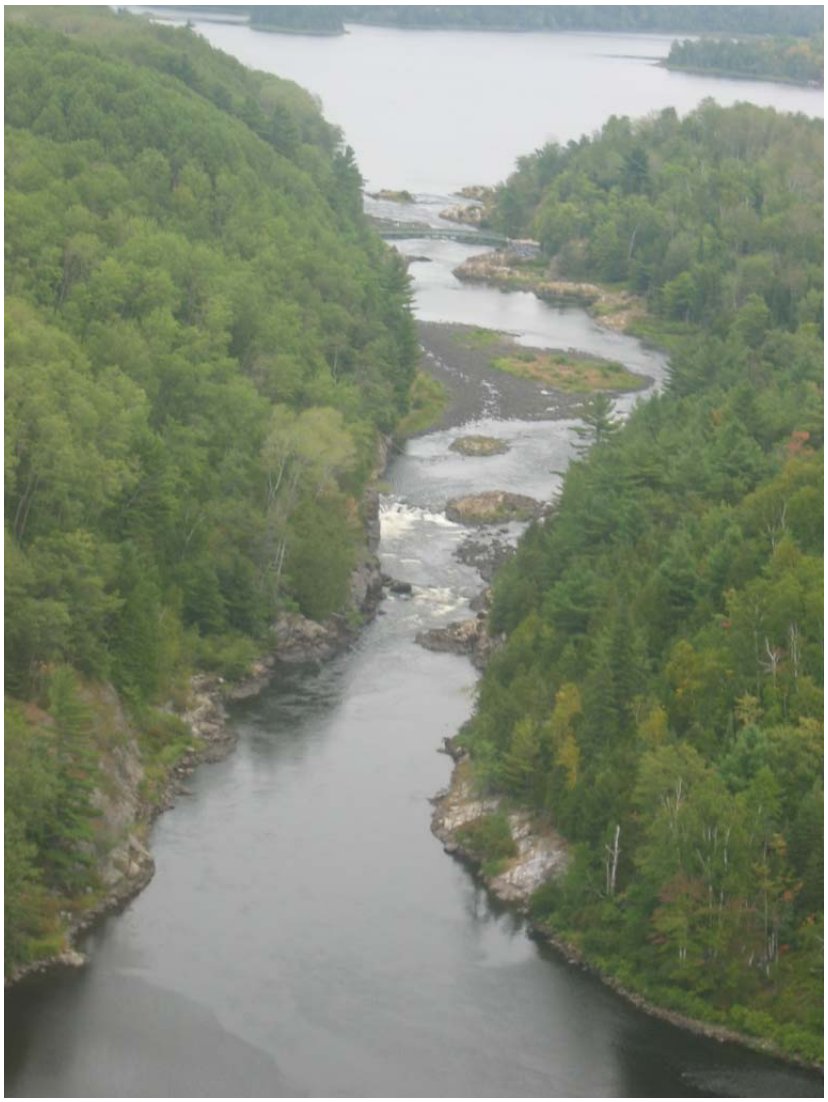
Appendix B

Project Description

N.B.

Please note that the following Project Description was issued in November 2010 to federal and provincial regulators for the purposes of introducing the project and initiating discussion at the start of the EA planning process. For the reader's convenience, the Project Description is included as an appendix to this Environmental Report as a reference for the initial scope of the project and to ensure that all relevant project information is presented.

The main Environmental Report represents the most up-to-date document, and its contents supersede what was presented in the Project Description.



Project Description

Wabageshik Rapids
(Vermilion River)
Hydroelectric Generating Station

Xeneca Power Development Inc.

Distribution:
Canadian Environmental Assessment Agency

Federal Agencies to be contacted by the Federal Environmental Assessment Coordinator
Environment Canada
Fisheries and Oceans Canada
Health Canada
Indian and Northern Affairs Canada
Natural Resources Canada
Transport Canada
Other departments as identified by CEAA

Provincial Agencies
Nickel District Conservation Authority
Ministry of Aboriginal Affairs
Ministry of Tourism and Culture
Ministry of Energy and Infrastructure
Ministry of the Environment
Ministry of Municipal Affairs and Housing
Ministry of Natural Resources
Ministry of Transportation
Ministry of Northern Development, Mines and Forestry
Ontario Waterpower Association

Municipal
Township of Nairn and Hyman
City of Greater Sudbury
Town of Walden
Town of Onaping Falls

First Nations
Sagamok First Nation
Whitefish River First Nation
Wahnapitae First Nation
Whitefish Lake First Nation
North Channel Métis Council
Sudbury Métis Council

TABLE OF CONTENTS

1. General Information

1.1 General

This Project Description has been prepared by the proponent, Xeneca Power Development Inc. (Xeneca), based on the current conceptual design for the Wabageshik Rapids Generating Station, in order to satisfy the requirements of the federal *Canadian Environmental Assessment Act* (CEAA) as well as the provincial Class Environmental Assessment for Waterpower Projects (Ontario Waterpower Association (OWA), 2008).

Conceptual design is subject to change subsequent to the results of studies in support of the proposed undertaking, comment by regulatory agencies, First Nation and Aboriginal Communities and other stakeholders.

1.1.1 Name and Proposed Location of Project

The name of the project is "Wabageshik Rapids" and is located on the Vermilion River west of the City of Sudbury at existing rapids approximately 400 m downstream of a local road, 600 m downstream of Wabageshik Lake (Figure 1).

Xeneca's proposed At Soo Crossing Generating Station (G.S.) is located approximately 30 km upstream of the Wabageshik Rapids site. At Soo Crossing G.S. is being evaluated under a separate provincial Waterpower Class Environmental Assessment (EA) and a federal screening under CEAA. The legal description for the project site is Lot 6, Concession 6 Township of Foster.

1.1.2 Nature of the Project

Xeneca submitted a Waterpower Site Release Application to the Ministry of Natural Resources (MNR) on May 22, 2007 for Wabageshik Rapids Site ID Number 2CF12. The MNR released this site as part of a Non-Competitive Site Release Package. Peterborough MNR acknowledged receipt of the application on June 28, 2007 and MNR Sudbury acknowledged it on January 12, 2009. Xeneca has yet to receive a Site Description Package for this site and has yet to be awarded Applicant of Record Status by the Ministry.

Xeneca was awarded a Feed-in-Tariff (FIT) contract for this site by the Ontario Power Authority on April 29, 2010.

