commercial operational in 2014 at which time the Applicant believes the starting average price conservatively will be 16 cents 18 cents per kWh; this assumes a 2% annual inflation rate and considers the potential of the First Nation adder.

The 40 year FIT contract that will be issued will allow for debt leveraging of up to 80%. The long-term interest rate used by the OPA is 7.25%. Both where applied to the RETScreen model.

Capital costs were estimated at between $3 million - $5 million per MW installed. Industry averages (enclosed) are $2.8 million. Hatch estimates the range of $3 million - $5 million per MW installed (enclosed). Applicant and Hatch both feel this range approach is more representative and accurate then attempting to estimate with no detailed design the various cost factors outlined in RETScreen.

Based on similar projects and current market conditions the Project should have an average Capital cost of $4 million per MW installed, which was used in this analysis after discussions with Hatch. Overall the Project is extremely viable up to $5.5 million per MW installed and technical viable up to $6 million per MW installed.

Analysis:
The following variables where used in the RETScreen Analysis:

- $4 million per MW average capital cost with a water control structure.
- $3 million subtracted from capital cost estimate if no water control structure is built.
- Q95 operations.
- Q80 operations.
- 7.25% interest rate.
- 40 year debt term.
- Inflation at a 2% average.

Operations:
There is no way to accurately gauge operations using RETScreen; it only allows for a yearly average of residual flows.

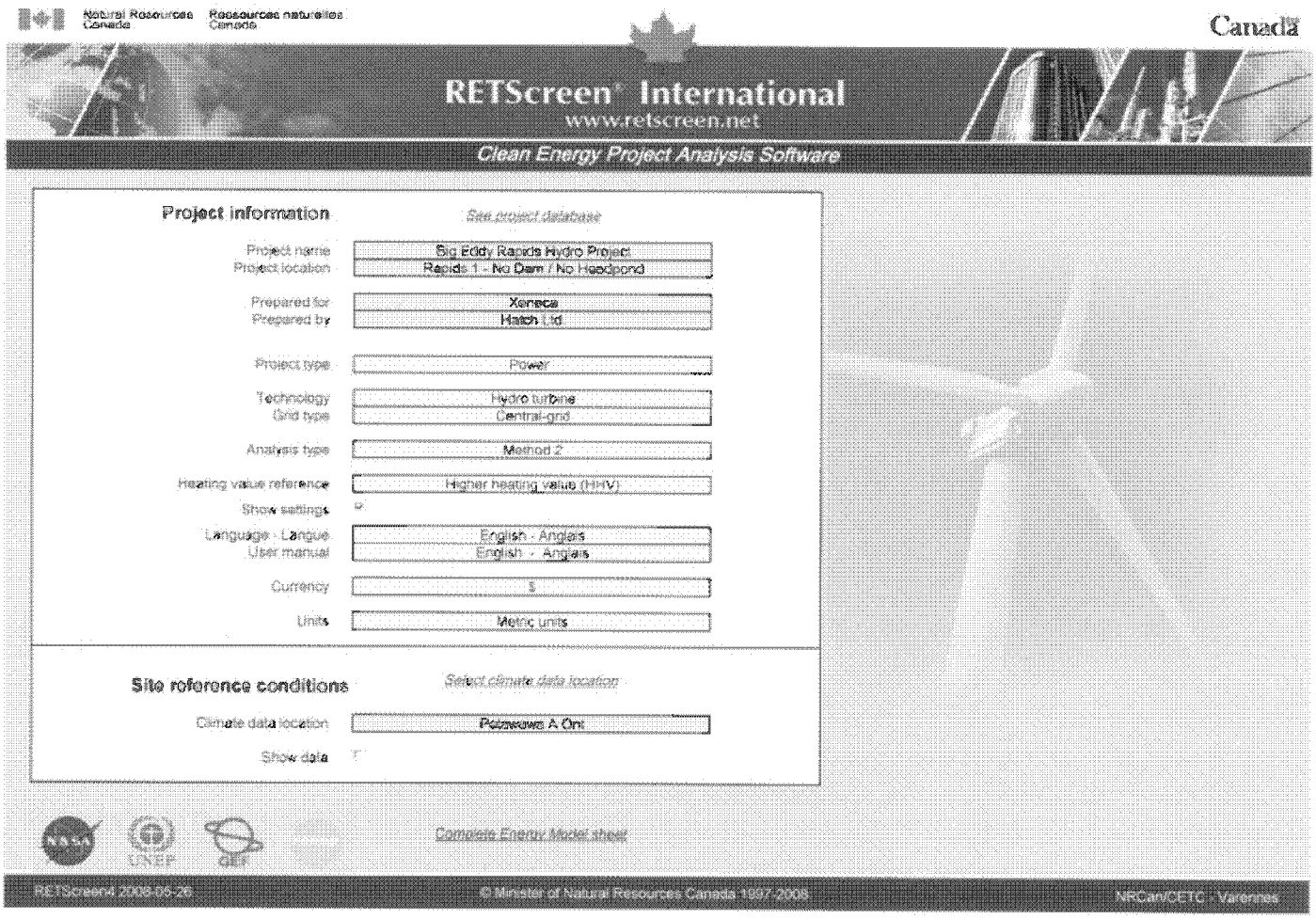
Daily and weekly operations will vary depending on

- Compensatory flows.
- Use of a water-control structure.
- Water allocations for recreational users and tourism and it variability during the year.

Q95 and Q80 were used to reflect this potential variability.

Overall, the Applicant is satisfied this is a financially viable Project as outlined in the enclosed RETScreens.

Big Eddy at $160 MWh, with dam, at Q95 compensatory flow



RETScreen Energy Model - Power project

Show alternative units

Proposed case power system

Technology		Hydro turbine	
Analysis type		Method 1 Method 2	
Resource assessment			
Proposed project		Run-of-river	
Hydrology method		User-defined	
Gross head	m	9.0	
Minimum tailwater effect	m	0.50	
Residual flow	m³/s	9.200	
Percent time firm flow available	%	95.0%	
Firm flow	m³/s	0.00	
Hydro turbine			
Design flow	m³/s	55.000	
Type		Kaplan	See product database
Turbine efficiency		Standard	
Number of turbines		1	
Manufacturer			
Model			
Design coefficient		4.5	
Efficiency adjustment	%	0.0%	
Turbine peak efficiency	%	91.7%	
Flow at peak efficiency	m³/s	41.3	
Turbine efficiency at design flow	%	91.3%	Show flows

%	Flow m³/s	Turbine efficiency	Number of turbines	Combined efficiency	Show flows
0%	470.40	0.00	0	0.00	
5%	147.10	0.00	1	0.00	
10%	104.80	0.00	1	0.00	
15%	86.50	0.08	1	0.08	
20%	68.24	0.42	1	0.42	
25%	59.30	0.64	1	0.64	
30%	50.40	0.77	1	0.77	
35%	44.80	0.84	1	0.84	
40%	39.10	0.88	1	0.88	
45%	35.00	0.90	1	0.90	
50%	30.80	0.91	1	0.91	
55%	28.00	0.92	1	0.92	
60%	25.10	0.92	1	0.92	
65%	22.90	0.92	1	0.92	
70%	20.70	0.92	1	0.92	
75%	18.80	0.92	1	0.92	
80%	16.40	0.92	1	0.92	
85%	14.30	0.92	1	0.92	
90%	12.20	0.92	1	0.92	
95%	9.20	0.92	1	0.92	
100%	6.80	0.91	1	0.91	

Maximum hydraulic losses	%	3.0%	
Miscellaneous losses	%	2.5%	
Generator efficiency	%	96.0%	
Availability	%	100.0%	
Summary			Firm
Power capacity	kW	4,130	0
Available flow adjustment factor		1.00	
Capacity factor	%	45.8%	
Electricity exported to grid	MWh	16,556	
Electricity export rate	$/MWh	180.00	

RETScreen Cost Analysis - Power project

Settings

○ Method 1	◉ Notes/Range			
○ Method 2	○ Second currency	Notes/Range	None	
	○ Cost allocation			

Initial costs (credits)	Unit	Quantity	Unit cost	Amount	Relative costs
Feasibility study					
Feasibility study	cost			$ -	
Sub-total:				$ -	0.0%
Development					
Development	cost			$ -	
Sub-total:				$ -	0.0%
Engineering					
Engineering	cost			$ -	
Sub-total:				$ -	0.0%
Power system					
Hydro turbine	kW	4,129.73		$ -	
Road construction	km			$ -	
Transmission line	km			$ -	
Substation	project			$ -	
Energy efficiency measures	project			$ -	
User-defined	cost	1	$ 16,518,937	$ 16,518,937	
				$ -	
Sub-total:				$ 16,518,937	100.0%
Balance of system & miscellaneous					
Spare parts	%			$ -	
Transportation	project			$ -	
Training & commissioning	p-d			$ -	
User-defined	cost			$ -	
Contingencies	%		$ 16,518,937	$ -	
Interest during construction			$ 16,518,937	$ -	
Sub-total:		Enter number of months		$ -	0.0%
Total initial costs				$ 16,518,937	100.0%

Annual costs (credits)	Unit	Quantity	Unit cost	Amount
O&M				
Parts & labour	project			$ -
User-defined	cost	1	$ 300,000	$ 300,000
Contingencies	%		$ 300,000	$ -
Sub-total:				$ 300,000

Periodic costs (credits)	Unit	Year	Unit cost	Amount
User-defined	cost			$ -
Turbine Overall @ Year 20		20	$ 500,000	$ 500,000
End of project life	cost			$ -

RETScreen Financial Analysis - Power project

Financial parameters

General

Fuel cost escalation rate	%	0.4%
Inflation rate	%	2.0%
Discount rate	%	8.0%
Project life	yr	80

Finance

Incentives and grants	$	0
Debt ratio	%	75.0%
Debt	$	12,389,203
Equity	$	4,129,734
Debt interest rate	%	7.25%
Debt term	yr	40
Debt payments	$/yr	956,393

Income tax analysis

Annual income

Electricity export income

Electricity exported to grid	MWh	16,556
Electricity export rate	$/MWh	160.00
Electricity export income	$	2,648,933
Electricity export escalation rate	%	0.5%

GHG reduction income

Customer premium income (rebate)

Other income (cost)

Clean Energy (CE) production income

Project costs and savings/income summary

Initial costs

Power system	100.0%	$	16,518,937
Balance of system & misc	0.0%	$	0
Total initial costs	100.0%	$	16,518,937

Annual costs and debt payments

O&M	$	300,000
Fuel cost - proposed case	$	0
Debt payments - 40 yrs	$	956,393
Total annual costs	$	1,256,393

Periodic costs (credits)

Turbine Overal @ Year 20 - 20 yrs	$	500,000

Annual savings and income

Fuel cost - base case	$	0
Electricity export income	$	2,648,933
Total annual savings and income	$	2,648,933

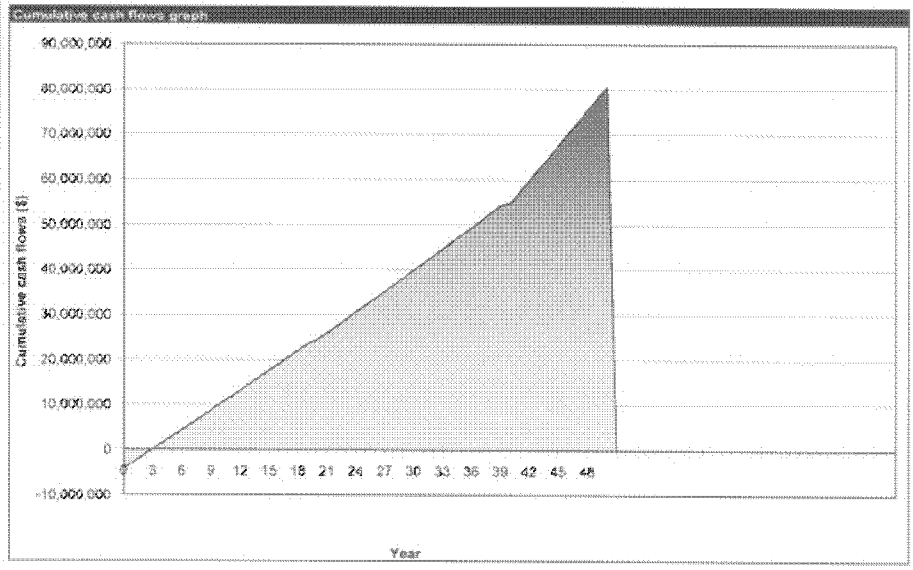
Financial viability

Pre-tax IRR - equity	%	34.4%
Pre-tax IRR - assets	%	8.8%
After-tax IRR - equity	%	34.4%
After-tax IRR - assets	%	8.8%
Simple payback	yr	7.0
Equity payback	yr	2.9
Net Present Value (NPV)	$	13,972,648
Annual life cycle savings	$/yr	1,120,185
Benefit-Cost (B-C) ratio		4.38
Debt service coverage		2.46
Energy production cost	$/MWh	98.25

Yearly cash flows

Year #	Pre-tax $	After-tax $	Cumulative $
0	-4,129,734	-4,129,734	-4,129,734
1	1,399,785	1,399,785	-2,729,949
2	1,406,976	1,406,976	-1,322,974
3	1,414,111	1,414,111	91,137
4	1,421,188	1,421,188	1,512,325
5	1,428,205	1,428,205	2,940,529
6	1,435,159	1,435,159	4,375,689
7	1,442,049	1,442,049	5,817,738
8	1,448,873	1,448,873	7,266,611
9	1,455,626	1,455,626	8,722,237
10	1,462,309	1,462,309	10,184,546
11	1,468,917	1,468,917	11,653,462
12	1,475,448	1,475,448	13,128,910
13	1,481,900	1,481,900	14,610,810
14	1,488,270	1,488,270	16,099,080
15	1,494,556	1,494,556	17,593,636
16	1,500,754	1,500,754	19,094,391
17	1,506,863	1,506,863	20,601,253
18	1,512,878	1,512,878	22,114,131
19	1,518,797	1,518,797	23,632,928
20	781,644	781,644	24,414,572
21	1,530,396	1,530,396	25,944,967
22	1,535,949	1,535,949	27,480,916
23	1,541,453	1,541,453	29,022,369
24	1,546,847	1,546,847	30,569,156
25	1,552,125	1,552,125	32,121,281
26	1,557,285	1,557,285	33,678,566
27	1,562,323	1,562,323	35,240,888
28	1,567,235	1,567,235	36,808,124
29	1,572,019	1,572,019	38,380,143
30	1,576,670	1,576,670	39,956,812
31	1,581,184	1,581,184	41,537,996
32	1,585,558	1,585,558	43,123,554
33	1,589,787	1,589,787	44,713,341
34	1,593,868	1,593,868	46,307,209
35	1,597,796	1,597,796	47,905,005
36	1,601,567	1,601,567	49,506,572
37	1,605,178	1,605,178	51,111,750
38	1,608,623	1,608,623	52,720,372
39	1,611,897	1,611,897	54,332,270
40	510,978	510,978	54,843,247
41	2,574,311	2,574,311	57,417,559
42	2,577,048	2,577,048	59,994,607
43	2,579,596	2,579,596	62,574,203
44	2,581,949	2,581,949	65,156,152
45	2,584,104	2,584,104	67,740,256
46	2,586,054	2,586,054	70,326,310
47	2,587,795	2,587,795	72,914,105
48	2,589,320	2,589,320	75,503,425
49	2,590,625	2,590,625	78,094,049
50	2,591,703	2,591,703	80,685,753

Cumulative cash flows graph



RETScreen Tools - Power project

Settings

☐ As fired fuel	☐ Ground heat exchanger	☐ User-defined fuel - gas
☐ Biogas	☐ Heat rate	☐ User-defined fuel - solid
☐ Building envelope properties	☐ Heating value & fuel rate	☐ Water & steam
☐ Appliances & equipment	☑ Hydro formula costing method	☐ Water pumping
☐ Electricity rate - monthly	☐ Landfill gas	☐ Window properties
☐ Electricity rate - time of use	☐ Unit conversion	☐ Custom 1
☐ GHG equivalence	☐ User-defined fuel	☐ Custom 2

Hydro formula costing method

Country		Canada	
Cold climate	yes/no	Yes	
Frost days at site	day	120	
Design flow	m³/s	55	55
Gross head	m	9	9
Number of turbines	turbine	1	1
Type		Kaplan	Kaplan
Flow per turbine	m³/s	55.00	
Turbine runner diameter per unit	m	2.93	
Facility type		Small	Small
Existing dam	yes/no	No	
New dam crest length	m	100	
Rock at dam site	yes/no	Yes	
Maximum hydraulic losses	%	3.0%	3.0%
Miscellaneous losses	%	2.0%	
☐ **Road construction**			
☐ **Tunnel**			
☐ **Canal**			
☐ **Penstock**			
Distance to borrow pits	km		
Transmission line			
Grid type		Central-grid	Central-grid
Length	km		
Difficulty of terrain			
Voltage	kV		

See maps

Initial costs (credits)	Amount $	Adjustment factor	Amount $	Relative costs
Feasibility study	0		0	
Development	0		0	
Engineering	664,000		0	
Power system				
Hydro turbine	7,019,000		0	
Road construction	0		0	
Transmission line	0		0	
Substation	0		0	
Balance of system & miscellaneous				
Penstock	0		0	
Canal	0		0	
Tunnel	0		0	
Other	0		0	
Sub-total	0		0	
Total initial costs	**7,683,000**		**0**	

Petawawa Green Energy Development Big Eddy Hydropower Development WSS
Site Release WSR 2008-02
Site ID #2KB21

Xeneca Power Development Inc.

Big Eddy at $160 MWh, with dam, at Q80 compensatory flow

Natural Resources Canada | Ressources naturelles Canada

Canada

RETScreen® International

www.retscreen.net

Clean Energy Project Analysis Software

Project information

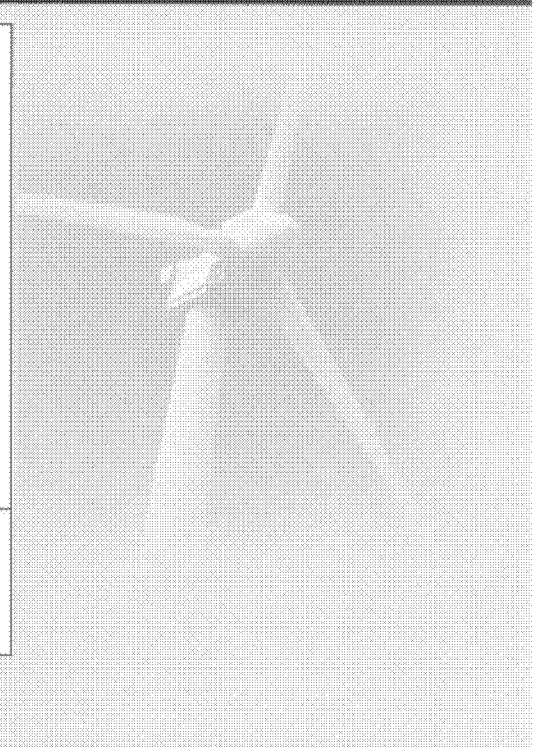
See project database

Project name	Big Eddy Rapids Hydro Project
Project location	Rapids 1 - No Dam / No Headpond
Prepared for	Xeratica
Prepared by	Heaton Ltd
Project type	Power
Technology	Hydro turbine
Grid type	Central-grid
Analysis type	Method 2
Heating value reference	Higher heating value (HHV)
Show settings	☑
Language - Langue	English - Anglais
User manual	English - Anglais
Currency	$
Units	Metric units

Site reference conditions

Select climate data location

Climate data location	Pelawawa A Ont
Show data	☐



Complete Energy Model sheet

RETScreen Energy Model - Power project

Show alternative units

Proposed case power system

Technology		Hydro turbine
Analysis type		○ Method 1 ● Method 2

Resource assessment

Proposed project		Run-of-river
Hydrology method		User-defined
Gross head	m	8.5
Maximum tailwater effect	m	0.50
Residual flow	m³/s	19.400
Percent time firm flow available	%	95.0%
Firm flow	m³/s	0.00

Hydro turbine

Design flow	m³/s	55.000
Type		Kaplan
Turbine efficiency		Standard
Number of turbines		1
Manufacturer		
Model		
Design coefficient		4.5
Efficiency adjustment	%	0.0%
Turbine peak efficiency	%	91.7%
Flow at peak efficiency	m³/s	41.3
Turbine efficiency at design flow	%	91.3%

See product database

Show flows

%	Flow m³/s	Turbine efficiency	Number of turbines	Combined efficiency
0%	470.40	0.00	0	0.00
5%	147.15	0.00	1	0.00
10%	104.80	0.00	1	0.00
15%	88.45	0.06	1	0.06
20%	68.20	0.42	1	0.42
25%	58.50	0.64	1	0.64
30%	50.40	0.77	1	0.77
35%	44.80	0.84	1	0.84
40%	39.10	0.88	1	0.88
45%	35.00	0.90	1	0.90
50%	30.80	0.91	1	0.91
55%	28.00	0.92	1	0.92
60%	25.10	0.92	1	0.92
65%	22.90	0.92	1	0.92
70%	20.70	0.92	1	0.92
75%	18.80	0.92	1	0.92
80%	16.40	0.92	1	0.92
85%	14.50	0.92	1	0.92
90%	12.20	0.92	1	0.92
95%	9.20	0.92	1	0.92
100%	4.80	0.91	1	0.91

Show flows

Maximum hydraulic losses	%	2.0%
Miscellaneous losses	%	2.0%
Generator efficiency	%	98.0%
Availability	%	100.0%

Summary

			Firm
Power capacity	kW	4,130	0
Available flow adjustment factor		1.00	
Capacity factor	%	37.3%	
Electricity exported to grid	MWh	13,451	
Electricity export rate	$/MWh	160.00	

RETScreen Cost Analysis - Power project

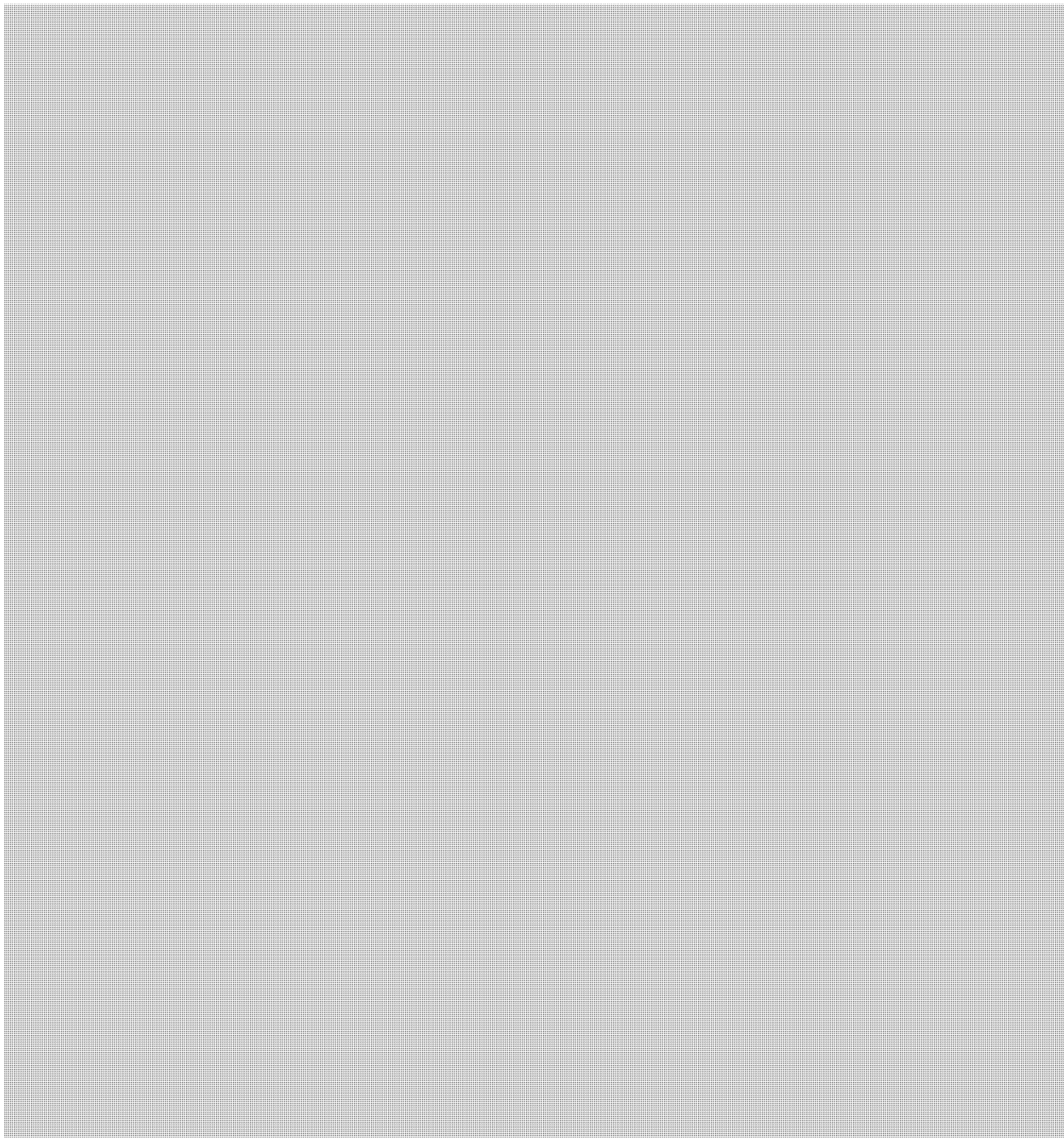
Settings				
Method 1	Notes/Range			
Method 2	Second currency	Notes/Range	None	
	Cost allocation			

Initial costs (credits)	Unit	Quantity	Unit cost	Amount	Relative costs
Feasibility study					
Feasibility study	cost			$ -	
Sub-total:				$ -	0.0%
Development					
Development	cost			$ -	
Sub-total:				$ -	0.0%
Engineering					
Engineering	cost			$ -	
Sub-total:				$ -	0.0%
Power system					
Hydro turbine	kW	4,129.73		$ -	
Road construction	km			$ -	
Transmission line	km			$ -	
Substation	project			$ -	
Energy efficiency measures	project			$ -	
User-defined	cost	1	$ 16,518,937	$ 16,518,937	
				$ -	
Sub-total:				$ 16,518,937	100.0%
Balance of system & miscellaneous					
Spare parts	%			$ -	
Transportation	project			$ -	
Training & commissioning	p-d			$ -	
User-defined	cost			$ -	
Contingencies	%		$ 16,518,937	$ -	
Interest during construction			$ 16,518,937	$ -	
Sub-total:		Enter number of months		$ -	0.0%
Total initial costs				$ 16,518,937	100.0%

Annual costs (credits)	Unit	Quantity	Unit cost	Amount
O&M				
Parts & labour	project			$ -
User-defined	cost	1	$ 300,000	$ 300,000
Contingencies	%		$ 300,000	$ -
Sub-total:				$ 300,000

Periodic costs (credits)	Unit	Year	Unit cost	Amount
User-defined	cost			$ -
Turbine Overall @ Year 20		20	$ 500,000	$ 500,000
End of project life	cost			$ -

2007-09-27



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RETScreen Tools - Power project

Settings

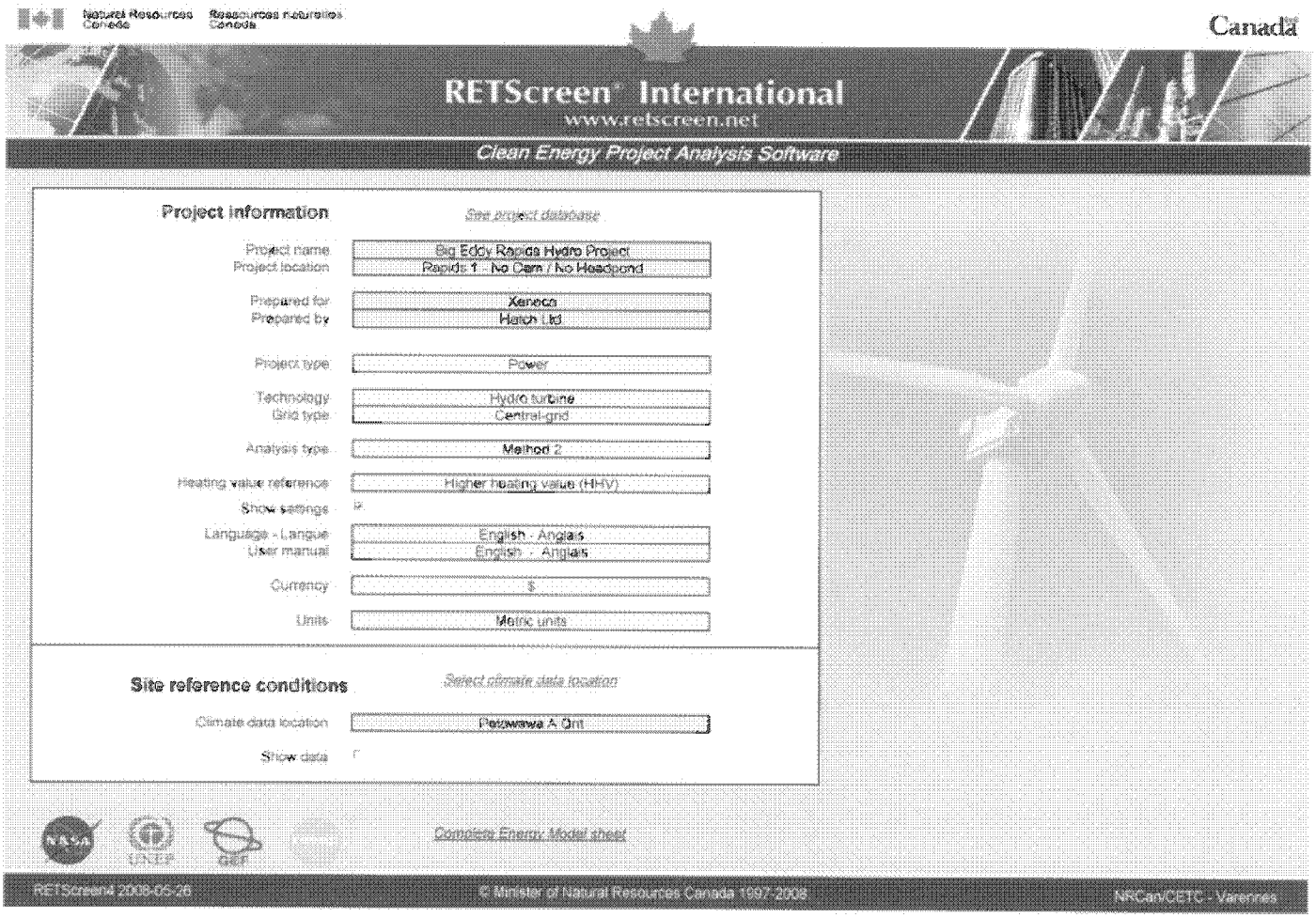
☐ As fired fuel	☐ Ground heat exchanger	☐ User-defined fuel - gas
☐ Biogas	☐ Heat rate	☐ User-defined fuel - solid
☐ Building envelope properties	☐ Heating value & fuel rate	☐ Water & steam
☐ Appliances & equipment	☑ Hydro formula costing method	☐ Water pumping
☐ Electricity rate - monthly	☐ Landfill gas	☐ Window properties
☐ Electricity rate - time of use	☐ Unit conversion	☐ Custom 1
☐ GHG equivalence	☐ User-defined fuel	☐ Custom 2

Hydro formula costing method

Country		Canada		
Cold climate	yes/no	Yes		
Frost days at site	day	120		See maps
Design flow	m³/s	55	55	
Gross head	m	9	9	
Number of turbines	turbine	1	1	
Type		Kaplan	Kaplan	
Flow per turbine	m³/s	55.00		
Turbine runner diameter per unit	m	2.93		
Facility type		Small	Small	
Existing dam	yes/no	No		
New dam crest length	m	100		
Rock at dam site	yes/no	Yes		
Maximum hydraulic losses	%	3.0%	3.0%	
Miscellaneous losses	%	2.0%		
☐ **Road construction**				
☐ **Tunnel**				
☐ **Canal**				
☐ **Penstock**				
Distance to borrow pits	km			
Transmission line				
Grid type		Central-grid	Central-grid	
Length	km			
Difficulty of terrain				
Voltage	kV			

Initial costs (credits)	Amount $	Adjustment factor	Amount $	Relative costs
Feasibility study	0		0	
Development	0		0	
Engineering	664,000		0	
Power system				
Hydro turbine	7,019,000		0	
Road construction	0		0	
Transmission line	0		0	
Substation	0		0	
Balance of system & miscellaneous				
Penstock	0		0	
Canal	0		0	
Tunnel	0		0	
Other	0		0	
Sub-total	0		0	
Total initial costs	**7,683,000**		**0**	

Big Eddy at $160 MWh, without dam, at Q95 compensatory flow



RETScreen Energy Model - Power project

Show alternative units

Proposed case power system

Technology		Hydro turbine
Analysis type		Method 1 / Method 2
Resource assessment		
Proposed project		Run-of-river
Hydrology method		User-defined
Gross head	m	7.0
Maximum tailwater effect	m	0.50
Residual flow	m³/s	9.206
Percent time firm flow available	%	95.0%
Firm flow	m³/s	0.00
Hydro turbine		
Design flow	m³/s	55.000
Type		Kaplan
Turbine efficiency		Standard
Number of turbines		1
Manufacturer		
Model		
Design coefficient		4.5
Efficiency adjustment	%	0.0%
Turbine peak efficiency	%	90.6%
Flow at peak efficiency	m³/s	41.3
Turbine efficiency at design flow	%	90.2%

See product database

Show flows

%	Flow m³/s	Turbine efficiency	Number of turbines	Combined efficiency
0%	470.40	0.00	0	0.00
5%	147.10	0.00	1	0.00
10%	184.60	0.00	1	0.00
15%	86.50	0.07	1	0.07
20%	88.25	0.41	1	0.41
25%	58.35	0.65	1	0.63
30%	50.40	0.75	1	0.75
35%	44.80	0.83	1	0.83
40%	39.15	0.87	1	0.87
45%	35.00	0.89	1	0.89
50%	30.80	0.90	1	0.90
55%	28.05	0.90	1	0.90
60%	25.10	0.91	1	0.91
65%	22.90	0.91	1	0.91
70%	20.70	0.91	1	0.91
75%	18.85	0.91	1	0.91
80%	16.40	0.91	1	0.91
85%	14.30	0.91	1	0.91
90%	12.20	0.91	1	0.91
95%	9.20	0.90	1	0.90
100%	4.20	0.90	1	0.90

Show flows

Maximum hydraulic losses	%	5.0%
Miscellaneous losses	%	2.0%
Generator efficiency	%	98.0%
Availability	%	100.0%

Summary			Firm
Power capacity	kW	3,172	0
Available flow adjustment factor		1.00	
Capacity factor	%	45.7%	
Electricity exported to grid	MWh	12,704	
Electricity export rate	$/MWh	150.00	

2007-08-27
RETScreen 4.0 Power.xls

RETScreen Cost Analysis - Power project

Settings

○ Method 1	◉ Notes/Range				
○ Method 2	○ Second currency	Notes/Range	None		
	○ Cost allocation				