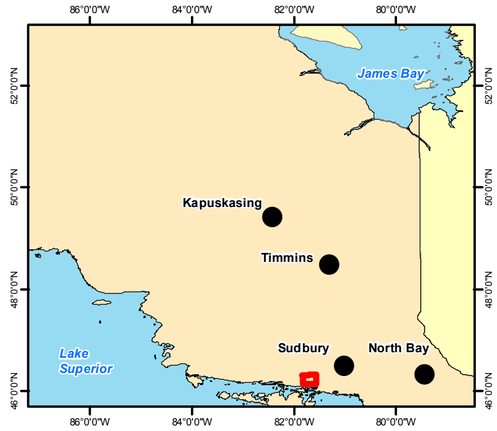
Xeneca is proposing to construct a hydroelectric generating facility on the Vermilion River. The proposed facility would have a generating capacity of 3.4 MW. The station would include a water control structure (spillway and control dam), open approach canal and powerhouse. Road upgrades as well as new road construction would be required to access the site. A 10.4 km – 44 kV power line connecting to feeder 18M2 from the Espanola transformer station (TS) would be required in order to connect the station to the provincial power supply grid.

Project design information presented herein is based on preliminary investigations and analyses. Design optimization and finalization will be conducted pending the results of feasibility studies, field investigations as well as public and agency consultation. The description of the components of the project will be updated throughout the environmental assessment process as detailed design information becomes available.

81°46'0"W
81°39'0"W
46°15'0"N
46°10'0"N
Wabageshik Lake
Wabageshik Rapids
Espanola
6
ONTARIO

LEGEND

- Site Locations
- Roads
- Water Features



REFERENCE

Note: MNR & Geogratis Data Services (2010)
UTM Zone 17

0 1,875 3,750
Meters

1:50,000

PROJECT

WABAGESHIK RAPIDS GS

TITLE

SITE LOCATION MAP

PROJECT No.			**FIGURE**
DESIGN	KC	06/10/2010	
GIS	KC	06/10/2010	
CHECK	TS	06/10/2010	1
REVIEW	PD	06/10/2010	

1.1.3 Purpose of the Project

The purposes of the project are to:

- Meet government and energy regulatory agency goals and objectives to generate environmentally sustainable hydroelectric green energy on a consistent and reliable basis; and
- sell the generated power to the Ontario Power Authority (OPA) under a Feed-in-Tariff (FIT) contract.

In order to meet these objectives, Xeneca will try to maximize the use of existing infrastructure to connect to the existing distribution grid and to the provincial power grid.

1.1.4 Economic Benefits

The proposed Wabageshik Rapids generating station would have a total installed capacity of approximately 3.4 MW.

Waterpower creates jobs, generates revenue to the taxpayers of Ontario and is the longest lived and most reliable source of clean, renewable electricity.

- Approximate economic activity (direct) to build in Ontario is $5 million per megawatt, about half of which is spent locally procuring everything from consulting and legal services to concrete, steel, trucking and other services such as hotels, restaurant and fuel.
- Direct job creation (construction only) 10,000 person hours per MW. Indirect jobs multiply by 1.5.
- Local/Regional economic boost of $2.5 million per MW – about $12 million.
- First Nations and non-Aboriginal community participation incentives. For overview see Xeneca Website.
- Significant return to the people of Ontario with approximately $5 million per MW ($24 million over the 40 year lifespan of the project) paid through Gross Revenue Charges (GRC) and provincial and federal income taxes.
- May assist mining companies or local industry by providing more reliable power with some potential cost savings.
- Waterpower lasts… many power plants built in the early 1900s are still in operation and with regular maintenance and upgrades can last for generations to come. In comparison the life span for other sources of clean power are: nuclear 40 years, wind 20 years, solar 20 years.

1.1.5 Parties who Received the Project Description

This Project Description has been submitted to the Canadian Environmental Assessment Agency (CEAA) for distribution to relevant federal agencies including:

- Environment Canada (EC)
- Fisheries and Oceans Canada (DFO)
- Health Canada (HC)
- Indian and Northern Affairs Canada (INAC)
- Natural Resources Canada (NRCan)
- Transport Canada (TC)
- Other departments as identified by CEAA

The Project Description will also be submitted to the following provincial Ministries, municipalities and Aboriginal communities:

Provincial Agencies

- Nickel District Conservation Authority
- Ministry of Aboriginal Affairs
- Ministry of Tourism and Culture
- Ministry of Energy and Infrastructure
- Ministry of the Environment
- Ministry of Municipal Affairs and Housing
- Ministry of Natural Resources
- Ministry of Transportation
- Ministry of Northern Development, Mines and Forestry
- Ontario Waterpower Association

Municipal Governments

- Township of Nairn and Hyman
- City of Greater Sudbury
- Town of Walden
- Town of Onaping Falls

Aboriginal Communities

- Whitefish River First Nation
- Whitefish Lake First Nation
- Wahnapitae First Nation
- Sagamok First Nation
- North Channel Métis Council
- Sudbury Métis Council

1.1.6 Federal, Provincial and Municipal Agency and Stakeholder Class EA Consultations

The agencies and organizations shown in Table 1.1 will be engaged and consulted through the environmental screening process. These organizations and any additional stakeholders identified subsequent to the issuance of this project description have or will receive an introductory letter and copy of the Notice of Commencement.

Table 1.1: Government Agencies and Organizations to be Contacted

Federal Government
Environment Canada (EC)
Fisheries and Oceans Canada (DFO)
Health Canada (HC)
Indian and Northern Affairs Canada (INAC)
Natural Resources Canada (NRCan)
Transport Canada (TC)
Provincial Government
Nickel District Conservation Authority
Ministry of Aboriginal Affairs
Ministry of Tourism and Culture
Ministry of Energy and Infrastructure
Ministry of the Environment
Ministry of Municipal Affairs and Housing
Ministry of Natural Resources
Ministry of Transportation
Ministry of Northern Development, Mines and Forestry
Municipal Government
Township of Nairn and Hyman
City of Greater Sudbury
Town of Walden
Town of Onaping Falls
First Nations
Whitefish River First Nation
Whitefish Lake First Nation
Wanapitae First Nation
Sagamok First Nation
North Channel Métis Council
Sudbury Métis Council
Industry/Commercial and Public Stakeholders
French River Delta Association
Hartley Bay House and Marina
Sudbury Game and Fish Protective Association
Fish and Game Gateways
Rainbow Routes
B. Thomas Bulldozing Inc
Ontario Waterpower Association
Ontario Fur Managers Federation

1.1.7 Environmental Assessment Processes

As a new development with a nameplate capacity less than 200MW, this project is subject to the Class Environmental Assessment for Waterpower Projects (OWA, 2008), which is an approved Class EA under the *Ontario Environmental Assessment Act*. The proponent has categorized this undertaking as a 'new project on a managed waterway' in accordance with the definition for 'managed waterway' provided in the Class Environmental Assessment for Waterpower Projects (OWA, 2008). Confirmation that this categorization is accurate will be provided subsequent to a review of this project description by applicable regulatory bodies (MNR and MOE) and the OWA. The proponent will assess the project in accordance with the applicable designation.

EA provisions of other provincial Class EAs will be identified at the proponent-agency coordination meeting. Where necessary a coordinated approach will be sought during this meeting.

An authorization from DFO under the *Fisheries Act* and approval from Transport Canada under the *Navigable Waters Protection Act* (NWPA) will be required. Each triggers the need for an environmental assessment under the *Canadian Environmental Assessment Act* (CEAA). Since the proposed project is less than 200 MW, a screening level environmental assessment would be completed in accordance with the CEAA and all applicable guidelines.