Initial costs (credits)	Unit	Quantity	Unit cost	Amount	Relative costs
Feasibility study					
Feasibility study	cost			$ -	
Sub-total:				$ -	0.0%
Development					
Development	cost			$ -	
Sub-total:				$ -	0.0%
Engineering					
Engineering	cost			$ -	
Sub-total:				$ -	0.0%
Power system					
Hydro turbine	kW	3,172.26		$ -	
Road construction	km			$ -	
Transmission line	km			$ -	
Substation	project			$ -	
Energy efficiency measures	project			$ -	
User-defined	cost	1	$ 9,689,021	$ 9,689,021	
				$ -	
Sub-total:				$ 9,689,021	100.0%
Balance of system & miscellaneous					
Spare parts	%			$ -	
Transportation	project			$ -	
Training & commissioning	p-d			$ -	
User-defined	cost			$ -	
Contingencies	%		$ 9,689,021	$ -	
Interest during construction			$ 9,689,021	$ -	
Sub-total:		Enter number of months		$ -	0.0%
Total initial costs				$ 9,689,021	100.0%

Annual costs (credits)	Unit	Quantity	Unit cost	Amount
O&M				
Parts & labour	project			$ -
User-defined	cost	1	$ 300,000	$ 300,000
Contingencies	%		$ 300,000	$ -
Sub-total:				$ 300,000

Periodic costs (credits)	Unit	Year	Unit cost	Amount
User-defined	cost			$ -
Turbine Overall @ Year 20		20	$ 500,000	$ 500,000
End of project life	cost			$ -

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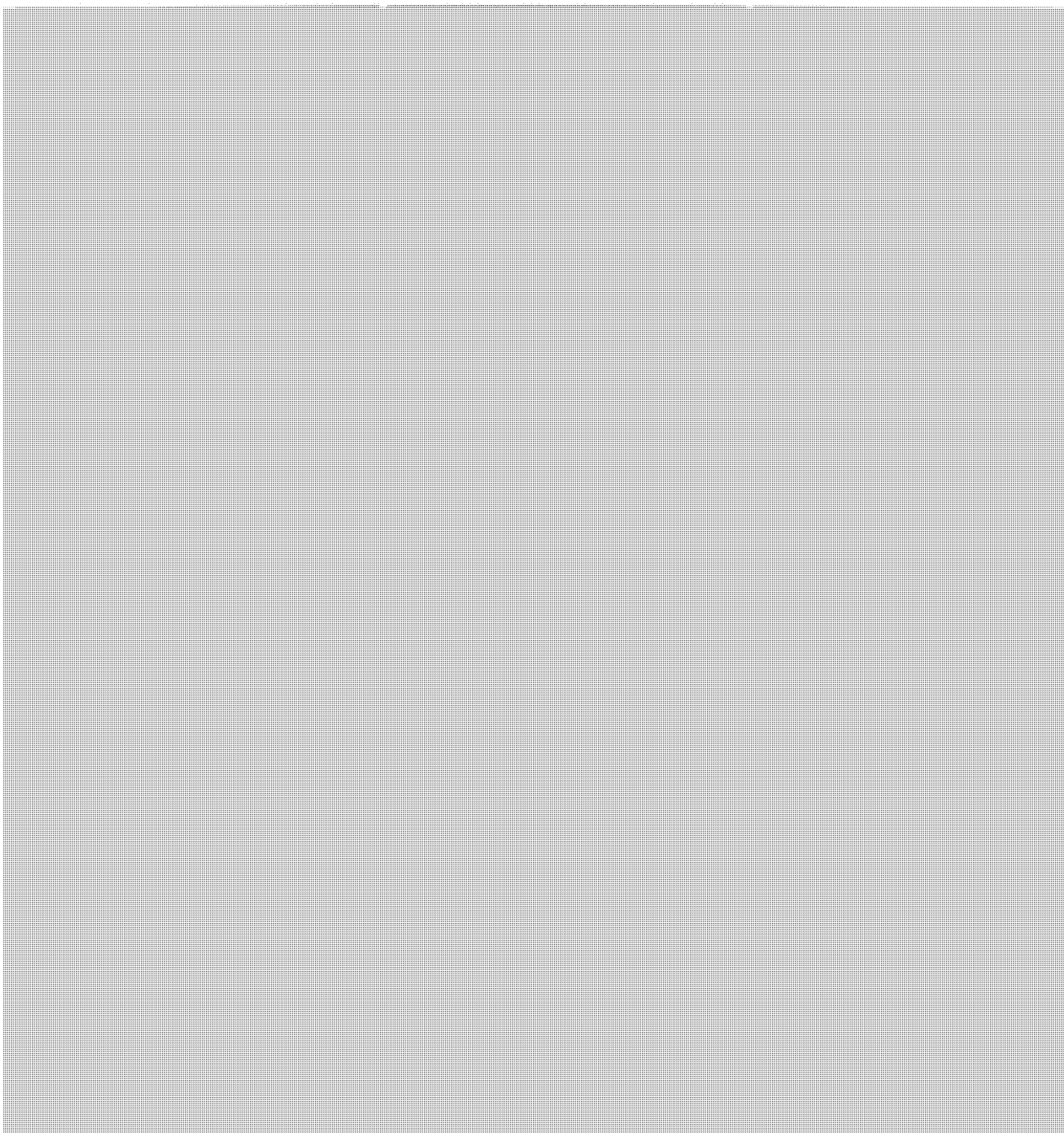


Settings

As fired fuel	Ground heat exchanger	User-defined fuel - gas
Biogas	Heat rate	User-defined fuel - solid
Building envelope properties	Heating value & fuel rate	Water $ steam
Appliances & equipment	☑ Hydro formula costing method	Water pumping
Electricity rate - monthly	Landfill gas	Window properties
Electricity rate - time of use	Unit conversion	Custom 1
GHG equivalence	User-defined fuel	Custom 2

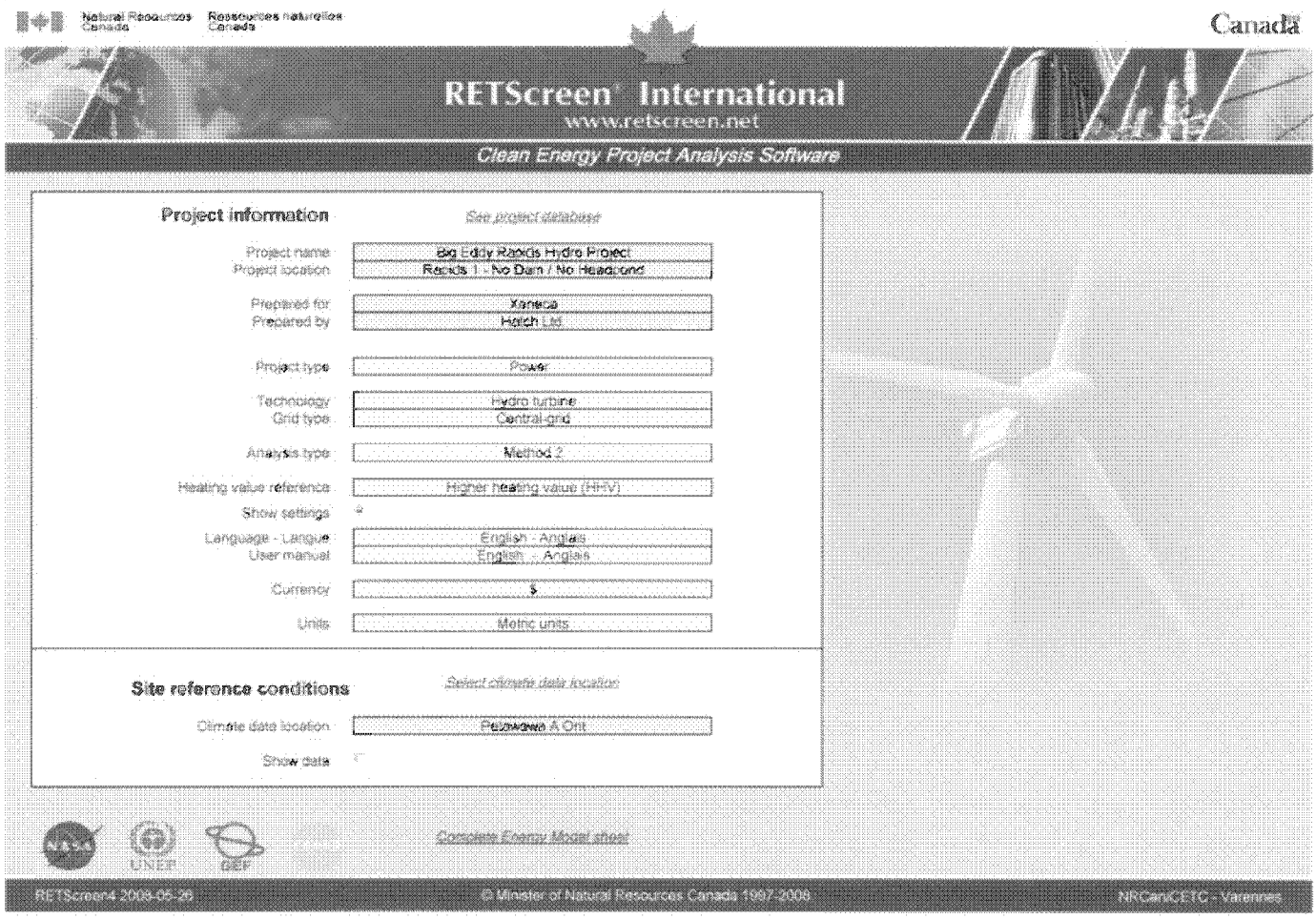
Hydro formula costing method

Country		Canada	
Cold climate	yes/no	Yes	
Frost days at site	day	120	
Design flow	m³/s	55	55
Gross head	m	9	7
Number of turbines	turbine	1	1
Type		Kaplan	Kaplan
Flow per turbine	m³/s	55.00	
Turbine runner diameter per unit	m	2.90	
Facility type		Small	Small
Existing dam	yes/no	No	
New dam crest length	m	100	
Rock at dam site	yes/no	Yes	
Maximum hydraulic losses	%	3.0%	3.0%
Miscellaneous losses	%	2.0%	
Road construction			
Tunnel			
Canal			
Penstock			
Distance to borrow pits	km		
Transmission line			
Grid type		Central-grid	Central-grid
Length	km		
Difficulty of terrain			
Voltage	kV		

See maps

Initial costs (credits)	Amount $	Adjustment factor	Amount $	Relative costs
Feasibility study	0		0	
Development	0		0	
Engineering	664,000		0	
Power system				
Hydro turbine	7,019,000		0	
Road construction	0		0	
Transmission line	0		0	
Substation	0		0	
Balance of system & miscellaneous				
Penstock	0		0	
Canal	0		0	
Tunnel	0		0	
Other	0		0	
Sub-total	0		0	
Total initial costs	**7,683,000**		**0**	

Big Eddy at $160 MWh, without dam, at Q80 compensatory flow



RETScreen Energy Model - Power project

Show alternative units

Proposed case power system

Technology		Hydro turbine
Analysis type		Method 1 / Method 2
Resource assessment		
Proposed project		Run-of-river
Hydrology method		User-defined
Gross head	m	7.0
Maximum tailwater effect	m	0.50
Residual flow	m³/s	16.400
Percent time firm flow available	%	95.0%
Firm flow	m³/s	0.00
Hydro turbine		
Design flow	m³/s	55.000
Type		Kaplan
Turbine efficiency		Standard
Number of turbines		1
Manufacturer		
Model		
Design coefficient		4.5
Efficiency adjustment	%	2.0%
Turbine peak efficiency	%	93.6%
Flow at peak efficiency	m³/s	41.3
Turbine efficiency at design flow	%	90.2%

See product database

Show flows

%	Flow m³/s	Turbine efficiency	Number of turbines	Combined efficiency
0%	470.46	0.00	0	0.00
5%	147.18	0.00	1	0.00
10%	104.66	0.00	1	0.00
15%	86.50	0.07	1	0.07
20%	68.30	0.41	1	0.41
25%	59.30	0.63	1	0.63
30%	50.40	0.76	1	0.76
35%	44.80	0.83	1	0.83
40%	39.10	0.87	1	0.87
45%	35.00	0.89	1	0.89
50%	30.80	0.90	1	0.90
55%	28.00	0.90	1	0.90
60%	25.10	0.91	1	0.91
65%	22.90	0.91	1	0.91
70%	20.70	0.91	1	0.91
75%	18.80	0.91	1	0.91
80%	16.40	0.91	1	0.91
85%	14.30	0.91	1	0.91
90%	12.20	0.91	1	0.91
95%	9.20	0.90	1	0.90
100%	4.80	0.90	1	0.90

Show flows

Maximum hydraulic losses	%	3.0%
Miscellaneous losses	%	2.0%
Generator efficiency	%	98.0%
Availability	%	100.0%

Summary			Firm
Power capacity	kW	3,172	0
Available flow adjustment factor		1.00	
Capacity factor	%	37.2%	
Electricity exported to grid	MWh	10,343	
Electricity export rate	$/MWh	150.00	

2007-06-27
RETScreen4-4182-45.xls

RETScreen Cost Analysis - Power project

Settings

○ Method 1	◉ Notes/Range			
○ Method 2	○ Second currency	Notes/Range	None	
	○ Cost allocation			

Initial costs (credits)	Unit	Quantity	Unit cost	Amount	Relative costs
Feasibility study					
Feasibility study	cost			$ -	
Sub-total				$ -	0.0%
Development					
Development	cost			$ -	
Sub-total				$ -	0.0%
Engineering					
Engineering	cost			$ -	
Sub-total				$ -	0.0%
Power system					
Hydro turbine	kW	3,172.26		$ -	
Road construction	km			$ -	
Transmission line	km			$ -	
Substation	project			$ -	
Energy efficiency measures	project			$ -	
User-defined	cost	1	$ 9,689,021	$ 9,689,021	
				$ -	
Sub-total				$ 9,689,021	100.0%
Balance of system & miscellaneous					
Spare parts	%			$ -	
Transportation	project			$ -	
Training & commissioning	p-d			$ -	
User-defined	cost			$ -	
Contingencies	%		$ 9,689,021	$ -	
Interest during construction			$ 9,689,021	$ -	
Sub-total		Enter number of months		$ -	0.0%
Total initial costs				$ 9,689,021	100.0%

Annual costs (credits)	Unit	Quantity	Unit cost	Amount
O&M				
Parts & labour	project			$ -
User-defined	cost	1	$ 300,000	$ 300,000
Contingencies	%		$ 300,000	$ -
Sub-total				$ 300,000

Periodic costs (credits)	Unit	Year	Unit cost	Amount
User-defined	cost			$ -
Turbine Overall @ Year 20		20	$ 500,000	$ 500,000
End of project life	cost			$ -

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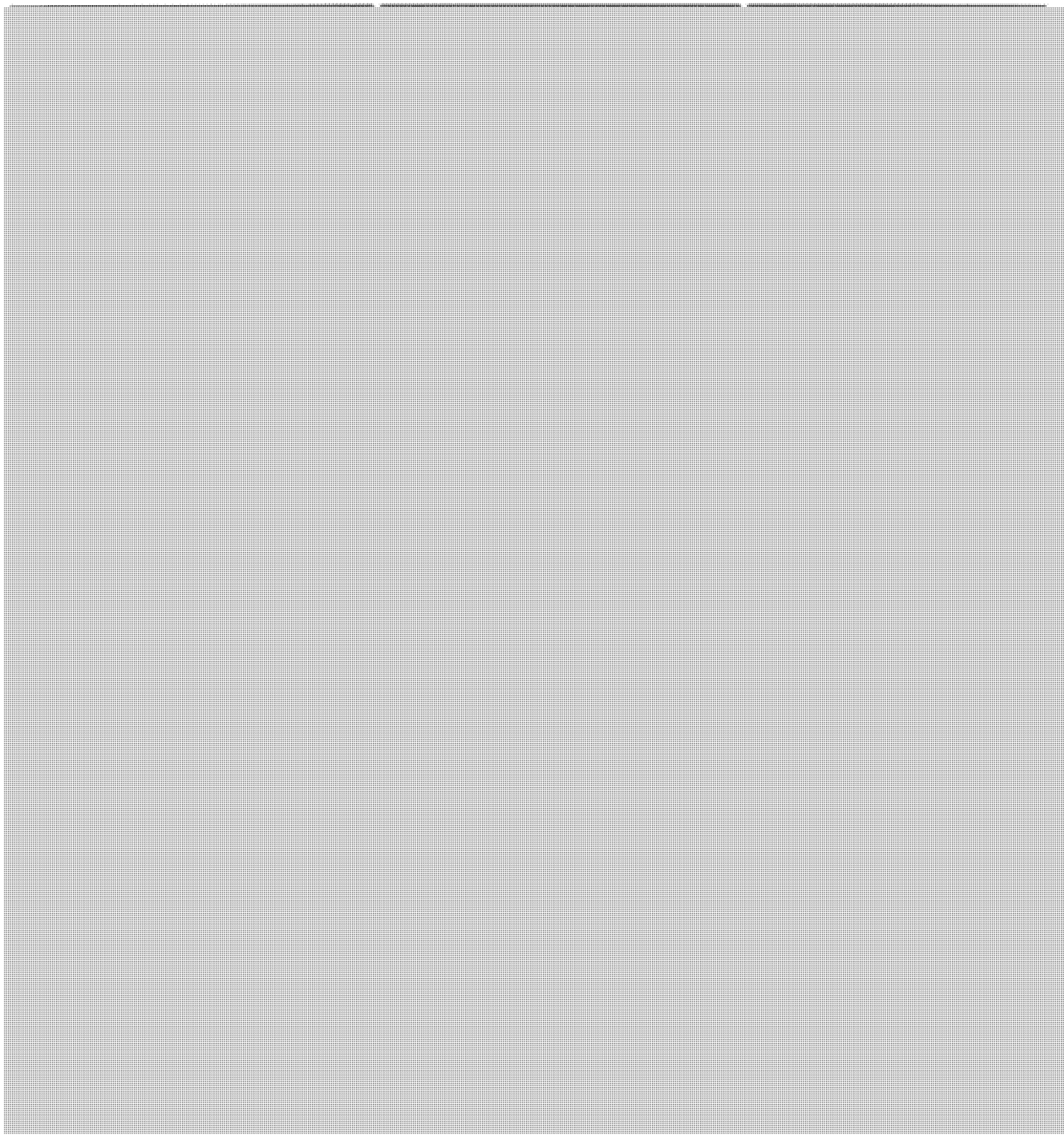


Settings

☐ As fired fuel	☐ Ground heat exchanger	☐ User-defined fuel - gas
☐ Biogas	☐ Heat rate	☐ User-defined fuel - solid
☐ Building envelope properties	☐ Heating value & fuel rate	☐ Water & steam
☐ Appliances & equipment	☑ Hydro formula costing method	☐ Water pumping
☐ Electricity rate - monthly	☐ Landfill gas	☐ Window properties
☐ Electricity rate - time of use	☐ Unit conversion	☐ Custom 1
☐ GHG equivalence	☐ User-defined fuel	☐ Custom 2

Hydro formula costing method

Country		Canada		
Cold climate	yes/no	Yes		
Frost days at site	day	120		See maps
Design flow	m³/s	55	55	
Gross head	m	9	7	
Number of turbines	turbine	1	1	
Type		Kaplan	Kaplan	
Flow per turbine	m³/s	55.00		
Turbine runner diameter per unit	m	2.93		
Facility type		Small	Small	
Existing dam	yes/no	No		
New dam crest length	m	100		
Rock at dam site	yes/no	Yes		
Maximum hydraulic losses	%	3.0%	3.0%	
Miscellaneous losses	%	2.0%		
☐ **Road construction**				
☐ **Tunnel**				
☐ **Canal**				
☐ **Penstock**				
Distance to borrow pits	km			
Transmission line				
Grid type		Central-grid	Central-grid	
Length	km			
Difficulty of terrain				
Voltage	kV			

Initial costs (credits)	Amount $	Adjustment factor	Amount $	Relative costs
Feasibility study	0		0	
Development	0		0	
Engineering	584,000		0	
Power system				
Hydro turbine	7,019,000		0	
Road construction	0		0	
Transmission line	0		0	
Substation	0		0	
Balance of system & miscellaneous				
Penstock	0		0	
Canal	0		0	
Tunnel	0		0	
Other	0		0	
Sub-total	0		0	
Total initial costs	**7,603,000**		**0**	

Appendix D
Big Eddy Site Photographs

Photo 1 Big Eddy Rapids 1: Railway and Pedestrian Bridge

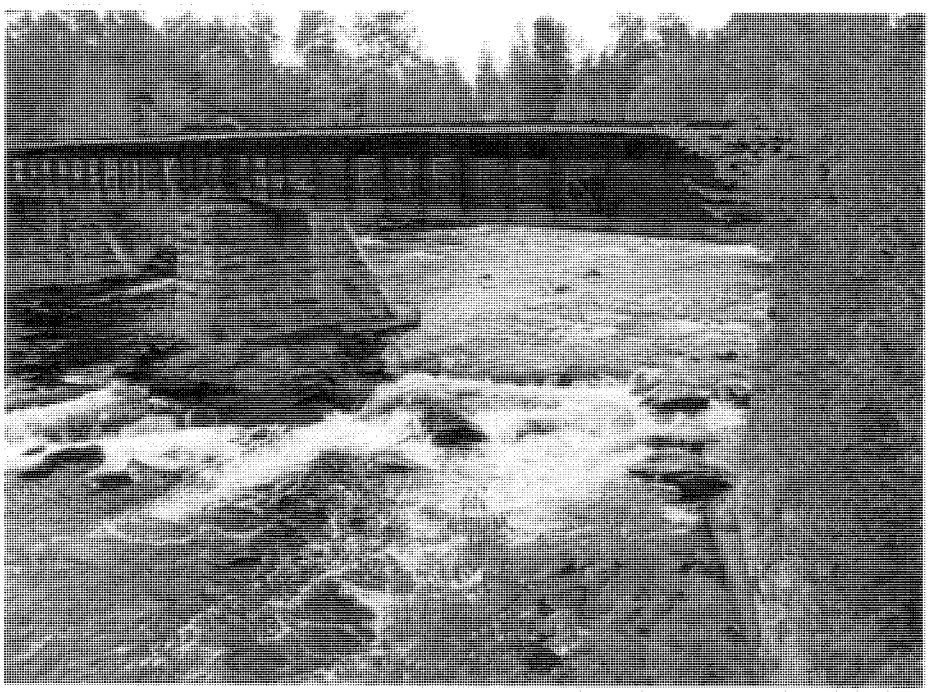


Photo 2 Big Eddy Rapids 1: Railway Bridge Looking Upstream

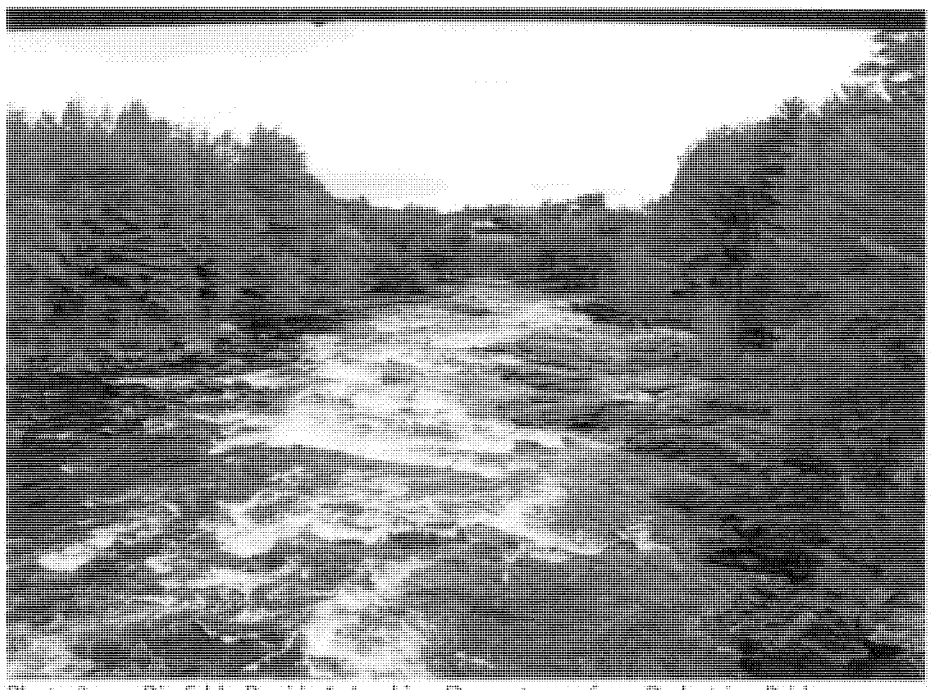


Photo 3 Big Eddy Rapids 1: Looking Downstream from Pedestrian Bridge

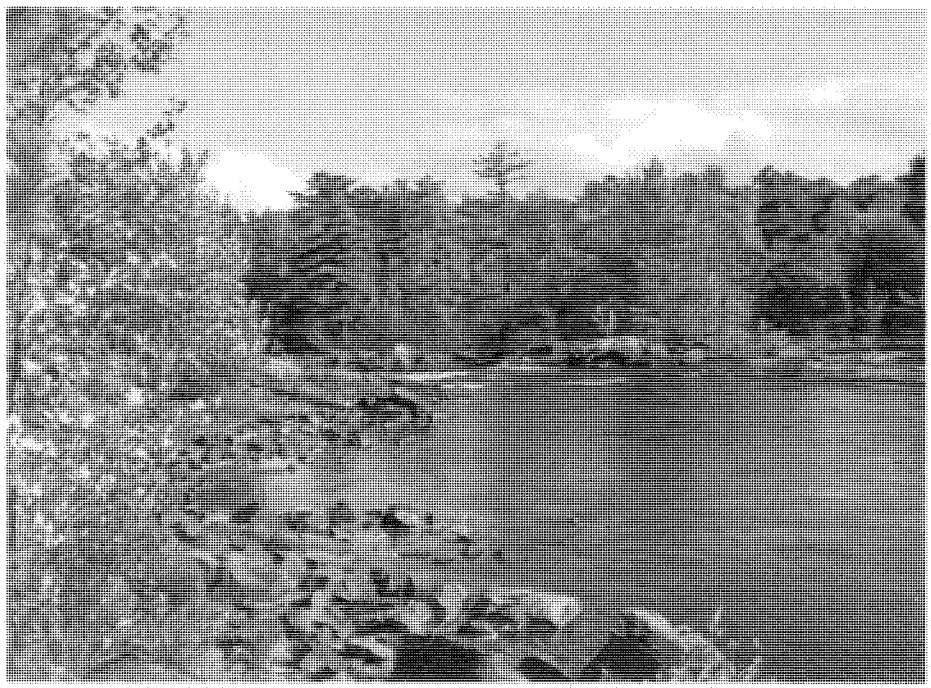


Photo 4 Big Eddy Rapids 1: ~80 m Upstream of Railway Bridge

Photo 5 Big Eddy Rapids 1: Looking North along Railway Line

Photo 6 Big Eddy Rapids 1: Looking North along Railway

Photo 7 Downstream of Big Eddy Rapids 1; Looking West at Powerhouse and Discharge Channel (Petawawa Boulevard in foreground)

Photo 8 Big Eddy Rapids 2:

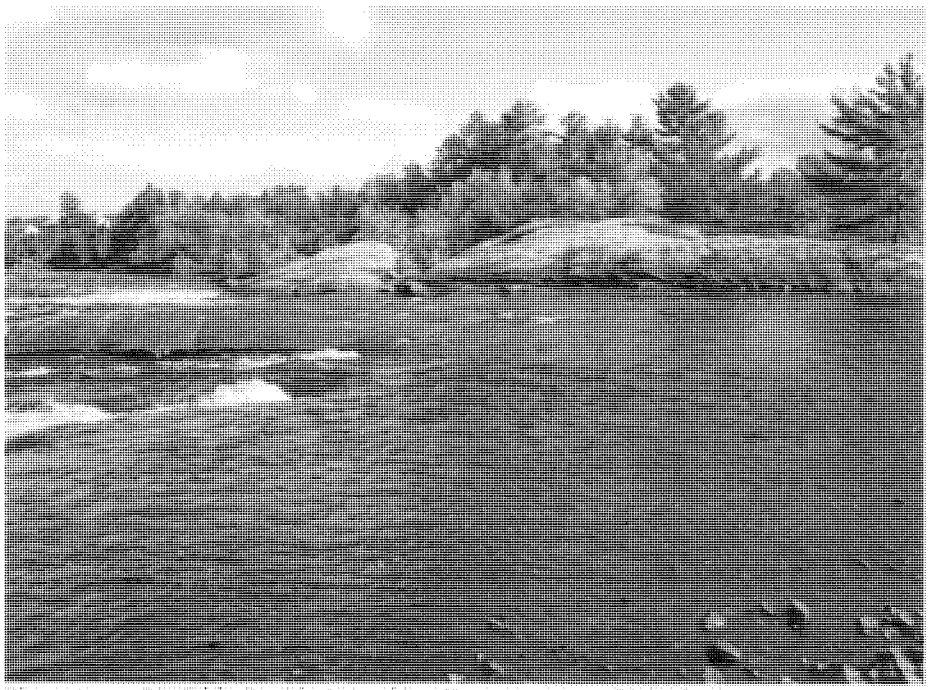


Photo 9 Big Eddy Rapids 2: Looking Downstream at Right Bank

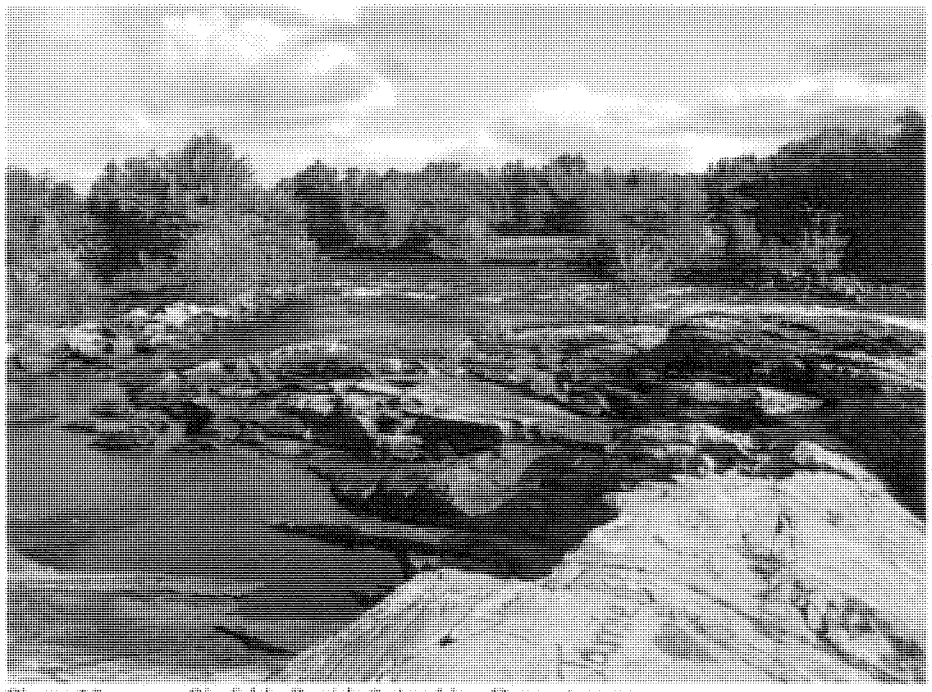


Photo 10 Big Eddy Rapids 2: Looking Downstream

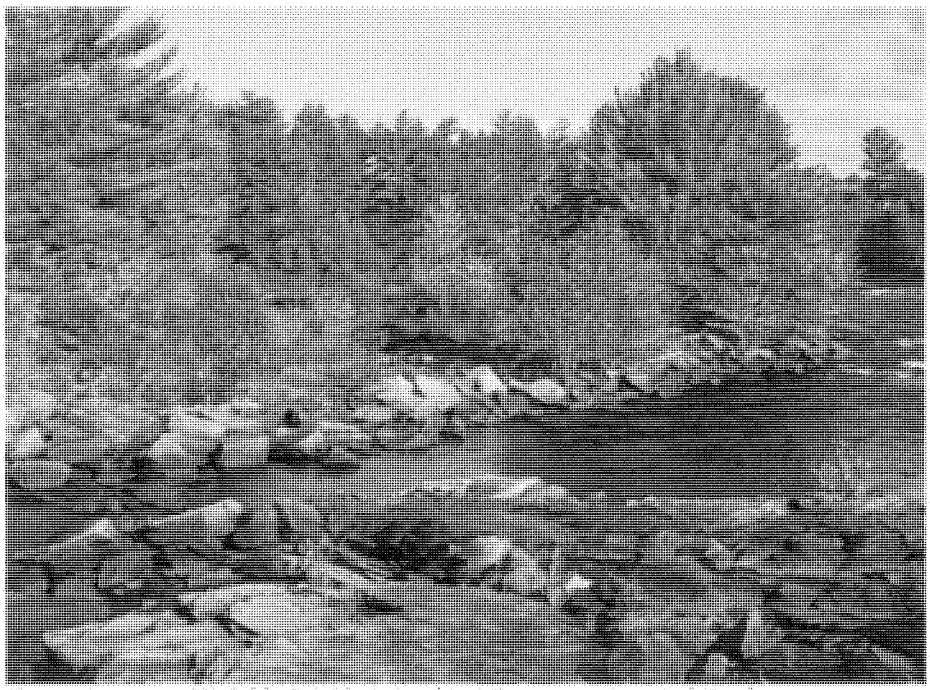


Photo 11 Big Eddy Rapids 2: Looking Downstream at Left Bank

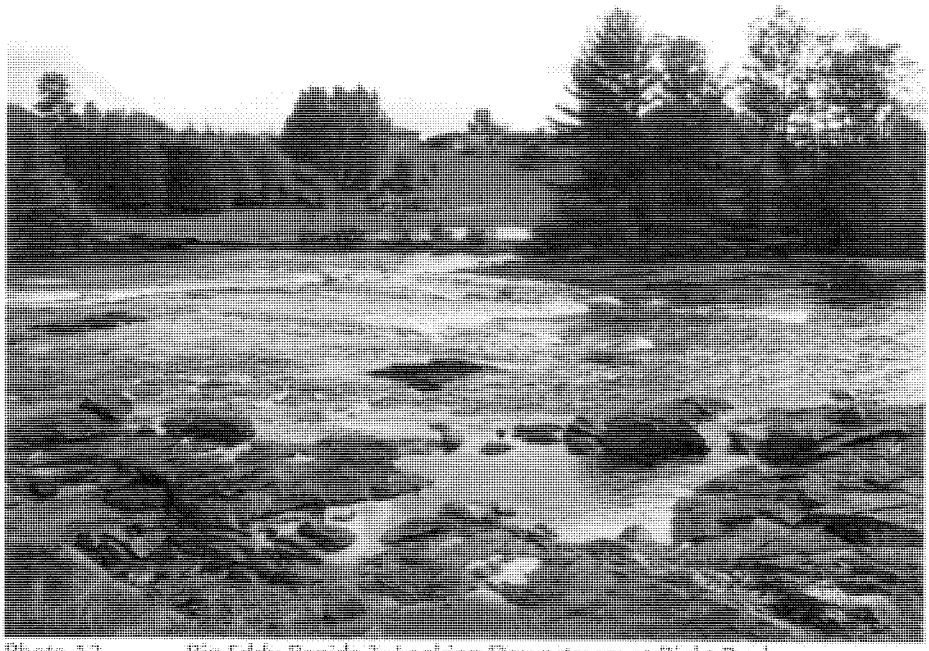


Photo 12 Big Eddy Rapids 3: Looking Downstream at Right Bank

Photo 13 Big Eddy Rapids 4: Looking Upstream

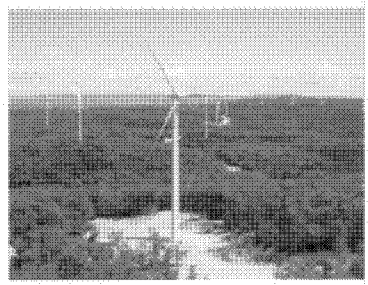
Appendix E
Project Team Experience

Page(s) 000149 to 000155

is(are) not relevant

HATCH

RENEWABLE POWER



Hatch completed the EA addenda, plan of development and environmental management plan for the Prince wind power development in Sault Ste. Marie, Ontario, Canada

ENVIRONMENTAL ASSESSMENTS

For more than four decades, Hatch's environmental scientists have successfully managed and conducted Environmental Assessments (EA) associated with hydroelectric dams and reservoirs, flood control/recreational works, thermal generating plants, utility transmission lines and, more recently, wind power developments.