No federal funding is involved in this project.

1.2 Contacts

1.2.1 Proponent and Contact Information

The project proponent is Xeneca Power Development Inc. At the time of this submission there were no co-proponents involved in this undertaking. Xeneca is presently pursuing the possibility of partnering with interested identified Aboriginal communities.

Contact information for Xeneca Power Development Inc is:

Patrick Gillette
President
Xeneca Power Development Inc.
5160 Yonge Street #520
North York, ON
M2N 6L9
Phone: 416-590-9362
Fax: 416-590-9955
Email: pgillette@xeneca.com

1.2.2 Proponent's Consultant

Natural Resource Solutions Inc. (NRSI) has been retained to conduct the field study program for this project. Contact information for NRSI is:

Rob Steele
Natural Resource Solutions Inc
225 Labrador Drive, Unit 1
Waterloo, ON N2K 4M8
Phone: 519-725-2227
Fax: 519-725-2575
Email: info@nrsi.on.ca

OEL-HydroSys Inc. has been retained to conduct the Class EA for this project. Contact information for OEL-HydroSys Inc. is:

Tami Sugarman,
OEL-HydroSys Inc.
3108 Carp Road
P.O. Box 430
Carp, ON K0A 1L0
Phone: 613-839-1453 x229
Fax: 613-839-5376
Email: EAinfo@oel-hydrosys.ca

1.3 Land Ownership

The project footprint and potential area of impact, (i.e. for the generating station, headpond, switchyard, control structure(s) and transmission line are to be entirely on Crown Land. The access road(s) are located on both provincial and private lands.

1.4 Authorizations Required

Table 1.2 outlines a list of potential regulatory approvals (federal, provincial and municipal) that may be required during the construction or operation of this project. The list provided below is not meant to be comprehensive; site specific permitting requirements will be confirmed through the EA planning process and once a detailed design and construction plan is available.

Table 1.2: Potential Federal, Provincial and Municipal Approvals

Permit and Legislative Requirement	Agency
Federal	
Authorization for Works and Undertakings Affecting Fish Habitat - *Fisheries Act* [Section 35(2)]	Department of Fisheries and Oceans
Authorization for Destruction of Fish by Means other than Fishing - *Fisheries Act* (Section 32)	Department of Fisheries and Oceans
Species at Risk Act (SARA) – authorizations, as applicable	Department of Fisheries and Oceans; Environment Canada
Approval for Construction in Navigable Waters - *Navigable Waters Protection Act* (Section 5)	Transport Canada (Marine)
Explosives Act - Temporary Magazine Licence	Natural Resource Canada (NRCan)
Provincial	
Lakes and Rivers Improvement Act (LRIA) – Location Approval and Plans and Specifications Approval	Ministry of Natural Resources
Lakes and Rivers Improvement Act (LRIA) – Water Management Plan	Ministry of Natural Resources
Public Lands Act (PLA) – Work Permits (Parts 1-5, as required).	Ministry of Natural Resources
Public Lands Act (PLA) – Licence of Occupation	Ministry of Natural Resources
Endangered Species Act (ESA) – permits and agreements, as applicable	Ministry of Natural Resources
Crown Forest and Sustainability Act (CFSA) - Forest Resource Licence and Overlapping Licence Agreement	Ministry of Natural Resources
Forest Fires Prevention Act (FFPA) - Burn permit on Crown Land	Ministry of Natural Resources
Conservation Authority Act (CAA) - (Section 28 regulations)	Conservation Ontario
Ontario Heritage Act and the *Ontario Heritage Amendment Act (OHA and OHAA)*- Cultural Heritage Clearances	Ministry of Tourism and Culture
Permit to Take Water – *Ontario Water Resources Act* (Section 34)	Ministry of the Environment
Certificate of Approval (Industrial Sewage) – *Ontario Water Resources Act* (Section 53)	Ministry of the Environment
Certificate of Approval (Air and Noise) – *Environmental Protection Act* (Section 9)	Ministry of the Environment
Waste Generator Registration – *Environmental Protection Act* [Section 18(1)], Ontario Regulation 347	Ministry of the Environment
Notice of Project and Registration of Contractors – Construction Regulation 213/91	Ministry of Labour
Electricity Act (EA) - Electricity Generation Licence	Ontario Energy Board
Municipal	
Permit for Noise (from Construction)	Municipality
Road Use Agreement	Municipality
Building Permit	Municipality
Fire Protection and Prevention Act (FFAPA) - Burn Permit	Municipality

2. Project Information

2.1 Description of Proposed Project

2.1.1 General

The proposed project at Wabageshik Rapids would capture the surveyed gross head of 6.1 m. The conceptual development incorporates the use of a dam and separate powerhouse. A control dam would be constructed on the north side of the river. On the south side of the river, an open conveyance channel would conduct flows to an intake before directing them through one or more turbines with a total nameplate rating of 3.4 MW (Appendix A).

The general arrangement of the site and generating facility and access roads are presented in Appendix A. The extent of the lands involved in the development is also shown in Appendix A. The proposed site development is described in more detail in the following sections.

The proposed design of the project could be subject to change subsequent to the results of field investigation, regulatory agency input, First Nation and Aboriginal Community involvement, and comments received from other stakeholders. Project design changes may therefore be implemented based on the valued ecosystem components within the project area, including environmental, social or economic factors.

2.1.2 Summary of Hydraulic Characteristics

- Estimated existing water levels and flows
- normal operating headwater level el 205 m
- normal tailwater level downstream of powerhouse el 199 m
- normal operating gross head 6.1 m
- 1: 100 year maximum flood flow 575 m^3/s
- 1:100 year low flow 1.07 m^3/s
- long-term average flow 47.3 m^3/s

2.1.3 Installed Capacity

The installed capacity at this site will be 3.4 MW provided by one or more turbine units.

2.1.4 Site Access

A new 1 km access road will be required on the south side of the river as well as upgrades to approximately 7.3 km of existing roads (Appendix A).

2.1.5 Headworks Structures

Appendix A shows the layout and details of the headworks structures. The project would require a 132 m long dam, including a 43 m long concrete control spillway section with most of the remaining length of the structure constructed as an earth filled dam.

2.1.6 Conveyance System

The conveyance system would be composed of a 40m long open approach channel and 130 m open tailrace channel.

2.1.7 Powerhouse

The powerhouse would be constructed with reinforced concrete floors and walls to a level above the historical flood level and existing ground levels. Construction above this defined line can be reinforced concrete, insulated steel panels or a combination of the two based on existing physical needs and constraints. A coffer dam will be required to make initial excavations of the powerhouse, draft tube and flow transition features, as these are below the tailrace water level. The water passage within the powerhouse will be constructed from a combination of concrete and steel conduits. A second upstream coffer dam will also be required for construction of 'close coupled' projects. (i.e. powerhouse connected to dam).