The types of EAs that we have successfully undertaken include

- Environmental screenings for federal projects in accordance with the *Canadian Environmental Assessment Act* (CEAA)
- Environmental screenings under the Electricity Projects Regulation 116/01 of the *Ontario Environmental Assessment Act*
- Strategic EAs
- Ontario Ministry of Natural Resources (MNR) Class EAs for resource stewardship and facility development projects
- EAs in accordance with the requirements of the EIS Guidelines for screenings of inland wind farms under the Wind Power Production Incentive (WPPI) and CEAA
- EAs in accordance with the EA guidance document for wind turbines and birds (Canadian Wildlife Service)
- Ontario Hydro Class EAs for minor transmission facilities
- Conservation Authority Class EAs for remedial flood and erosion control projects
- Municipal Class EAs for municipal infrastructure road or water and wastewater projects
- EAs and environmental peer reviews in accordance with the requirements of the World Bank, CIDA, Export Development Canada, USAid, ADB, and other international lending institutions

The services that we provide as part of an EA include

- Environmental constraints analysis for facility siting and/or route selection
- Baseline environmental studies
- Physical, biological and socioeconomic impact assessments, including cumulative effects assessment and significance of effects
- Mitigation planning/development
- Follow-up environmental monitoring programs
- Environmental permitting and approval services
- Public, agency and First Nation consultation
- Environmental peer review of EAs undertaken by others.

CONTACT

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Charlie Gibbs
Tel: +1 905 374 5200
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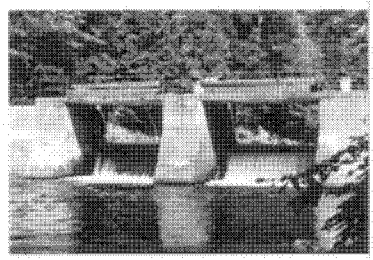
42CAPA002/01/2008

HATCH

RENEWABLE POWER



Hatch was responsible for final design, tender specifications, construction supervision and environmental monitoring for the decommissioning of the Distress and Finlayson dams in Ontario, Canada

ENVIRONMENTAL ASSESSMENTS CONTINUED

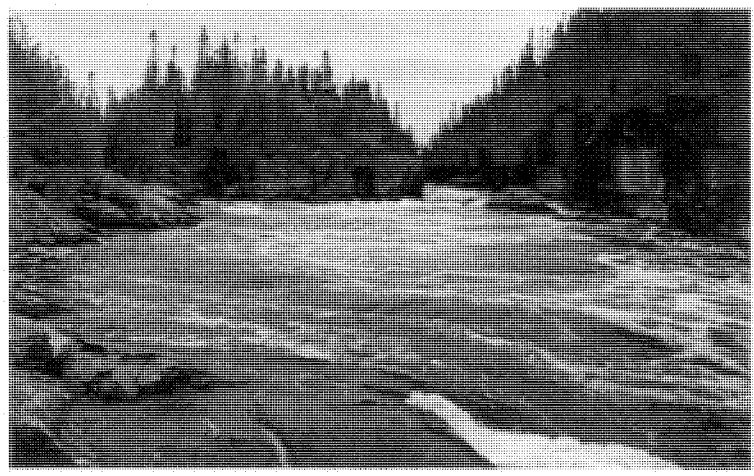
PUBLIC AGENCY AND FIRST NATION CONSULTATION

Hatch works closely with clients to develop a comprehensive public agency and First Nation consultation program. This ensures all stakeholders (including affected landowners, adjacent landowners, tenants, government agencies, First Nations, special interest groups and the general public) are fully informed about a project and are given adequate opportunities to provide input into the process. The consultation program provides opportunities for the public to identify their issues and concerns so that they can be addressed during the planning/environmental assessment process. Hatch also provides assistance with the formation of public advisory/community liaison committees and attends any of the group meetings where technical input is required.

EXPERT STAFF

Hatch's comprehensive and dedicated environmental team has extensive experience in conducting EAs. Our staff members include technical specialists and experts in

- Aquatic ecology/wetlands
- Terrestrial ecology
- Hydrology and water quality
- Soils and land use planning
- Hydrogeology
- Socioeconomics



Hatch provided services for the federal environmental screening and the provincial environmental review/PIP for the 23-MW Umbata Falls hydroelectric development on the White River in Ontario, Canada

Environmental Assessments
Canadian Experience

Years/Project	Client/Summary of Services
2008 Gesner Environmental Assessment for Wind Farm, Ontario, Canada (H-328628)	**Saturn Power** • Environmental screening to satisfy provincial and federal legislation requirements for a wind power project. The EA includes background review, site characterization, avian and bat baseline studies, public and First Nation consultation and reporting to the relevant agencies
2007–08 Kashechewan Protective Dyke Repairs, Ontario, Canada (327480)	**Kashechewan First Nation** • CEAA environmental screening for the Phase 1—high priority dyke repairs to protective ring dyke encompassing the community of Kashechewan on the Albany River
2006–08 Sinaminda Lake Dam Class EA, Ontario, Canada (323788)	**Domtar** • Environmental screening under the Ministry of Natural Resources (MNR) Class EA Process for Resource Stewardship and Facility Development projects to examine alternatives for the final disposition of the deteriorating Sinaminda Lake dam. The project alternatives involved constructing a new replacement dam or decommissioning and removal of the dam
2006–08 Lower Mattagami River Project, Ontario, Canada (323076)	**Ontario Power Generation** • Studies and updates to meet the terms and conditions for the earlier provincial EA approval of the Lower Mattagami River project near Kapuskasing, Ontario, involving the replacement of the Smoky Falls power generating station and expansion of the Little Long, Harmon and Kipling stations to create 471 MW of incremental power on the Mattagami River. Input also being provided to a federal comprehensive EA for the project
2006–08 Kapuskasing North Water Power Project, Ontario, Canada (322544)	**Hydroméga Services Inc.** • Federal and provincial environmental screening for the development of four run-of-river waterpower facilities, totaling approximately 20 MW, on the Kapuskasing River
2006–08 Coldwell Wind Energy Facility, Ontario, Canada (322027)	**Brookfield Power** • Federal and provincial environmental screening, including social and cultural assessment, for a proposed 100-MW wind power development near Marathon, Ontario
2006–08 Lower Lake Hydroelectric Project, Ontario, Canada (321397)	**Brookfield Power** • Combined federal and provincial environmental screening for a 10-MW 'run-of-river' hydroelectric development, located on the Aguasabon River near Terrace Bay, Ontario, including social and cultural assessment
2006 Welland Canal Hydroelectric Developments, Ontario, Canada (16873)	**Rankin Renewable Power Inc.** • Combined provincial and federal environmental screening for three 2-MW hydroelectric facilities at Locks 1, 2 and 3 on the Welland Canal, Ontario
2006–07 Gitchi Miki (White River) Hydroelectric Projects, Ontario, Canada (16864)	**Regional Power/Pic Mobert First Nation** • Combined federal and provincial environmental screening for the construction of two hydroelectric facilities having installed capacities of 8.5 MW and 9.99 MW, on the White River, Ontario

Years/Project	Client/Summary of Services
2005–06 Toyota Woodstock Yard, Woodstock, Ontario, Canada (16776)	**Canadian Pacific Railway** • CEAA environmental screening for a new CPR spur line, rail yard and rail facilities to service the new Toyota automobile plant east of the City of Woodstock, Ontario
2006–08 Crooks' Hollow Dam Rehabilitation, Hamilton, Ontario, Canada (16681)	**Hamilton Conservation Authority** • Conservation Ontario Class EA for remedial flood and erosion control projects to assess rehabilitation, reconstruction and removal alternatives for the Crooks' Hollow Dam
2005 King Road Grade Separation, Burlington, Ontario, Canada (16603B0)	**City of Burlington** • Municipal Class EA (Schedule C) for the King Road/ CNR Grade Separation
2004–05 Toronto West Diamond Rail-to-Rail Grade Separation, Toronto, Ontario, Canada (P14721)	**GO Transit** • GO Transit Class EA and federal environmental screening for a rail to rail grade separation
2004 CPR VACIS Installation, Windsor, Ontario, Canada (16172)	**Canadian Pacific Railway** • Federal environmental screening for installation of a vehicle and cargo imaging system (VACIS) on the CPR rail line as part of the border security program
2004 Shikwamkwa Replacement Dam, Ontario, Canada (P15635E0)	**Great Lakes Power Limited** • Federal environmental screening and MNR Class EA (Category B) for replacement of a 38-m high dam with a crest length of 425 m, including social and cultural assessments
2004 Wolfe Island Wind Power Development, Ontario, Canada (15762)	**Canadian Renewable Energy Corporation (CREC)** • Federal and provincial environmental screening, including social and cultural assessment for a proposed wind power development on Wolfe Island, south of Kingston, Ontario
2003–04 Wind Power Development, Wainfleet, Ontario, Canada (P15253)	**Wind Energy Niagara** • Environmental screening/review of a proposed wind power development in the Wainfleet area near the north shore of Lake Erie, including social, socioeconomic and cultural assessment
2003–04 Umbata Hydroelectric Development, Northwestern Ontario, Canada (P15126)	**Begetekong Power Corporation** • Environmental screening project information package for an 23-MW hydroelectric development, located at Umbata Falls on the White River, Ontario, including social and cultural assessment
2003 Springbank Dam Class Environmental Assessment, London, Ontario, Canada (P15152)	**City of London/Upper Thames River Conservation Authority (UTRCA)** • Municipal Class EA (Schedule B) to evaluate options for the rehabilitation of Springbank Dam and downstream erosion protection works, located on the Thames River in the City of London. Results of the Class EA recommended replacement of existing stop logs and gates with new overflow gates to improve flood and debris passage capability

Years/Project	Client/Summary of Services
2003 Dorchester Mill Pond Dam Class Environmental Assessment, Ontario, Canada (P14560)	**Municipality of Thames Centre/UTRCA** • Municipal Class EA (Schedule B) to evaluate options for the rehabilitation of Dorchester Mill Pond Dam, located on Dorchester Creek, a tributary of the South Thames River. Results of the Class EA recommended construction of a new overflow dam immediately downstream from the existing structure
2003 Transformer Station Upgrade Class EA, Northern Ontario, Canada (P14967)	**Great Lakes Power Limited (GLPL)** • Class EA for upgrades to GLPL's Third Line and MacKay transformer stations, as part of their overall transmission reinforcement project
2003 Transmission Line Upgrade Class EA, Northern Ontario, Canada (P14963)	**GLPL** • Class EA for replacement of two 115-kV transmission lines with one new 230-kV line within the existing right of way, as part of GLPL's overall transmission reinforcement project
2003 Commonwealth Games 2010 Bid EA, Hamilton, Ontario, Canada (P14879)	**Commonwealth Games Bid Corporation** • Strategic EA of the City of Hamilton's bid to host the 2010 Commonwealth Games
2003 Knoefli Dam Class Environmental Assessment (EA), Ontario, Canada (P14672)	**Ministry of Natural Resources (MNR)** • Class EA to evaluate options for the rehabilitation of the Knoefli Dam, located at the outlet of Ahmic Lake, approximately 8 km west of the Village of Magnetawan. Results of the Class EA recommended construction of a new, fully operable dam immediately downstream from the existing structure, cultural heritage assessment and mitigation was an integral part of the project
2002 Wind Power Development, Wolfe Island, Ontario, Canada (P14413)	**Canadian Renewable Energy Corporation** • Environmental screening/review, including social/cultural assessment of a proposed wind power development on Wolfe Island near Kingston, consisting of up to ten 1.8-MW turbines on three possible sites
2002 Wind Power Development, Huron-Kinloss Township, Ontario, Canada (P14384)	**Canadian Renewable Energy Corporation** • Environmental screening/review, including social/cultural assessment of a proposed wind farm, consisting of up to ten 1.8-MW wind turbines near the shore of Lake Huron
2002 Renewable Energy Hybrid Power Plant – Preliminary Environmental Screening, Jamaica (P14049)	**Canadian International Development Agency (CIDA)** • Preliminary federal environmental screening of alternative renewable energy technologies (i.e., wind, solar, biogas) at a resort in Jamaica
2002 St. Ola Dam Class EA, Design and Construction, Ontario, Canada (P14485)	**MNR** • Examination of alternatives to determine the disposition of the dam, including repairing, replacing with a new dam or converting the dam to a self-regulating weir (partial decommissioning); or removal of the dam (full decommissioning)

Years/Project	Client/Summary of Services
2002–03 Cummings Lake Dam Class EA Design and Construction, Ontario, Canada (P14427)	MNR • Class EA to determine options for the rehabilitation of Cumming Lake Dam, located immediately upstream of Tunnel Lake on the Mississagi River system. The results of the Class EA recommended the construction of a new drop-style structure immediately downstream from the existing dam, at the inlet to the culvert underneath Highway 129.
2002 Go Home Lake Dam Class EA, Ontario, Canada (025A87)*	MNR • Class EA to determine options to improve operational control of water levels and flows at the dam. Results of the Class EA recommended installation of an overflow remotely controlled gate in one of the existing sluiceways.
2001 Hamilton-Milton Pipeline EA, Ontario, Canada (015806)	Union Gas Limited • Update of the EA carried out 10 years ago for a proposed 16-km NPS48 gas pipeline. The work included a reassessment of the preferred route to determine feasibility with respect to any changes in socio-economic conditions over the last decade.
2001 Kenora Mill A Dam Class EA, Ontario, Canada (015A57)	MNR • Class EA study to evaluate the options for the severely deteriorated MNR owned Mill A Dam in Kenora, northwestern Ontario was undertaken. The study resulted in the construction of a new earthfill dam incorporating a boat ramp, and the demolition and infilling of the current dam and abandoned Mill A powerhouse. The project also included the decommissioning and removal of a nonoperational boat lift that was used to transfer small craft between Lake-of-the-Woods and the Winnipeg River
2001 Sturgeon Falls Environmental Screening, Ontario, Canada (P13500)	Weyerhauser • An environmental screening of a proposed significant modification (new 4-MW unit) to an existing power facility on the Sturgeon River was undertaken in compliance with MOE's EA requirements for electricity projects. Tasks included background data collection and review, preparation of a summary data report and application of MOE's screening criteria to the project, including social and cultural components
2001 Environmental Assessments (EA) for Misema Small Hydro Development, Northern Ontario (P13911)	Misema Power Partnership • EA, including social and cultural assessments, under the *Electricity Regulation, Ontario Environmental Assessment Act* for a 3.0-MW small hydro development near Englehart, Ontario
2001–current Class EA for Northern Ontario Dams, Ontario (P13929,13927)	MNR • Seven separate Class EAs to assess rehabilitation of seven dams in northern Ontario
2000–01 Operational Alternatives Study and EA for Musquash Watershed Dams, New Brunswick (P13490)	New Brunswick Department of Natural Resources • Study of the operational alternatives and EA for 25 dams in southeast New Brunswick

Years/Project	Client/Summary of Services
2000–01 White Lake Dam Rehabilitation Class EA, Ontario (015A41)	**MNR** • Initial stages of Class EA process to develop and assess rehabilitation alternatives and environmental effects
1999–00 Big East Class EA, Ontario (P13107)	**MNR** • Class EA to develop operational strategies for two dams on the Big East River near Huntsville
1999 Environmental Screening Assessment, 230-kV Transmission System Upgrade, British Columbia (P12986)	**West Kootenay Power Ltd.** • Screening level assessment, including social/cultural components, of various proposed transmission line routes and switchyard projects in the West Kootenay and South Okanagan regions of British Columbia
1998 TriState Pipeline Environmental Assessment, Ontario (985561)	**TriState Pipeline (Canada)** • Routing study, social and cultural assessments and federal environmental screening for a 5-km gas pipeline in southwestern Ontario
1998 Bertie Hill Transmission Line Upgrade EA, Ontario (985529)	**Canadian Niagara Power** • Federal environmental screening, including social, socioeconomic and cultural assessments, for upgrade of a transmission line in Fort Erie
1997 Environmental Assessment (EA) of New Ore Body for Mine (P12762)*	**Cominco Ltd.** • EA of new ore body for Polaris mine in high Arctic
1997 High Falls Hydro Redevelopment EA, Ontario (P11087-E/975A32)	**GLPL** • Environmental, socioeconomic and cultural studies in support of an MNR project information package (PIP)
1995 Niagara District Airport Sanitary Sewer Project EA, Ontario (P11224)	**Transport Canada—Airports Niagara District Airport Commission** • Federal environmental screening/Class EA for a new sanitary sewer service and decommissioning of an existing lagoon.
1995 Whitby Pipeline Route Selection and EA, Ontario (P11158)	**Consumers Gas** • Route selection, socioeconomic and cultural assessments, and environmental assessment for a 6-km gas pipeline
1994 Bluewater Pipeline Route Selection and EA, Ontario (P11115)	**St. Clair Pipelines Limited** • Route selection, socioeconomic and cultural assessments and environmental assessment for a 3-km gas pipeline, valve site and metering station
1994–96 Proposed Diavik Diamond Mine, Northwest Territories (P11047)	**Kennecott Canada Inc.** • Multidisciplinary environmental baseline studies for preparation of an environmental impact statement

Years/Project	Client/Summary of Services
1994 Black Creek Storage Pool Route Selection and EA, Ontario (P10692)	**Tecumseh Gas Storage** • Route selection, socioeconomic and cultural assessments and environmental assessment for a 6-km gas pipeline and compressor station
1994 EA of Propeller Wash Dredging, British Columbia (P10689)	**Government Services Canada** • EA of proposed propeller wash dredging program at five small craft harbors along the lower Fraser River
1993 St. Clair River Pipeline Route Selection and EA, Ontario (P10494)	**Interprovincial PipeLine Inc.** • Route selection, environmental assessment and engineering investigations for a gas pipeline directionally drilled under the St. Clair River
1993 Northern Reservoir Operations, Ontario (P10446)	**Public Works Canada** • A preliminary environmental assessment was conducted on the current operation of reservoirs on the northern portion of the Ottawa River. Alternate operating policies were formulated and evaluated environmentally. Key issues were erosion, flood control, fisheries, electrical generation and water quality
1992–93 High Speed Rail Environmental Study, Ontario (P10423)**	**Transport Canada, Ontario Ministry of Transport, and Québec Ministry of Transport** • Assessment of the environmental aspects of a high-speed rail service for the Windsor-Québec corridor
1992–93 Malvern Remedial Project, Ontario (P10369)	**Ontario Management Board Secretariat Energy, Mines and Resources Canada** • Federal environmental screening for cleanup of historic low-level radioactive contamination in the Malvern area of Scarborough.
1992–93 Pine River Gas Plant Expansion EA, British Columbia (P10355)**	**Westcoast Energy Inc.** • Assessment of environmental impacts of spray irrigation effluent on vegetation and wildlife
1992–93 Detroit River Pipeline Route Selection and EA, Ontario (P10314)	**Union Gas Limited** • Route selection and environmental assessment for a gas pipeline directionally drilled under the Detroit River
1992–94 Chaudiere No. 2 Generating Station Rehabilitation (P10898,10113)	**Ottawa Hydro** • Federal environmental screening for rehabilitation works to intake and tailrace channels, and bulkhead/spillway structures
1992–93 EA of Proposed Hydroelectric Facilities, Yukon (P10248)	**Yukon Electrical Company Ltd.** • Environmental assessment of four proposed hydroelectric facilities throughout the Yukon Territory
1992 Scuzzy Creek Hydroelectric Project EA, British Columbia (P10209)	**BC Ministry of Energy, Mines and Petroleum** • Studies of environmental impacts of a proposed small hydroelectric project

Years/Project	Client/Summary of Services
1992 Hamilton Airport Initial Assessment, Ontario (P10094,10130)	**Public Works Canada** • Initial environmental assessments of proposed hangar-associated works and general aviation area land development
1991–93 GO Transit Rail Service Expansion EA, Ontario (P9990)**	**GO (Government of Ontario) Transit** • Studies of the environmental impact of extending commuter train services from Stouffville to Goodwood
1991 Springhill Penitentiary Initial Environmental Evaluation (IEE), Nova Scotia (P9871)	**Public Works Canada** • Environmental evaluation of proposed sewage treatment plant expansion
1991–92 Port Stanley Marina IEE, Ontario (P9829)	**Department of National Defence** • Initial environmental evaluation and conceptual design of a new marina and boathouse
1991 South Muskoka Watershed Study, Ontario (P9759)	**Ontario Hydro** • Environmental appraisal of potential hydro redevelopment sites
1991–93 Railyard Needs and EA, Ontario (P9756)*	**Toronto Transit Commission** • Environmental assessment for a new subway storage and maintenance facility
1991 Welland River Dredging Demonstration Project, Ontario (P8960.06)	**Environment Canada** • Environmental screening of a proposed dredging demonstration project
1990–91 Highway Upgrading and Realignment, British Columbia (P9580)	**B.C. Ministry of Transportation and Highways** • Environmental and socioeconomic assessment
1990–91 Decommissioned Sawmill EA, West Vancouver, British Columbia (P9538)	**Technology Resource Inc.** • Environmental assessment of contaminant effects on a marine environment
1990 Lindsay Sewage Treatment Plant Municipal Class EA, Ontario (P9476)	**Town of Lindsay** • Environmental investigations for a proposed expansion of a sewage treatment facility
1989–90 Hamilton-Milton Pipeline EA, Ontario (P9243)	**Union Gas Limited** • Route selection and environmental assessment for a proposed 16-km gas pipeline
1989–90 Westray Coal Mine IEE, Nova Scotia (P9238)	**Industry, Science and Technology, Canada** • Initial environmental evaluation of a coal mine in Pictou County

Years/Project	Client/Summary of Services
1989 La Joie Hydro Project EA, British Columbia (P9099)	**Environmental Resources Section, British Columbia Hydro** • Environmental assessment for a proposed hydro development in Gold Bridge
1989–90 Misema Hydro Project Environmental Appraisal, Ontario (P9012.01)	**Misema Power Limited Partnership** • Environmental appraisal for a small hydro project in northern Ontario
1989–90 Yellow Falls Environmental Appraisal, Ontario (P8935.02)	**Yellow Falls Power Limited Partnership** • Environmental appraisal for a small hydro project in northern Ontario
1989–90 Niagara River Hydroelectric Development EA, Ontario (P8943)	**Ontario Hydro** • Comprehensive environmental and socioeconomic assessment for a proposed 1050-MW hydro development on the Niagara River
1988–89 Business Park Municipal Class EA, Niagara Falls, Ontario (P8695)	**City of Niagara Falls** • Environmental studies for a proposed business park
1988 Horseshoe Valley Pipeline EA, Ontario (P8692)	**Consumers Gas** • Route selection and environmental assessment for a proposed 10-km NPS4 pipeline in Simcoe County
1988–89 Niagara Line EA, Ontario (P8523)	**Union Gas Limited** • Routing and detailed impact assessment for a 90-km section of pipeline from Hamilton to Niagara Falls
1988–89 Vancouver Airport Runway Expansion IEE, British Columbia (P8479)	**Transport Canada** • Environmental evaluation of wildlife populations following FEARO guidelines for airports
1987–88 Study of Rule Curve Change on Lake Simcoe, Lake Couchiching and Trent-Severn Waterway, Ontario (P8181)	**Parks Canada, Trent-Severn Waterway** • Assessment of physical, environmental and socioeconomic impacts of modifications to the water control structure operating policy for the Trent-Severn River system
1986–87 Huronia Airport IEE, Ontario (P8014)	**Transport Canada** • Initial environmental evaluation for planned runway extension and lighting
1986 Georgian Bay Reinforcement Pipeline EA, Ontario (P7893)	**Consumers Gas** • Route optimization and statement of environmental impact for 45-km NPS8 pipeline

Years/Project	Client/Summary of Services
1986–87 Kirkwall-Hamilton Pipeline Routing EA, Ontario (P7767)	**Union Gas Limited** • Routing studies and detailed impact assessment for a 37-km pipeline
1986 Chippawa Creek Cleanup, Ontario (P7765,7958)	**Ontario Ministry of the Environment** • Environmental study report and Environmental Assessment Act exemption application for cleanup of coal-tar contaminated sediments
1985–88 Fuel Barge Off-Loading Facility, British Columbia (P7608)	**Vancouver Airport Fuel Facilities Corporation** • Environmental assessment of a jet fuel barge off-loading facility at Vancouver International Airport
1985 Parkway Belt West Pipeline EA, Ontario (P7484)	**Consumers Gas** • Route selection and impact assessment for a 40-km pipeline
1985–86 Magpie River Hydro Project EA, Ontario (P7451.01)	**GLPL** • Environmental assessment of impacts on fisheries, wildlife, water quality, recreation and tourism
1985–86 Dawn-Enniskillen Pipeline Routing EA, Ontario (P7427)	**Union Gas Limited** • Routing studies and detailed impact assessment for an 18.5-km pipeline in Lambton County
1985–89 Environmental Assessment Exemption Application Walker Transformer Station, Ontario (P7396.01)	**Windsor Utilities Commission** • Environmental study report and Environmental Assessment Act exemption application for proposed extension to a transformer station
1984–85 Port Dalhousie Generating Station, Ontario (P7354)	**St. Catharines Hydroelectric Commission** • Environmental studies to support an exemption application under the Environmental Assessment Act
1984–85 Ammonia Plant EA, Kitimat, British Columbia (P7296)	**Ocelot Industries Limited** • Comprehensive environmental assessment, navigational safety and emergency response plan in support of a 550-t/d ammonia plant
1984–85 Brantford-Kirkwall Pipeline EA, Ontario (P7268)	**Union Gas Limited** • Routing studies and detailed impact assessment for a 15.3-km pipeline
1984–86 Georgian Bay Airport IEE, Ontario (P7093)	**Transport Canada** • Initial environmental evaluation for planned runway extension, lighting, septic system and water supply system
1983–84 Richmond Auto Park EA, British Columbia (P6943)	**Richmond Auto Mall Limited** • Review of impacts to air quality, hydrology, vegetation, lighting, noise and traffic on a nearby nature park

Years/Project	Client/Summary of Services
1983–84 Hearst Ramp Sites IEE, Ontario (P6878)	**Transport Canada** • Initial environmental evaluation of installation of radar units at sites in the Hearst- Kapuskasing area
1981–83 Sasamat Gas Storage EA, British Columbia (P6417)	**British Columbia Hydro** • Environmental studies of geology, soils, water quality, air quality, wildlife and marine biota
1981–83 Proposed Methanol Plant Expansion EA, Kitimat, British Columbia (P6373)	**Ocelot Industries Limited** • Assessment of geology, soils, water quality, air quality, terrestrial/marine biota, and navigational safety
1981–82 Proposed Industrial Park Development EA, Ontario (P6286.01)	**Ontario Energy Corporation** • Review of environmental baseline data and anticipated impacts from proposed Bruce Energy Centre industrial complex and nearby nuclear facilities
1980–83 Natural Gas Pipeline EA, Prince Rupert, British Columbia (P6120-C)	**Carter Energy Limited** • Environmental assessment included impacts on agriculture, forestry, recreation, wildlife, air and water quality, noise levels, public and marine safety and slope stability
1980–81 Nordfibre Energy from Waste Project, North Bay, Ontario (P6064.01)	**Ontario Energy Corporation** • Assessment of the potential impacts of a proposed energy from waste facility
1980–82 Proposed Rod Mill, Vancouver, British Columbia (P5967)	**Tree Island Steel Co. Ltd.** • Assessment of aquatic and industrial resources, and development of mitigation measures to compensate for habitat losses
1980 EA Criteria, British Columbia (P5965)	**Resort Municipality of Whistler** • Development of criteria and guidelines to assist in evaluating environmental impacts from future residential development
1980 Thompson Open-Pit Mine EA, Manitoba (P5912)	**Inco Metals Company, Manitoba Division** • Study of the potential environmental impacts of a proposed open-pit nickel mine in Thompson
1979–80 Gambier Island Mine EA, British Columbia (P5671)	**20th Century Energy Corporation** • Biophysical, recreation, land use and cost/ benefit studies undertaken in connection with a proposed copper-molybdenum open-pit mine
1979–80 Transmission Line Route Selection, British Columbia (P5491)	**Ocean Falls Corporation** • Siting and environmental impact assessment to determine preferred corridor for a proposed transmission line between Kemano and Ocean Falls
1979–80 Port Development EA, British Columbia (P5321-A)	**Public Works Canada, Pacific Region** • Assessment of the environmental and sociological concerns associated with a proposed port development in the Lower Mainland area

Years/Project	Client/Summary of Services
1978–79 Gull Island Environmental Studies, NFDP (P5089)	**Newfoundland and Labrador Hydro** • Environmental impacts of proposed transmission line routes in the Churchill River area of Labrador with particular attention to stream crossings and wildlife activity
1978 Emma Lake Cottage Development, Saskatchewan (P4927)	**Emma Lake Development Limited** • Evaluation of the potential impacts of a proposed cottage subdivision at a resort lake in northern Saskatchewan
1978 Ferry Terminal EA, British Columbia (P4843)	**The British Columbia Ferry Corporation** • Environmental assessment of proposed ferry terminal in the Queen Charlotte Islands. Studies covered terrestrial and marine biology, oceanography, safety, and socioeconomics
1977–78 St. Marys Hydro Project EA, Sault Ste. Marie, Ontario (P4617.01)	**GLPL** • Environmental assessment for redevelopment of a hydro station at Sault Ste. Marie, Ontario. Emphasis on effects of construction on water quality and fisheries
1976–78 Coal Conversion Demonstration Plant, British Columbia (P4549)	**British Columbia Hydro** • Assessment and siting studies for a proposed plant. Work included environmental inventories and evaluation of impacts on wildlife, air and water quality, land use and socioeconomic base
1976 Lyons Creek Recreation Area Study, Ontario (P4537)	**The Niagara Peninsula Conservation Authority** • Overview of present environmental resources of the creek, including water quality, biological diversity and flow conditions
1976–78 Oil Storage Facility, Bell Island, NFDP (P4226)	**Wabanex Energy Corporation** • Study for proposed oil storage facility, including oceanographic surveys, review of biological resources, and determination of impacts of oil spills
1975–76 Marmion Lake Power Development EA, Ontario (P4029)	**Ontario Hydro** • Environmental investigation regarding proposed thermal generating station at Atikokan, including review of existing air quality, terrestrial and aquatic biology and socioeconomic base
1974–75 Forest Products Complex EA, Ontario (P3803,4550)	**Reed Papesr Ltd.** • Comprehensive siting and assessment study of potential environmental impacts from a large forest products development in northwestern Ontario
1974–75 Spanish River Hydro Project EA, Ontario (P3719,4616)	**Inco Limited** • Comprehensive environmental assessment prepared in accordance with guidelines to satisfy the Environmental Assessment Act of Ontario
1974–75 Cochin Pipeline EA (P3666)	**Dome Petroleum Limited** • Environmental impact statement for pipeline route between Alberta and Ontario, with particular attention to major river crossings
1973 Green River Hydro Project EA, New Brunswick (P3379)	**New Brunswick Electric Power Commission (NBEPC)** • Study of effects to wildlife, forestry and water quality resulting from proposed hydro development

Years/Project	Client/Summary of Services
1973 St. Lawrence Supertanker Port, Grande Ile, Québec (P3344.11)	**CECOP Company Limited, Ashland Oil Canada Limited, New England Petroleum Company Limited** • Environmental inventory of wildlife fisheries, benthic fauna, water quality, historic sites, recreational facilities, and aesthetic features. Effects of construction were assessed and a plan developed to minimize impacts
1972 Highway Environmental Interactions in Southern Canada (P3282)	**Transportation Development Agency** • Assessment of environmental impacts of interurban highways in Canada south of the Boreal Forest
1971–72 Environmental Study for Coleson Cove Thermal Station, New Brunswick (P2986)	**NBEPC** • Study of the impact of a 600-MW oil-fired electric power station on the environment in the Lorneville and Saint John areas

Appendix F
Funding Letter and Background Materials

FIRELIGHT INFRASTRUCTURE PARTNERS LP
State Street Financial Centre
30 Adelaide Street East, Suite 1600
Toronto, Ontario, Canada M5C 3H1
Telephone: (416) 365-3535
Facsimile: (416) 365-6565

May 13, 2009

Xeneca Power Development Inc.
5160 Yonge Street
Suite 520
North York, ON
M2N 6L9

Attention: P. Gillette, President & COO

Dear Sirs:

Ministry of Natural Resources (MNR) Water Power Site Release

This letter has been issued as supporting evidence related to MNR's site release process.

The Firelight Infrastructure Partners L.P. ("Firelight") is a jointly sponsored fund of OPTrust Private Markets Group and Dundee Realty Corporation. Firelight has entered into agreements with Xeneca to provide the pre-construction costs for the McCarthy Chute and Four Slide Falls. Subject to certain financial and due diligence targets being met, Firelight will provide the necessary equity to build the two projects.

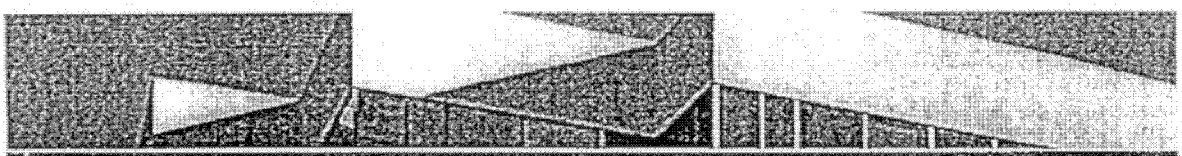
Please feel free to contact us if you have any questions regarding the foregoing or require further information in this regard.

Yours very truly,
Firelight Infrastructure Partners LP

Jason Lester
Chief Operating Officer

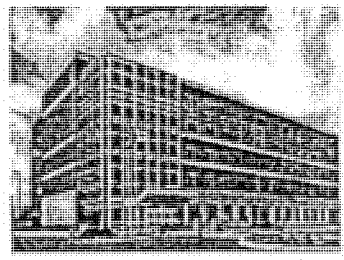
c.c. Gavin Ingram, OPTrust Private Markets Group
Michael Kosiancic, Firelight Infrastructure Partners LP

DUNDEE



Management

About Us



Toronto-based Dundee Realty Management Corp. ("Dundee Realty") has more than 7 million square feet of desirable, high-quality office and industrial properties under management. With properties located across Canada, including Toronto, Regina, Saskatoon, Calgary, Edmonton, Yellowknife and Vancouver, we have a strong national presence to help serve the varying needs of our customers and clients.