The headworks structures may be constructed from any or all of the following materials within the engineering constraints for the same; concrete, RCC – rolled and compacted concrete, earthen/stone, clay and 'rubber' (impermeable barriers). Typical construction will feature a broad overflow weir topped by a control feature. (i.e.: an Obermeyer or similar, pneumatically operated dam). Headgate structures may be either included in the dam design or built as a separate riverside structure dependent upon penstock routing. In most cases, a coffer dam is required for temporary diversion of river flows around the intake/dam/weir construction areas.

The powerhouse footprint would be approximately 14.5 m long x 14.5 m wide. Its intake would be approximately 13.5 m wide and 4.5 m deep.

2.1.8 Transmission

Generated energy will be transported via a 10.4 km power line supported by wood poles with a 44 kV capacity connecting to feeder line 18M2 at Espanola Township. The required right-of-way (ROW) for the power line corridor will extend to 10m. One padmounted transformer will be required at the site. (Appendix A).

2.1.9 Area of Inundation

Based on preliminary hydrological information the proposed project would flood riparian lands up to 1 km upstream of the water control structure in Option 1. The project will inundate approximately 1.6 ha of land resulting in the creation of a headpond with a total surface area of 7 ha (Appendix A).

2.2 Operating Strategy for Project

2.2.1 Type of Proposed Project

Xeneca proposes to operate the facility based on the natural run of water upstream of the plant with some daily flow modifications.

The OPA FIT program encourages power to be produced during daytime hours when Ontario households use power most. To this end, and where circumstances permit, some electricity production may be shifted from night time and weekend hours to daytime hours on weekdays. No long term storage of water is proposed. The Ministry of Energy and Infrastructure refers to this operation mode as "run-of-river with modified peaking." Most of the year production will occur round the clock. Production shifting will occur during periods of low flow when the natural run in the river drops below the plant capacity. These conditions occur predominantly in late summer and late winter. The amount of water that can be stored is limited by the amount of natural storage available and based on acceptable fluctuation of water levels upstream and minimum flow requirements downstream of the plant. Details of the operation will determined during the Waterpower Class Environmental Assessment based on environmental, stakeholder and economic constraints specific to the project.

2.2.2 Operating Strategy

A dam operating strategy will be developed after due consideration of technical and economic aspects of the project and input from the public, agencies and the municipality. This strategy will be documented in a Dam Operating Plan (DOP) that will respect the requirements of the LRIA (Section 23.1).

2.2.3 Water Management Plan

The Vermilion River is falls under the Spanish/Vermilion River Water Management Plan (WMP). INCO owns the 3.74 MW Lorne Falls GS at the upper end of Wabageshik Lake, upstream of the rapids. The construction and operation of the proposed facility at Wabageshik Rapids will require an amendment to the existing WMP before the facility commences operation.

2.3 Project Activities

2.3.1 Construction Schedule and Activities

Construction of the proposed facility is scheduled to take place between 2012 and 2013.

2.3.2 Operation

The facility will operate as a run-of-river with modified peaking. It will be designed with the ability to be remotely operated in addition to having on-site controls. Typically, hydroelectric projects are designed for a 50 to 100 year lifespan. Upgrades and rehabilitation activities may extend their useful life.

2.3.3 Decommissioning

At the present time there are no plans being developed for decommissioning of the facility. The decision to decommission the facility, or alternatively upgrade and/or rehabilitate to extend the operational life, at the time will depend on the structure, the operational history of the facility as well as economic and other considerations. Responsibility for decommissioning will be borne by the facility owner at such time as the facility is deemed no longer useful; at which point the decommissioning will be completed according to the applicable legal requirements.

2.4 Resource Material Requirements

2.4.1 Energy and Water Requirements and Sources

On-site energy requirements during construction will likely be provided by portable diesel generators. Once operational, the outside energy requirements for the facility will be supplied via a metered station service transformer. A back-up diesel generator will likely be installed on site to provide emergency power to the facility during area wide power outages and to enable black start capability.

On-site water requirements for construction are not known at the present time, although it is likely that water will be required during the construction process (i.e. wash water, etc). This water may be supplied from the Vermilion River via portable pumps. The quantities required are anticipated to be small and will likely not require a Permit to Take Water (PTTW) from MOE as the taking will be much less than the 50,000 L/d threshold. Construction process water might also be trucked in from outside sources if required.

Operational water requirements for the facility are not known at this time. Small amounts of cooling water may be withdrawn from the Vermilion River to cool powerhouse components. A PTTW will be obtained if the amount required exceeds the PTTW threshold. There will not likely be any requirement for potable water at the facility. Operation water requirements will be determined during the detailed design process.

2.4.2 Excavation and Quantity of Fill

Excavation will be required for the construction of the dam, canal, powerhouse and tailrace. The expected quantity of excavated material is unknown at this time. Excavated material will include topsoil, underlying soils and bedrock in terrestrial areas, and substrate material and bedrock within the watercourse. Excavated substrate material will be reused to the greatest extent possible to re-line the excavated portions of the channel downstream from the facility. Excess aggregate material will be stored for future use on roadways and other areas requiring fill or material. Any excess or unusable material will be disposed of in accordance with applicable local regulations. Solid waste materials requiring off-site disposal will be chemically tested for waste classification purposes in accordance with the *Ontario Waste Management Regulation (O. Reg. 347)*, as amended by *Regulation 558/00*, and then disposed of accordingly.

Some fill materials may be required from approved commercial sources, but quantities are unknown at this time.

2.4.3 Toxic/Hazardous Materials

Fuels, hydraulic fluids and lubricants will be used in equipment during construction and operation of the facility. Storage of these materials will comply with all current regulations and guidelines (*Ontario Fire Code*, *O. Reg 347*, *Occupational Health and Safety Act*). The storage of small amounts of hydraulic fluids and lubricants will be in a contained area, well away from the watercourse. It is not anticipated that any explosives will be manufactured on site for this project. It is unknown whether explosives magazines will be required for this undertaking. Should explosives be stored on site, the proponent will seek appropriate approvals for usage and storage of explosives in a manner compliant with NRCan requirements and applicable industry standards. Transport of explosives will be completed in accordance with federal legislative requirements (e.g. *Transportation of Dangerous Goods Act*).

2.4.4 Waste Disposal

Solid nonhazardous construction waste (e.g. material packaging) generated during the construction process will be removed from the site to an approved disposal location (likely the municipal landfill) or a recycling/composting facility as applicable/available. Waste debris from clearing activities (e.g. grubbing, non-merchantable timber) will be disposed of in accordance with regulatory requirements. No gaseous wastes other than construction equipment emissions are anticipated. Industrial liquids such as paints, sealants, fuels and lubricating fluids will be stored in a secure containment area and disposed of in accordance with provincial liquid waste disposal regulations (e.g. *Environmental Protection Act and Transportation of Dangerous Goods Act*).