Our management team and staff are committed to continually improving the quality of our p through efficient property management, value added services for our tenants and capital improvements to our assets.

Dundee Realty Management Corp. was established in 1996 and operates as a wholly-owne subsidiary of Dundee REIT. We manage the properties owned by Dundee REIT as well as t property owners.

In August 2007, Dundee REIT completed the sale of its assets principally located in Ontario and Newfoundland to GE Real Estate. Dundee REIT continues to own approximately 6.3 m square feet of office and industrial properties located primarily in Western Canada. For mor please see the press release issued by Dundee REIT or visit the Dundee REIT web site at www.dundeereit.com.

Investments

- Investment Objective
  - Portfolio Diversification
  - Public Markets
  - Real Estate
  - Private Markets
  - Investment Performance
  - Statement of Investment Policies and Procedures
  - Corporate Governance
  - Significant Investments

Already collecting an OPTrust Pension?
Please see the section for Retirees.

Not yet a member?
Learn more about the Plan.

Investment Objective

With invested assets of $13.6 billion, OPTrust manages one of Canada's largest pension funds. Our investment objective reflects our long-term commitment to providing our 80,000 members and pensioners with a secure lifetime income in their retirement.

Our investment strategy is designed to achieve the necessary growth of the pension fund over the long term, while keeping risk within acceptable limits.

Funding target return

To meet our funding obligation, OPTrust's $13.6 billion investment portfolio must generate an average real rate of return (after inflation) of 4.0%, over the long term. Assuming inflation of 2.75% per year, the Plan's nominal target return is 6.75% for funding purposes.

This target provides a valuable reference point for evaluating OPTrust's investment performance, particularly over the long term. It is also a key criterion in establishing the Plan's asset mix and determining the amount of investment risk that it must assume.

Weighted market benchmark

Over short-term time horizons, we expect the Plan's returns to rise and fall from year to year, in response to the same factors that shape the overall performance of the markets in which we invest.

We therefore compare our investment performance to a composite "benchmark portfolio" that mirrors OPTrust's asset mix and the performance of each asset class. This provides a useful way to gauge the added value produced by OPTrust's active investment managers, compared to an equivalent passively managed portfolio.

Long-term performance

In 2007, OPTrust achieved a nominal return of 5.6%.[1] This result bettered the 4.2% nominal return for our composite benchmark, and compared well with the returns achieved by most other Canadian pension plans.

Our 2007 return fell short of the Plan's funding target and was down from the 13.4% return we achieved in 2006, reflecting challenging market conditions over the year.

In contrast, OPTrust's portfolio has produced an average annual return of 12.6% over the past five years, outperforming both our funding target return and the 11.1% average for our benchmark. Over our 13 years of operation, OPTrust has achieved an average annual return of 10.3%, *versus* 9.2% for the benchmark.

Appendix G
Big Eddy Notice to Newspapers

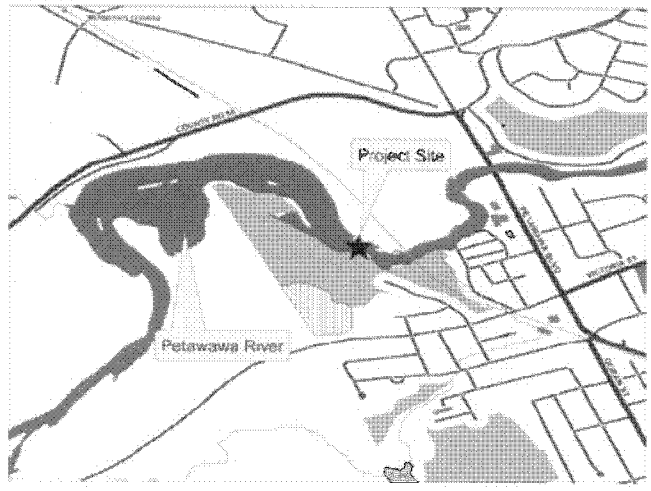
Notice of Waterpower Site Strategy
Big Eddy at the CPR Bridge – Petawawa River

Petawawa Green Energy Development Inc. has applied to the Ministry of Natural Resources to release a site on crown land in order to develop it as a hydro-electric generating station. As a component of this process the proponent is required to submit a Waterpower Site Strategy (WSS) document. This document will describe the conceptual design and operation of the facility. Provided the WSS is accepted by the MNR, the proponent will attain Applicant of Record Status for site number **2KB21 at Big Eddy at the CPR Bridge** (The Railway Rapid) on the **Petawawa River**. Current planning for this project estimates a generation potential of up to 10MW. Upon approval of the WSS and issuance of the Applicant of Record, the proponent will proceed with a *Class Environmental Assessment for Waterpower Projects* (Class EA) process as well as other permits and approvals required to secure land tenure. The *Class EA* is administered by the Ministry of the Environment and includes opportunities for public participation which will take place following this WSS consultation period. The Class EA consultation period will include notifications to the community regarding the availability of reports, studies and public open house events. The proponent has retained ORTECH Environmental to assist them in this process.

Interested parties are invited to comment in writing on this proposed development until **July 14, 2009**.

For more information please contact:

Leah Deveaux
ORTECH Environmental
804 Southdown Rd.
Mississauga ON; L5J 2Y4
Phone: 1-877-774-6560 ext. 305
905-822-4120 ext. 305
info@petawawadevelopments.com



Information will be collected and used in accordance with the Freedom of Information and Protection of Privacy Act, and solely for the purpose of assisting PGED in meeting permitting requirements. This material will be maintained on file for use during the study and may be included in project documentation. With the exception of personal information, all comments will become part of the public record.

Xeneca Power Development Inc.

5160 Yonge St., Suite 520, Toronto, ON M2N 6L9
tel: 416-590-9362 fax: 416-590-9955 www.xeneca.com

In Partnership with Petawawa Green Energy

May 29, 2009

"Big Eddy" waterpower

Project to provide green, renewable energy

PEMBROKE – A development proposed for the Town of Petawawa is part of Ontario's efforts to replace smog producing, coal fired electricity with clean, green, renewable waterpower.

The project, located on the Petawawa River immediately upstream from the CNR bridge at Portage Road, could produce up to 10 megawatts (MW) of energy – enough to run about 5,000 homes. Currently in the very early stages of development, extensive public consultation is planned to ensure all interested parties are informed, can present concerns and contribute ideas. Furthermore, the project must comply with all provisions under government legislation including the Canadian Environmental Assessment Act (CEAA).

Already, local stakeholders such as the Pembroke Outdoor Sportsman's Club have been presented with project information at local meetings, and much more consultation is planned with notices urging public comment appearing in local newspapers. Further meetings and public open house events are also planned.

The project being developed under the name Petawawa Green Energy is part of Xeneca Power Development which has extensive experience in energy development and has successfully developed waterpower plants across Ontario.

"We recognize the tremendous asset that is the Petawawa River, and we fully intend to build in a manner that meets or exceeds the needs of the environment as well as stakeholders such as anglers, white water rafters and kayakers, nature enthusiasts and all other recreational users," says Mark Holmes, Xeneca Vice President Corporate Affairs who will oversee the project's development.

"By adding to the value of the river by increasing our supply of renewable energy while maintaining or enhancing the existing natural and social benefits, we will have a successful project," concludes Mr. Holmes.

Public consultation, rigorous environmental studies, extensive engineering, water management planning and much, much more needs to be completed before the project can move into construction – a process that could take up to four years.

...2

Several design options are being considered for the project and final selection will depend on environmental, social and economic considerations. In relative terms, the developments will be low impact. The cost to build is estimated at about $ 4 million per megawatt, about half of which will be spent locally and regionally. Employment averages about 10,000 person-hours per megawatt and, over the long term (40 years), royalties and tax revenues will generate about $5 million per megawatt much of which will be paid to the town.

Waterpower facilities are assigned a lifespan of about 40 years, but with retrofits, a waterpower site can remain in production in excess of 100 years.

One megawatt is enough energy to run about 1,000 homes, and, once constructed, waterpower facilities have virtually no carbon emissions.

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For public questions or comment on the project, e-mail ldeveaux @ortech.ca. For media enquires only, contact Mark Holmes at 416-590-9362 or e-mail mholmes@xeneca.com

Appendix H
Stakeholder Response

Mark Holmes

From: Leah Deveaux [LDeveaux@ortech.ca]
Sent: July 20, 2009 1:17 PM
To:
Subject: RE: Petawawa River

Dear Mr. Guyea:

Thank you for your recent e-mail regarding the proposed waterpower development (Big Eddy) on the Petawawa River and please accept our apologies if it has been perceived we have not consulted with the Bonnechere Algonquin Community.

The proponent Petawawa Green Electricity Development (PGED) is currently working on two projects on the Petawawa River, one on CFB Petawawa known as Half Mile, and the other as you are aware at Big Eddy. They are both at very early stages and it is PGED's intention to ensure that your community and all others belonging to the Algonquin First Nation are fully informed and duly consulted regarding these potential developments.

Albeit informally at this early stage, PGED has, as suggested by Pembroke MNR, approached the firm of JP2G to begin the process of discussing a working relationship through which comprehensive, effective and ultimately successful consultation will occur with all of the area's Algonquin First Nation Communities.

Quite frankly, PGED would have initiated consultation some time ago following MNR notification of the Algonquin First Nation, but, as you are likely aware, the Government of Ontario has recently passed the Green Energy Act (GEA) and the related Renewable Energy Approvals (REA) process which may significantly alter the means through which First Nation consultation, benefit sharing and community participation in projects may occur.

The proponent continues to seek clarity on the government's new process, but, in the meantime they would be pleased to open dialogue with you and members of your community.

Furthermore, if you wish I can add your name to our distribution list to ensure you receive all future correspondence issued with respect to both of these projects. Kindly advise if that is appropriate and if you would like assistance in reviewing studies as they become available next year

Regards,

Leah Deveaux, BES
EA Specialist
ORTECH Power
804 Southdown Rd.
Mississauga, ON ; L5J 2Y4
Tel: (905) 822-4120 ext. 305
1-877-774-6560 ext. 305
Fax: (905) 855-0406
www.ortech.ca

Please consider the environment before printing this email.

From: [redacted]]
Sent: Wednesday, July 15, 2009 3:03 PM
To: Leah Deveaux
Subject: Petawawa River

We at the Bonnechere Algonquin Community in Petawawa were not made aware of any proposed development on our traditional land claim area. There is to be no development on our territory until it is cleared with the Algonquin people.

Director
Bonnechere Algonquin Community

Mark Holmes

From: Leah Deveaux [LDeveaux@ortech.ca]
Sent: July 16, 2009 10:32 AM
To: Ottawa Riverkeeper
Subject: RE: Hydro development on Petawawa River

Jessie,

Thank you for your interest in the Big Eddy waterpower project. Please note that the proponent, Petawawa Green Electricity Development (PGED), is aware of issues you have brought forward. Your correspondence has been duly noted and logged and you have been added to our stakeholder database through which you will receive information and notices regarding project development.

PGED is currently drafting a Waterpower Site Strategy (WSS) document which will outline at a conceptual level the design and operation of the development including strategies to address concerns raised by interested stakeholders. As the project progresses more information will become available.

Starting with a baseline study of the project area, an assessment of environmental impacts will be analyzed in the Environmental Review stage of the project. Consultations with the provincial and federal agencies, First Nations and local stakeholders regarding these findings will be a significant component of project development and will ensure the project is designed to protect the natural environment and local values. Public consultations will continue throughout the environmental review and each subsequent phase of this project with the posting of public notices and open house opportunities.

This small scale hydroelectric project meets the objectives and goals of the Ontario government's commitment to offset fossil fuel generation with green, renewable energy. Distributed connection projects such as the Big Eddy Generating Station (Big Eddy) benefit the community by reducing the need for increased high voltage transmission connections and providing long term economic benefits through local taxes and fees. The Ontario government has recently cleared the way for hydroelectric projects like Big Eddy to operate under a 40 year contract, which results in a more stable, long term, reliable and cost efficient renewable power source.

Again we thank you for your interest and look forward to working with you and other interested stakeholders on this project.

A second structure is proposed on lands under CFB Petawawa jurisdiction; this project will undergo a federal process and is being developed in coordination with CFB Petawawa, information can be found on the Canadian Environmental Assessment Agency Registry website under project number 09-01-47878, the registry notice indicates who to contact for further information on that project (known as Half Mile Rapids).

For further information on the MNR process for development of crown land for waterpower sites please see the MNR website: http://www.mnr.gov.on.ca/en/Business/Renewable/2ColumnSubPage/STEL02_167251.html. Also you can view the Class EA for Waterpower through the Ministry of the Environment website at: http://www.ene.gov.on.ca/en/eaab/parent-class-ea-list.php

Sincerely,

Leah Deveaux, BES
EA Specialist
ORTECH Power
804 Southdown Rd.
Mississauga, ON ; L5J 2Y4
Tel: (905) 822-4120 ext. 305
1-877-774-6560 ext. 305
Fax: (905) 855-0406
www.ortech.ca

Please consider the environment before printing this email.

From: Ottawa Riverkeeper [mailto:info@ottawariverkeeper.ca]
Sent: Monday, July 13, 2009 4:08 PM
To: Leah Deveaux
Subject: Hydro development on Petawawa River

Good afternoon,

I'm emailing with regards to the proposed hydro development on the Petawawa River, the proponent being Xeneca Power Development Corporation. I work for an organization called Ottawa Riverkeeper, and part of what we do is track new developments (or proposed developments) within the Ottawa River watershed to keep the public informed about what's happening along the Ottawa River and its subsidiaries, which includes the Petawawa River. Our starting point usually involves gathering some general information about new projects being proposed, and I'm interested in knowing a little bit more about the proposed project at Petawawa, however none of the links (other than the contact link) on the Petawawa Developments website seem to be functional. I noticed that the period in which interested parties can submit comments regarding the project ends tomorrow, so while we will be unable to participate in this preliminary consultation with the public, I would still appreciate it if someone would be able to connect me with information regarding the project.

Thanks and best regards,

Pollution Hotline Coordinator – Coordinatrice, ligne info anti-pollution

Phone - Téléphone - (613) 321-1120

Email - Courriel - info@ottawariverkeeper.ca

Ottawa Riverkeeper - Sentinelle Outaouais

www.ottawariverkeeper.ca

Mark Holmes

From: Leah Deveaux [LDeveaux@ortech.ca]
Sent: July 16, 2009 10:29 AM
To:
Subject: RE: Hydro Project at Big Eddy, Petawawa

Thank you for your interest in the Big Eddy waterpower project. Please note that the proponent, Petawawa Green Electricity Development (PGED), is aware of issues you have brought forward. Your correspondence has been duly noted and logged and you have been added to our stakeholder database through which you will receive information and notices regarding project development.

PGED is currently drafting a Waterpower Site Strategy (WSS) document which will outline at a conceptual level the design and operation of the development including strategies to address concerns raised by stakeholders such as yourself. At this time the proponent is only in the initial stages of the WSS drafting process, as they are still drafting a conceptual design the location of the structure and details regarding diversions is uncertain.

Starting with a baseline study of the project area, an assessment of environmental impacts will be analyzed in the Environmental Review stage of the project. Consultations with the provincial and federal agencies, First Nations and local stakeholders regarding these findings will be a significant component of project development and will ensure the project is designed to protect the natural environment and local values. Public consultations will continue throughout the environmental review and each subsequent phase of this project with the posting of public notices and open house opportunities.

This small scale hydroelectric project meets the objectives and goals of the Ontario government's commitment to offset fossil fuel generation with green, renewable energy. Distributed connection projects such as the Big Eddy Generating Station (Big Eddy) benefit the community by reducing the need for increased high voltage transmission connections and providing long term economic benefits through local taxes and fees. The Ontario government has recently cleared the way for hydroelectric projects like Big Eddy to operate under a 40 year contract, which results in a more stable, long term, reliable and cost efficient renewable power source.

Again we thank you for your interest and look forward to working with you and other interested stakeholders on this project.

For further information on the MNR process for development of crown land for waterpower sites please see the MNR website: http://www.mnr.gov.on.ca/en/Business/Renewable/2ColumnSubPage/STEL02_167251.html.
Also you can view the Class EA for Waterpower through the Ministry of the Environment website at:
http://www.ene.gov.on.ca/en/eaab/parent-class-ea-list.php

Sincerely,

Leah Deveaux, BES
EA Specialist
ORTECH Power
804 Southdown Rd.
Mississauga, ON ; L5J 2Y4
Tel: (905) 822-4120 ext. 305
1-877-774-6560 ext. 305
Fax: (905) 855-0406
www.ortech.ca

Please consider the environment before printing this email.

From:
Sent: Tuesday, July 14, 2009 1:47 PM
To: Leah Deveaux
Subject: Hydro Project at Big Eddy, Petawawa

I'm writing to object to the proposed hydro project at Big Eddy on the Petawawa River. I have reviewed the powerpoint slide presentation, available at
http://www.blackbay.ca/BBRA/Issues/PowerStations/Petwawa%20version%202.ppt
http://www.blackbay.ca/BBRA/Issues/PowerStations/Petwawa%20version%202.ppt

According to this presentation, the hydro project will have no net-negative impact on the environment or recreation. Diverting the river from two significant rapids has great impact to recreational opportunities for canoers, kayakers, and fishers. The diversion of water will impact a key resource used by Scouts Canada, several YMCA camps from Ottawa and the environs, and at least 3 paddling clubs that I'm aware of (Couriers de Bois, YCCC, Ottawa River Runners).

I cannot see how removing water from Big Eddy to the Catwalk rapids can be considered net-neutral or net-positive. I strongly object to this project, and when I paddle there this weekend, I'm going to mention this to the restaurant I eat in, the gas station I fill up with, and the corner store that will supply my snacks. This project also impacts small businesses financially, since our paddling clubs will no longer travel to Petawawa to look at tail-race.

Mark Holmes

From: Leah Deveaux [LDeveaux@ortech.ca]
Sent: July 16, 2009 10:27 AM
To:
Subject: RE: Big Eddy proposal

[redacted] **s.21**

Thank you for your interest in the Big Eddy waterpower project. Please note that the proponent, Petawawa Green Electricity Development (PGED), is aware of issues you have brought forward. Your correspondence has been duly noted and logged and you have been added to our stakeholder database through which you will receive information and notices regarding project development. In order to create a complete listing of involved stakeholders we prefer to have on file mailing addresses as well as e-mail addresses. This will allow for PGED to maintain contact with you in the event email communication is not possible.

PGED is currently drafting a Waterpower Site Strategy (WSS) document which will outline at a conceptual level the design and operation of the development including strategies to address concerns raised by interested stakeholders. As the project progresses more information will become available.

Starting with a baseline study of the project area, an assessment of environmental impacts will be analyzed in the Environmental Review stage of the project. Consultations with the provincial and federal agencies, First Nations and local stakeholders regarding these findings will be a significant component of project development and will ensure the project is designed to protect the natural environment and local values. Public consultations will continue throughout the environmental review and each subsequent phase of this project with the posting of public notices and open house opportunities.

This small scale hydroelectric project meets the objectives and goals of the Ontario government's commitment to offset fossil fuel generation with green, renewable energy. Distributed connection projects such as the Big Eddy Generating Station (Big Eddy) benefit the community by reducing the need for increased high voltage transmission connections and providing long term economic benefits through local taxes and fees.
The Ontario government has recently cleared the way for hydroelectric projects like Big Eddy to operate under a 40 year contract, which results in a more stable, long term, reliable and cost efficient renewable power source.

Again we thank you for your interest and look forward to working with you and other interested stakeholders on this project.

For further information on the MNR process for development of crown land for waterpower sites please see the MNR website:
http://www.mnr.gov.on.ca/en/Business/Renewable/2ColumnSubPage/STEL02_167251\.html
Also you can view the Class EA for Waterpower through the Ministry of the Environment website at:
http://www.ene.gov.on.ca/en/eaab/parent-class-ea-list.php

Sincerely,

Leah Deveaux, BES
EA Specialist
ORTECH Power

804 Southdown Rd.
Mississauga, ON ; L5J 2Y4
Tel: (905) 822-4120 ext. 305
1-877-774-6560 ext. 305
Fax: (905) 855-0406
www.ortech.ca

P Please consider the environment before printing this email.

-----Original Message-----
From: [redacted] [mailto:
Sent: Wednesday, July 08, 2009 8:26 PM
To: Leah Deveaux
Cc: tspurrell@petawawa.ca
Subject: Big Eddy proposal

TO: Leah Deveaux or representative
ORTECH Environmental

FROM: [redacted]
resident, Petawawa Point

RE: Notice of Waterpower Site Strategy

Having recently learned the of the application by Petawawa Green

Energy development Inc to have Crown land on the Petawawa river released for hydroelectric development, I wish to know more.

My main question is: "Who will benefit if this plan is allowed to go ahead?

Thank you.

Appendix I
Public Consultation

Xeneca
Power Development Inc.

5160 Yonge St., Suite 520, Toronto, ON M2N 6L9
tel 416-590-9362 fax 416-590-9955 www.xeneca.com

In Partnership with Petawawa Green Energy

April 22, 2009

Dear

Public notices will, in the next few days, be issued with respect to waterpower development on the Petawawa River.

Aside from outlining the nature of the relatively small (up to 10 Megawatts) hydro electric project, the notice is part of our company's efforts to -- first and foremost -- keep the community informed and engage the public in providing their input and insights on renewable, green energy projects in their area.

Our company, Petawawa Green Energy, is part of the Xeneca Power Development family of companies that is working to building renewable energy facilities in Ontario. Our "Big Eddy" project is focused on the area immediately upstream from the CNR bridge (Wilson Ave and Portage Road area) within the Town of Petawawa.

We are currently investigating several different site development options, each of which is being reviewed on criteria that includes but is not limited to:

- Impact on the river eco system
- Maintaining and enhancing recreational activities on the river
- Economic viability to construct and operate
- Improving Ontario's supply of green, renewable energy
- Addressing community concerns.

To put our development proposal into perspective, a 10 MW generating facility would create about 10,000 person hours of work per Megawatt (a total of about 100,000 hours of labor) much of it spent locally on goods and services ranging from local labor and contracting, cement and steel production, transportation, surveying, real estate, legal and consulting services. Indirect, spin off economic activity in the form of accommodations, food, fuel and other services would also be considerable.

The long term economic benefits would include permanent part time work, a steady revenue stream to the Town of Petawawa and CFB Petawawa, improved electricity generating and distribution capacity and potential enhancement of recreational activities and related tourism.

We are writing you today to:

- Inform you of our development proposal
- Garner your input into both the project and process leading up to and beyond construction
- Discuss any and all concerns related to the development
- Discuss compensation and/or mitigation with affected land owners between the CNR bridge and Hwy. 17 within the Town of Petawawa.

Naturally, local landowners will wonder about impacts to their property located immediately upstream of the project.

Complying with all Federal and Provincial regulations, any development proposal would not exceed water levels experienced during the course of a normal year, and, as such, no significant changes to current land use between the CNR bridge and Hwy. 17 is anticipated.

However, if you are interested, we are open to negotiate an agreement, possibly an easement of 50 -100 cm of shoreline you own on sections of the Petawawa River between the CNR bridge and Hwy 17.

For example, an easement will involve landowner compensation for limited, timely access to the shoreline in order to:

- Conduct studies
- Make slight alterations to water levels (changes would not exceed normal fluctuations after a period of normal summer rainfall).

Compensation could start upon signing of an agreement (2009) with a series of payments and conclude when the project is built.

From our perspective, an agreement will help assure that you receive a net benefit for your cooperation and assistance, and, further, that we can demonstrate to federal and provincial authorities that landowner issues have been addressed.

As a landowner immediately upstream from the Big Eddy site, we recognize you have a significant interest in our project and, as such, we wish to extend to you the opportunity to contact us at your convenience using one of the following methods:

Write to: Petawawa Green Energy
Attn: L. Deveaux
ORTECH Power
804 Southdown Road
Mississauga, ON L5J 2Y4
e-mail: ldeveaux@ortech.ca
fax: 05-855-0406

Please know that your questions, comments and input are highly valued and it is our intention to develop the site in the most sustainable manner possible.

We look forward to speaking/meeting with you in the near future.

Very best regards,

Patrick W. Gillette
President/COO

Appendix I
Public Consultation

Xeneca
Power Development Inc.

5160 Yonge St., Suite 520, Toronto, ON M2N 6L9
tel 416-590-9362 fax 416-590-9955 www.xeneca.com

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- Conduct studies
- Make slight alterations to water levels (changes would not exceed normal fluctuations after a period of normal summer rainfall).

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Attn: L. Deveaux
ORTECH Power
804 Southdown Road
Mississauga, ON L5J 2Y4
e-mail: ldeveaux@ortech.ca
fax: 05-855-0406

Please know that your questions, comments and input are highly valued and it is our intention to develop the site in the most sustainable manner possible.

We look forward to speaking/meeting with you in the near future.

Very best regards,

Patrick W. Gillette
President/COO

Appendix J
First Nations

Blaney McMurtry
BARRISTERS & SOLICITORS LLP

EXPECT THE BEST

August 13, 2009

DELIVERED BY FAX AND EMAIL

ORTECH Environmental
804 Southdown Road
Mississauga, Ontario
L5J 2Y4

Attention: Leah Deveaux

RE: **Notice of Waterpower Site Strategy**
Big Eddy Rapids, Petawawa River
Site 2KB21
Our Project No. 2097334A (CP-99)

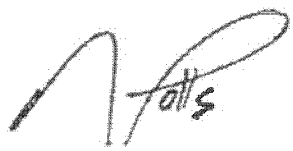
2 Queen Street East
Suite 1500
Toronto, Canada M5C 3G5
416.593.1221 TEL
416.593.5437 FAX

Dear Ms. Deveaux:

Robert J. Potts
416.593.3952
bpotts@blaney.com

Further to a notice in The Daily Observer May 27, 2009 please be advised that the Algonquins of Ontario have issued a letter to the Ministry of Natural Resources (via Ken McWatters, Resource Liaison Officer, Pembroke District) requesting that no MNR approvals be issued on the Big Eddy Rapids Site 2KB21 unless and until Algonquin cultural, environmental and economic interests are satisfactorily addressed.

Yours very truly,



R. J. Potts
Principal Negotiator

c.c. - Algonquin Negotiation Representatives
- B. Crane, Chief Provincial Negotiator
- R. Aitken, Chief Federal Negotiator
- P. Moreau, MNR Pembroke District Manager
- J. E. Hunton, Jp2g Consultants

Blaney McMurtry
BARRISTERS & SOLICITORS LLP

EXPECT THE BEST

June 10, 2009

Xeneca Power Development Inc.
2395 Speakman Drive
Mississauga, Ontario L5K 1B3

Attention: Patrick Gillette

RE: **Algonquins of Ontario**
Update on Land Claim Negotiations
Thursday, June 25, 2009

2 Queen Street East
Suite 1500
Toronto, Canada M5C 3G5
416.593.2221 tel
416.593.5437 fax
www.blaney.com

Dear Mr. Gillette:

As you may be aware the governments of Canada and Province of Ontario are currently engaged in Land Claim Treaty Negotiations with the Algonquins of Ontario (AOO). The AOO is recognized by both governments as the **only** entity it is negotiating with to reach a settlement of a land claim for the traditional territory of the Algonquins.

These negotiations involve a variety of matters and activities within Algonquin Traditional Territory. From the perspective of the AOO, a treaty will accomplish reconciliation, and allow the Algonquins to rebuild themselves as a Nation. The AOO has demonstrated its determination to proceed in a manner that is respectful of others living in its Traditional Territory and creates a positive outcome for all.

Robert J. Potts
416-593-3952
bpotts@blaney.com

At the same time, the governments have demonstrated their commitment to "consult and, where appropriate, accommodate" with the Algonquins. Both governments and the AOO recognize the fundamental need to protect non-native stakeholder interests. As these negotiations continue, matters will arise of mutual concern to the AOO, the governments (including Municipalities) and private enterprise.

We understand that there is a need for dialogue as a result of confusion and apprehension regarding the consultation process. Much of this confusion has been precipitated by events outside of the treaty process that are counter-productive to relationship building, economic development and the reconciliation efforts currently being pursued by all three principals.

This letter is to invite representatives of your firm who may be interested in obtaining clarification as to the Algonquin Land Claim and the associated consultation process to an information sharing workshop. We have invited Federal and Provincial representatives, municipalities in the Ottawa Valley, business leaders and police representatives; so that all concerned can share information, voice their questions/concerns and obtain responses all within the same venue.

We believe this event will be important in building an understanding of the process underway and in maintaining goodwill between native and non-native interests in the months and years to come.

This workshop will be held at the Pembroke Best Western Inn on Thursday, June 25, 2009 from 1:00 p.m. to 4:00 p.m.

Please RSVP if you plan to attend to the Algonquins of Ontario Consultation Office c/o J. E. Hunton at jhunton@jp2g.com

Your anticipated attendance and input would be welcome and appreciated.

Yours truly,

Robert J. Potts
Principal Negotiator

c.c. - Algonquin Negotiation Representatives

Ministry of
Natural Resources
31 Riverside Drive
Pembroke, ON
K8A 8R6

Ministère des
Richesses naturelles

Ontario

September 23, 2008

Chief Kirby Whiteduck (ANR Contact)
Algonquins of Pikwàkanagàn
1657A Mishomis Inamo
Pikwàkanagàn Golden Lake, ON K0J 1X0

Dear Chief Whiteduck:

SUBJECT: **Waterpower Application**
Big Eddy Rapids, Petawawa River

This letter is to advise you that the Ministry of Natural Resources (MNR) has accepted an application for a waterpower development at the big Eddy Rapids on the Petawawa River by Petawawa Green Electricity Development Inc. The proponent was successful in obtaining a lease agreement with the Town of Petawawa and with the Federal Government, who each own a bank of the river. The Provincial Crown retains ownership of the bed of the river at this location and as such, the MNR's Waterpower Direct Site Release process applies.

Over the next several months, the applicant must demonstrate to MNR their intent, means, and knowledge in developing a waterpower structure at this site. If successful in fulfilling the requirement of the Direct Site Release process, Applicant of Record status will be awarded to the proponent. This status allows the proponent to apply for the necessary approvals to construct and operate a waterpower facility. The proponent will have to fulfill federal, provincial, municipal and environmental assessment requirements prior to any authorizations or approvals being issued.

No rights or tenure are associated with the acceptance of the application or with achieving Applicant of Record status. MNR has not given any approval for the proposed project.

If you and the appropriate Algonquin Negotiation Representatives are interested at this stage in participating in a meeting with the proponent, we are willing to set one up.

Yours Truly,

Original signed by Ken McWatters

Ken McWatters
Resource Liaison Officer
Pembroke District

c: Jp2g Consultants Inc., 12 International Drive, Pembroke, Ontario, K8A 6W5

Xeneca Power Development Inc.

5160 Yonge St., Suite 520, Toronto, ON M2N 6L9
tel 416-590-9362 fax 416-590-9955 www.xeneca.com

July 24, 2009

Mr. Jim Hunton
12 International Drive
Pembroke, ON K8A 6W5 pembroke@jp2g.com

Dear Jim:

As follow up to our July 22 meeting at Jp2g's Pembroke office, I wanted to reiterate our thanks for what we believe was a very constructive, open and informative first meeting regarding consultation with the Algonquin First Nations.

Although at the very early stages of development, Xeneca's proposed waterpower projects on the Petawawa River have generated -- and will likely continue to generate -- considerable interest among First Nation communities as well as residents and other stakeholders in the Petawawa area.

With respect to First Nations consultation, we want to reaffirm our commitment to ongoing communication with the Algonquin First Nations, and that Xeneca would be pleased to meet with First Nations community leaders to share our project concepts and to begin what we believe will be a positive relationship.

As a starting point, the Xeneca Code of Conduct that we left with your office outlines in draft form how our company is prepared to work with the First Nations communities. We recognize, however, that (under Bill 150 The Green Energy Act) fundamental changes to public policy regarding development of renewable energy are imminent and, as such, it is unclear at this time how First Nations consultation and benefit sharing will be structured.

Furthermore, as noted above, our projects are at a relatively early stage of development. Aerial surveys, hydrology, design concepts, environmental and social considerations etc., are still being studied and analyzed to determine preliminary design options, production capacity, connection points to the power grid and much more. Also of primary importance is obtaining a power purchase agreement from the Ontario Power Authority. Without a purchase agreement, market conditions will not allow the waterpower facility to be built.

How the facility will operate, how much water can be diverted, etc., will also be determined but further on in the process.

Bearing those points in mind Xeneca respectfully suggests that, while notification and consultation can proceed immediately with First Nations, the benefit sharing/project participation discussions would be

Xeneca
Power Development Inc.

best left until studies, analysis and preliminary design work has been completed and the implications of the Green Energy Act are clarified and understood.

Also, further to our discussion, there are several potentially significant government programs related to First Nations participation in renewable energy projects that may be of interest to the Algonquin First Nation, specifically:

- programs that provide funding to build or hire capacity within communities to better understand renewable energy project impacts, benefits and potential participation,
- Programs that offer loan guarantees to communities wishing to partner in renewable energy projects,
- Programs that offer a power pricing incentive for First Nation participation.

Xeneca would be pleased to discuss and assist the Algonquin First Nation in accessing any funding that may be relevant to their interest in renewable energy projects.

Jim, again, thank you for your time and assistance in our efforts to consult with the Algonquin First Nation and, should you have questions, comments or additional information to share, we can be contacted at any of the numbers below.

Very best regards,

Mark Holmes
Vice President, Corporate Affairs
Xeneca Power Development
416-705-4283 (cell)
mholmes@xeneca.com

cc. MNR, Pembroke District, Attn: Paul Moreau
Leah Deveaux, Ortech Power

Jp2g Consultants Inc.
ENGINEERS ■ PLANNERS ■ PROJECT MANAGERS

J.M. Jancsi, M.Sc., P.Eng.
J.E. Hunton, M.C.I.P., RPP

August 10, 2009

Xeneca Power Development
5160 Yonge St.
North York
M2N 6L9

Attention: Mark Holmes
Vice President, Corporate Affairs

by e-mail and mail
mholmes@xeneca.com

RE : Waterpower Proposals in Algonquin Land Claim Area
Subject: Big Eddy Rapids Application for Applicant of Record Status
Site 2KB21 - Petawawa River
Our Project No. 2097334A (CP-99)

Dear Sir:

This is to acknowledge with thanks your letter of July 24, 2009. As you are aware from our July 22 meeting I have been instructed by the Algonquins of Ontario (AOO) to send letters on all current water power proposals within Algonquin Traditional Territory indicating the AOO requirement for MNR to refrain from issuing any Applicant of Record or subsequent approvals for any water power proposals on historic waterways in Algonquin Traditional Territory; until MNR and the AOO have initiated discussions firstly with regard to potential revenue streams as per the Ontario Green Energy Act (and the Ontario Power Authority Feed-in Tariff Program) and secondly, with regard to establishing consultation protocols specifically for the Algonquin Traditional Territory.

I expect we will be convening such a meeting in late September and will keep you apprised in this regard.

I look forward to discussing your application further once we have convened our meeting with MNR and obtained some clarity regarding their disposition in the above noted matters.

Yours very truly,
Jp2g Consultants Inc.
Engineers · Planners · Project Managers

J. E. Hunton, MCIP, RPP
Vice President

JEH/lr

c.c. - All ANRs