3. Project Site Information

3.1 Project Location

Figure 1 shows the project location. Table 3.1 below provides the geographic coordinates of the site.

Table 3.1: Geographic Coordinates of Site

Site Name	MNR Site No.	Geographic Coordinates (Latitude, Longitude)		Drainage Area (km^2)
Wabageshik Rapids	2CF12	46º16’8.94	-81º37’27.19	4393

The site is located in the geographic township of Foster.

3.2 Natural Environmental Features

3.2.1 Physical Environment

Geology and Soils

The project study area is located in the Superior Province of the Canadian Shield. Along the north shore of the Vermillion River at Wabageshik Rapids the bedrock consists of amphibolites and metamorphosed gabbro belonging to the Nipissing diabase. Bedrock on the south shore of the river is formed by sandstone and siltstone of the Mississagi Formation. Conglomerate belonging to the Bruce Formation is also found in the study area, ~200 m south of the rapids. The Elizabeth Lake Fault extends from south-southwest to north-northeast ~100 m west of the rapids. Details about the timing and extent of movement along the fault are not available; however given the geological stability of the Canadian Shield, the fault is in all likelihood an inactive one. There is insufficient information on the surficial geology immediately surrounding the study area (~1 km radius) although ~2 km to the west there are low-lying swampy areas.

Surface Water Resources

The drainage area at Wabageshik Rapids is 4393 km^2.

The mean annual average flow at Wabageshik Rapids is 47.3 m^3/s. Monthly mean flows at each site are summarized below in Table 3.2.

Table 3.2: Monthly Mean Water Flows

Month	Mean Monthly Flows (m^3/s)
January	24.4
February	18.7
March	33.0
April	149.4
May	111.2
June	45.3
July	26.5
August	15.5
September	17.1
October	34.9
November	50.1
December	41.9

High and low flow return periods flow are summarized below in Table 3.3

Table 3.3: High and Low Flow Return Periods

Return Period (Years)	Flood Flows (m^3/s)	Extreme Low Flows (m^3/s)
1.25	195.4	10.95
2	258.4	7.45
5	343.1	4.43
10	399.2	3.14
20	453.0	2.26
50	522.6	1.48
100	574.8	1.07

3.2.2 Biological Environment

The operating plan that will be developed for this project will address the flow regime of the Vermilion River as well as several other environmental factors. The following natural environment factors have been identified to be examined within the project area:

- habitat of endangered or threatened species
- fish habitat
- terrestrial and aquatic flora and fauna
- water quality
- trapping and bait fishing activities
- movement of fish

A review of background information concerning these natural environment factors was conducted prior to field surveys to ensure that any potential species occurrences were noted.

Habitat of Species at Risk and Conservation Concern

By legislation, species listed as Threatened (THR), Endangered (END), or Extirpated (EXP) under the federal *Species at Risk Act* (SARA) and/or provincial *Endangered Species Act* (ESA) receive protection under these Acts, and recovery strategies and habitat protection for listed species is mandated. If any species at risk are found to utilize the project site, additional surveys and considerations may be required. The Sudbury District Ministry of Natural Resources staff, the Natural Heritage Information Centre (NHIC) website, and other published documentation (COSEWIC status reports, Ontario Breeding Bird Atlas (OBBA), previous survey results, etc.) have assisted in drafting a list of potential species at risk for this site.

The Vermilion River is a tributary to the Spanish River. Lake Sturgeon are known to be present in the lower reaches of the Spanish River downstream of an impassable dam in Espanola Ontario. Although this dam is impassable to fish, MNR has documented Lake Sturgeon in the 40 km stretch of the Vermilion and Spanish Rivers, downstream of Wabageshik Lake, including the presence of juvenile fish. Presumably, these fish are part of a population that has been sustained in the Upper Spanish River watershed following construction of the dam at Espanola.

As part of the Upper Great Lakes – St. Lawrence Lake Sturgeon population, this species is listed as Threatened (THR) under the *Ontario Endangered Species Act* (MNR 2010). The ESA legislation affords this population complete protection to individuals and habitat. The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) also considers this population of Lake Sturgeon to be threatened, but it is not yet listed on any of the schedules of the federal *Species at Risk Act* (SARA) (Government of Canada 2010).

Habitat exists in and around the project area for several additional species listed as being "at risk" provincially and or federally. These potential species and their federal and provincial rankings are listed in Table 3.4 below.

Table 3.4: Potential Species at Risk for the Proposed Project Area

Common Name	Scientific Name	Federal Status (SARA)*	Provincial Status (ESA)*
Lake Sturgeon	*Acipenser fulvescens*	No Status (considered Threatened by COSEWIC)	Threatened (THR)
Eastern Massasauga Rattlesnake	*Sistrurus catenatus*	Threatened (THR)	Threatened (THR)
Blanding's Turtle	*Emydoidea blandingii*	Threatened (THR)	Threatened (THR)

* Species of "Special Concern" status and their habitat are not regulated under the ESA or SARA

Fishes and reptiles are most likely to be affected by alteration to the flow regime and levels of the lower Vermilion River, as well as to impacts on surrounding wetland areas.

Additional conversations with MNR and DFO staff will determine whether other species of conservation concern potentially occur within the projected impact area of the proposed site.

Fisheries

Major sportfish documented in the Vermilion River include Walleye, Northern Pike, Yellow Perch and Smallmouth Bass. Cyprinid species known from the river include Bluntnose Minnow and Fathead Minnow. Additional species include Brown Bullhead, Lake Herring, Longnose Sucker and White Sucker (WMP, 2006).

Reports from MNR Sudbury indicate that a remnant population of Lake Sturgeon is known to be present on the Vermilion River below Wabageshik Lake. These presumably are part of a population stemming from fish that had traversed the Spanish River prior to the construction of the dam at Espanola.

Site-specific species information was collected during the 2010 field season. This information will be provided in a comprehensive report.

Terrestrial and Aquatic Flora/Fauna

The study area is located within the Sudbury – North Bay Forest Section (L4e) of the Great Lakes – St. Lawrence Forest Region (Rowe 1972). The general topography of the area is characterized as relatively flat upland and lowland area with occasional bedrock outcroppings. Many of the forests have been impacted by cutting, fire and smelter fumes resulting in a predominance of pioneer tree species such as white birch, trembling aspen, red and white pine. Yellow birch and sugar maple are less abundant. There are no vascular plant species-at-risk known from the federal *Species at Risk Act* (SARA) or the provincial *Endangered Species Act* (2007) within the vicinity of the study area.

Characteristic wildlife includes white-tailed deer, black bear, snowshoe hare, beaver, wolf, and coyote. No mammalian species-at-risk are known to occur in the vicinity of the study area. A number of bird species-at-risk have ranges that overlap with the study area including Canada Warbler, Yellow Rail, Least Bittern, Olive-sided Flycatcher, Chimney Swift, Bobolink, Whip-poor-will and Common Nighthawk. Field surveys during the breeding bird season were conducted to determine species occurrence and habitat suitability in the study area.

An assessment of the terrestrial and aquatic habitats in the study area was undertaken in order to describe the habitats, assess the true potential for species at risk as well as all other species to be found in the area, and to assist in the component site selection and design process.

The requirements specifically related to aquatic species, fish habitat and navigable waters are specifically the mandate of Fisheries and Oceans Canada and Transport Canada (Navigable Waters Protection Branch). Detailed information pertaining to these issues is addressed in Section 4.0 of this project description.

Overall, indigenous fauna is typical of the surrounding area, and includes a wide variety of mammals, insects, reptiles, amphibians and avian species. All species encountered during field surveys were recorded.

3.3 Socioeconomic Features

3.3.1 Current and Past Land Uses

The project is located on provincial land in the geographical township of Foster.

Land use in proximity to Wabageshik Rapids include recreational activities such as hunting, fishing, boating, cottaging as well as commercial tourism, forestry and electricity production on the Spanish River.

The project is located within several General Use Areas; ‘G2033: Highways No 6 and No 17 Hinterlands.’ The land use is to maintain a reasonably balanced multiple-use area. In water areas, the emphasis will be allocated to commercial tourism and recreation.

Traditional Canoe and Fur Trade Route

Stage 1 and 2 archaeological assessments will be undertaken to establish the presence of any archaeological resources within the proposed project area.

Forestry

The study area is located within the Georgian Bay Forest Section (L4e) of the Great Lakes – St. Lawrence Forest Region (Rowe 1972). The general topography of the area is characterized as relatively flat upland and lowland area with occasional bedrock outcroppings. Many of the forests have been impacted by cutting, fire and smelter fumes resulting in a predominance of pioneer tree species such as white birch, trembling aspen, red and white pine. Yellow birch and sugar maple are less abundant.
No known commercial forestry is taking place in the vicinity of the project.

Hunting and Harvesting

The Project area is within Wildlife Management Units (WMU) 42 (south) and 39 (north). Popular game species include moose, black bear, and grouse.

The Wabageshik project site is located in the vicinity of licensed MNR trapping lines EP035, EP039 and EP043. Knowledge of trapping activities within the project area will be gathered through consultation with licensed trappers in the area, as well as the local MNR authorities. In order to ensure that all interest groups are involved, the Ontario Fur Managers Federation will also be invited to participate in consultations, if required. Subsistence trapping, hunting, and fisheries information will be collected in consultation with the local First Nations.

At this time, no Baitfish Harvest Areas are known to intersect with the project site. This will be confirmed with the MNR.

Mineral Resources

There is one mineral claim within a one kilometre radius of the project site. (Debicki 2010).

Recreation/Tourism

The Vermilion River with its many rapids, is considered by some to be perfect for fly-fishing.

Potential Contamination of the Site from Past Uses

Contaminants from historic and ongoing mining, milling and smelting activities in the Sudbury area are transported from the Nickel City to the Spanish River via the Vermilion River.

Proximity to Aboriginal Reserves and Traditional Territory

Potentially affected Aboriginal communities in the area identified by the MNR include the Whitefish Lake First Nation, Whitefish River First Nation, Wahnapitae First Nation, Sagamok Anishnawbek First Nation, the North Channel and Sudbury Métis Councils.

Proximity to Important or Designated Environmental or Cultural Sites

Stage 1 and 2 archaeological assessments are scheduled to be undertaken by a licensed archaeologist to determine whether there is potential for archaeological resources to exist within the project area. If required, a Cultural Heritage Evaluation Report will also be completed to assess any cultural heritage resources potentially affected by the project.

Proximity to Residential and other Urban Areas

The site is located within a rural area approximately 11 km to Espanola and 50 km from Sudbury.

4. Additional Requirements Related to Fish, Fish Habitat, Species at Risk and Navigable Waters

4.1 Biological Assessments

The Wabageshik facility is to be located on the Vermilion River, and the facility has potential to affect this body of water. A short distance of river upstream of the proposed facility will also be impacted through inundation. However, the inundation will stop short of Wabageshik Lake which will remain unaffected by the proposed undertaking.

The primary goal of the 2010 field season is to obtain data that will be used to describe the aquatic and terrestrial habitats and the floral and faunal communities therein. Biological data will be collected for the inundation area upstream of the proposed Wabageshik dam, and the waters immediately downstream of the dam. The whitewater area at the outlet of Wabageshik Lake shows spawning potential for both Lake Sturgeon and Walleye. The consulting team will utilize various methods of data collection including background information queries, interviews with locals and experts, literature reviews, scientific field data collection, aerial imagery analysis and GIS mapping, to determine what species of flora and fauna are present at the site.

This data will facilitate the determination of any changes to habitats and ecological communities that can be expected to occur on the Vermilion River. Should those changes be identified as negative impacts, adjustments can be made in the planning phase that will assist to mitigate or even eliminate the negative impacts.

4.1.1 Background Review

A request was made on behalf of the proponent to the Ministry of Natural Resources, Sudbury District, for any existing file information on the natural environment in the vicinity of the project site. The request was made for any information related to the following:

- Fisheries assessments
- Fish collection records and rare species
- Drain classifications
- Wetland evaluations
- Areas of Natural and Scientific Interest
- Provincially Significant Wetlands
- Environmentally Sensitive Areas

- VTE species, significant wildlife habitats (i.e. raptor nesting, colonial species nests, deer yards and feeding areas)
- Any species lists relating to animals and vegetation
- Vegetation mapping, floristic inventories.

Available information for the site and surrounding area, gathered from the Ministry of Natural Resources (Sudbury District), COSEWIC and ESA status reports, and the Natural Heritage Information Database, will be completed prior to finalizing survey sites, methodologies or target species. Known natural environment issues that must be addressed include:

- Confirmed and potential Species at Risk
- Fish species that may use the proposed area for habitat or spawning

4.1.2 Field Studies Proposed by the Proponent

A two-season (spring-summer) field inventory program was developed for the assessment of terrestrial and aquatic species and their habitats. This involved field inspections to characterize and map aquatic, terrestrial and wetland habitat conditions (i.e. fish habitat, landforms, vegetation community types, etc.) within the area to be flooded and other areas potentially affected by dam construction or other project components. This included the following surveys:

Floral Inventories and Forest Ecosystems Classification

Preliminary community mapping of vegetation was based on the use of aerial photos to identify, on a broad scale, distinct vegetation communities found within the study area, including the entire area to be flooded. This was supplemented with site-specific community mapping to characterize dominant vegetation forms, community boundaries, and species associations, as well as identify potential wildlife habitat usage. Surveys were conducted in the spring, and all vegetation communities were mapped using the Forest Ecosystems of Central Ontario (Chambers et al. 1997).

In addition to the vegetation community mapping, all vascular plants observed during the course of the field work were documented and compiled into a comprehensive plant list that will be appended to the final report. Any rare vegetation species observed during field surveys were documented and locations recorded with GPS.

Breeding Birds

In order to determine the extent of breeding bird usage within the area, surveys specific to recording breeding bird activity were conducted.

Breeding bird surveys consisted of biologists making observations while walking the shoreline of the river in vicinity of the proposed dam site. The surveys were conducted on two separate visits in June, with at least 10 days between visits. Surveys were conducted early in the morning when bird activity is known to be highest. All birds observed or heard while traveling within the study area were recorded.

In addition to surveys specific to breeding bird populations, all birds observed during the course of the field work were documented and compiled into a comprehensive bird list that will be appended to the final report.

Amphibian Surveys

Based on the amount of wetland and open water habitat within the study area, calling amphibian surveys were conducted. These surveys took place in June with at least 15 days between surveys. Biologists listened for amphibian calling during the course of spring field work. Audible amphibian calling was documented, including species, location, and date.

Reptile Surveys

Based on the background review of the NHIC's Biodiversity Explorer, the Massasauga rattlesnake (*Sistrurus catenatus*) is known from the vicinity of the study area. Habitat on the site was assessed and compared to the habitat requirements.

All reptiles observed during the course of the field work were documented and compiled into a comprehensive list that will be appended to the final report.

Other Wildlife Surveys

All incidental observations of wildlife, including both flora and fauna, within the study areas were documented and compiled into detailed species lists. Incidental observations also included signs, such as dens, tracks, scat, etc. In addition, the habitat on-site was assessed for value to wildlife and any significant wildlife habitats were documented.

Fish Habitat Mapping

Fish habitat investigations were carried out in the potential zones of impact on the Vermilion River and tributaries. A variety of fish habitat types were found within the study area. Habitat characteristics were documented, including adjacent lands, channel form, substrate, and aquatic vegetation. Habitats with the potential to support specific life stage activities such as spawning, nursery, migration or feeding habitats were also identified and their locations documented.

Fish Species Inventory

Generalized sampling of the fish community was conducted to determine the full range of species utilizing the river both above and below the proposed dam site. This is required to determine potential impacts to these species from the proposed project. In addition, sampling serves as a useful check of whether federally or provincially listed species at risk might use the area and have the potential of being impacted by the project. Sampling occurred on the Vermilion River over the full range of the river reaches where the potential for impact to fish habitat was recognized. A variety of gear was required to sample the various habitats present. The following gear types were used:

- Electrofisher
- Minnow traps
- Gill nets
- Angling equipment

Standard meristics including lengths and weights of fish captured were taken. For large fish (>20 cm length), lengths and weights were taken on a minimum of 10 individual fish of each species. For all small fish (<20 cm length), bulk weights, maximum and minimum lengths, and number of fish were recorded for each species.

Walleye Spawning Surveys

Walleye (*Sander vitreus*) spawning surveys were conducted to determine whether spawning habitat is present and currently used by Walleye. Methods used during the spawning period included night-time spotlight surveys to determine staging and/or spawning, and deployment of egg mats to determine whether eggs have been released as a result of spawning activity. The timing of these surveys was based on water temperature, which is the primary impetus for spawning. Walleye are known to spawn soon after ice breakup at temperatures in the range of approximately 6 to 9°C.

Lake Sturgeon Spawning Surveys

Lake Sturgeon (*Acipenser fulvescens*) spawning surveys were not conducted in 2010. Although permission to collect fish was received from the MNR on May 20, 2010, water temperatures climbed above the temperature range for Lake Sturgeon spawning several days following receipt of the permit. As part of the ESA requirements for the site, spawning surveys will be conducted in the spring of 2011 to determine whether spawning habitat is present and currently used by Lake Sturgeon. Methods to be used during the spawning period include fish capture using trot lines and multifilament gill nets, deployment of egg mats to determine whether eggs have been released as a result of spawning activity, and daytime observation of the spawning area. The timing of these surveys will be based on water temperature, which is the primary impetus for spawning. Lake Sturgeon are known to spawn at temperatures in the range of approximately 13 to 18°C.

Water Quality Sampling and Physical Attributes

MOE has expressed a need for water quality samples to be collected to document the baseline water quality conditions in the study area. The list of standard water quality parameters which MOE expects to see included in the water quality program:

- Physical measurements including pH, Dissolved Oxygen, conductivity and temperature
- Alkalinity
- Suspended Solids and Total Dissolved Solids
- Cations including H^{+},Na^{+},$^{K+}$,Ca^{+2},Mg^{+2}, Fe^{+2},Fe^{+3}
- Anions including OH^{-},Cl^{-},S^{-2}, HCO_3^{-},CO_3^{-},SO_4^{-2},PO_4^{-3}
- Nutrients including nitrate, nitrite, phosphorus and TKN
- Metals (ICP scan)

4.1.3 Reporting

A comprehensive report will be provided. It will include a description of all aquatic and terrestrial habitat assessed, and a list of flora and fauna present at the project site and surrounding area. The report will also outline the potential impacts of the proposed dam, both negative and positive, including type, area affected, duration, and magnitude of the impacts.

5. Potential Effects to the Environment

5.1 Zone of Influence

The construction of the dams and other headworks structures required to divert water to the proposed facility will result in the creation of a headpond and the inundation of riparian lands upstream of the dam. As a result, the facility's zone of influence will extend along an estimated 1 km upstream from the proposed dam at Wabageshik Rapids. The distance of the facility's downstream influence extends from the powerhouse to the end of the tailrace; 160 m. The anticipated zone of influence of the operational facility on the downstream waterway is unknown at this time. Hydrogeological investigations of the waterway are underway and the results will be available by the end of 2010.

5.2 Potential Effects to the Environment

In order identify the potential effects that the proposed project could have on the environment and to develop a preliminary informal gap analysis, the Potential Effects Identification Matrix from the provincial Class EA document (OWA, 2008) was completed (Table 5.1). It should be noted that the Matrix was completed using preliminary information regarding the existing natural and socioeconomic features of the project study area and the preliminary project design. The assessment Matrix will be updated following completion of the proposed baseline studies and the further refinement of the facility's engineering design.

The potential level of effect determination (positive or negative) for each criterion is based on the guidance in the provincial Class EA (OWA, 2008). Accordingly, the following effect definitions were utilized:

- A 'nil' effect would be assigned where there is no effect on that criterion
- A 'low' potential effect would be assigned where the potential impact and/or benefit is considered low or minimal
- A 'high' potential effect could be assigned where the potential impact and/or benefit is believed to be considerable
- An 'unk' would be assigned where the potential effects are unknown or there is insufficient information to assign a potential level of effect with reasonable certainty.
- A '-'means a potential negative effect
- A '+' means a potential positive effect.

The potential effect for each criterion has been rated assuming that mitigation measures have not been implemented. The 'Comments, Rationale' column in the table provides a more detailed identification of the potential effects that could occur, and the 'Mitigation Measures' column identifies the measures that could potentially be implemented to prevent or minimize adverse effects. Additional mitigation measures that could potentially be utilized are identified in Appendix B of the Class EA for Waterpower (OWA, 2008).

Table 5.1: Potential Effects Identification Matrix for Construction and Operation

Criteria	Potential Level of Effect						Comments, Rationale	Mitigation Measures
	-H	-L	Nil	Unk	+L	+H		
General Natural Environment Considerations								
Air quality, including GHG Offsets		X					• Potential adverse effects during construction due to equipment exhaust, smoke from burning waste materials and dust emissions. • Potential adverse effects during operations due to diesel generator emissions. • Potential positive effects due to GHG offsets.	• Standard construction site best management practices to minimize air emissions due to exhaust, waste burning and dust. • Diesel generator operates very infrequently (typically only in emergency situations).
Water quality or quantity (surface water)		X					• Potential adverse effects on water quality during construction due to erosion and sedimentation and accidental spills. • Potential effects on water quality during operation due to shoreline erosion, inundation of terrestrial land in head ponds (e.g., nutrients, mercury inputs) and accidental spills.	• Standard construction site best management practices to control erosion and sedimentation and prevent accidental spills from occurring. • Spill prevention and containment measures to be in place throughout operational period. • Areas of shoreline erosion susceptibility will be identified as part of the EA and the necessity for erosion monitoring and shoreline protection works will be determined. • shoreline erosion protection if necessary will be utilized on sensitive areas. • Increase above ambient river level and clearing of vegetation in proposed head ponds to limit nutrient availability in inundated area. • Determine volume required through bypass reach on basis of biological needs.

							• Change to flow volume through bypass reach. • Potential for downstream impacts to fish habitat based on changes to the magnitude, frequency, duration and timing of flows relative to the existing condition	• Potential modification to the magnitude , frequency and duration of peaking events particularly as it relates to critical downstream habitats and the timing of flows in relation to critical life stage activities such as spawning
Water quality or quantity (groundwater)		X					• Potential adverse effects on groundwater quality during construction due to accidental spills. • Potential decreases in local groundwater quantity during construction due to groundwater leakage into project excavations.	• Standard construction site best management practices to prevent accidental spills and manage groundwater.
Species at risk and their habitat				X			• Search of the NHIC database indicates that there are no documented occurrences of species at risk in the study area MNR has indicated that Lake Sturgeon have been documented in the 40 km of river downstream of the site. MNR has also indicated that Blandings Turtle, Whippoorwill and Chimney Swift are also of interest in power line and access road proposed corridors	• EA will determine whether suitable habitat is present in study area • Baseline inventories were conducted in 2010 to document the presence/ absence of species at risk – potential effects and required mitigation will be assessed subsequently in cooperation with MNR. ESA Agreements discussions to be initiated shortly.
Significant earth or life science features				X			• It is currently unknown if any earth or life science features exist at the proposed development sites.	• Field investigations will be conducted to assess presence/ absence of significant earth or life science features.
Land subject to natural or human-made hazards				X			• It is currently unknown if any natural hazards exist at the proposed development sites.	• Field investigations will be conducted to assess presence/ absence of natural hazards (e.g., significant existing erosion areas).

Terrestrial wildlife (including numbers, diversity and movement of resident or migratory species)		X					• Terrestrial wildlife could be affected by loss/ fragmentation of habitat (associated with construction of site facility and associated infrastructure, head pond creation, etc.), and disturbance associated with construction and operations of the proposed facility.	• Habitat loss associated with the project will be minimized to the greatest extent possible. • Mitigation measures will be developed to minimize potential effects on terrestrial wildlife from loss/ fragmentation of habitat and disturbance. • Analysis of habitat loss to inundation will consider the availability of equivalent habitat immediately outside of the zone of influence of the proposed undertaking
Natural vegetation and terrestrial habitat linkages		X					• Natural vegetation and terrestrial habitats could be affected by clearing associated with construction of site facility, roads, power lines and associated, infrastructure. head pond creation, etc., and accidental spills/malfunctions.	Extent of clearing associated with the project will be minimized to the greatest extent possible. • Other best management practices including limiting corridor widths, signage for wildlife crossing etc. will be considered to minimize potential impacts.
Soils and sediment quality		X					• Soil and sediment quality could be adversely affected by excavation and removal, compaction, loss due to fugitive dust or erosion or accidental spills during construction or operation.	Construction site best management practices will be implemented for erosion and sedimentation control, dust management and prevention/ containment of accidental spills to limit the potential for adverse effects on soil and sediment quality.
Significant natural heritage features and areas				X			• It is currently unknown if any natural areas, significant plant communities, wildlife concentration area, ANSI's and Provincial Parks exist within a 10 km grid surrounding the proposed dam site.	• Field studies will be conducted in 2010 and significance of identified habitats will be determined. • Mitigation measures will be developed to minimize potential effects on any representative features.
Other (specify)				X			• No other components identified to date.	• N/A

Aquatic and Riparian Ecosystem Considerations								
Shoreline dependant species	X						• Shoreline dependant riparian vegetation will be impacted by the creation of an inundation area.	• It is not possible to mitigate this effect. • Natural regeneration of shoreline habitat will eventually restore these areas for use by shoreline dependent species.
Wetland dependant species				X			• It is currently unknown if any wetlands exist at the proposed development sites.	• Field investigations will be conducted to assess presence/ absence of wetlands.
Fish habitat		X					• Fish habitat could be affected by in-stream structures (e.g. dam, tailrace excavations, temporary cofferdams and dewatering, water crossings on access roads and transmission lines), changes in flow (bypass reaches) and water level (head ponds) and sedimentation.	• Fish habitat mitigation and compensation measures will be developed in discussions with MNR and DFO to ensure no net loss of the productivity of fish habitat as a result of the project. • Bypass flow to be determined based on biological need with MNR/DFO.
Fish migration				X			•The dams could potentially block the movement of fish.	• Fisheries investigations will be undertaken to determine where critical spawning habitats are located and if the dams would block migration to these habitats.
Fisheries		X			X		• Head pond may result in an overall increase in the amount of aquatic habitat available.	• Although the amount may be more it will represent a change relative to riverine habitat. This must be discussed with DFO and MNR as part of the overall strategy for dealing with fish habitat loss.
Erosion and sedimentation		X					• Potential for erosion and sedimentation due to construction activities. • Potential for long term bank erosion due to water level and flow management activities.	• Standard construction site best management practices to minimize erosion and sedimentation potential during construction. • Bank stabilization measures, as required, on very susceptible erosion sites.

Fish injury or mortality (impingement and entrainment)		X					• Potential for some impingement on trash racks and entrainment and mortality through turbine flows.	• Inflow velocities will be compared with swimming capabilities of fish species of concern to determine the likelihood of impingement or entrainment. If a significant impact is predicted it may be necessary to adjust intake velocities to minimize impingement and entrainment potential or to consider diversion methods for fish. • Determine expected turbine mortality using manufacturer's specifications characteristics.
Flows and movement (surface or groundwater)		X					• Flows through bypass reaches will be reduced due to diversion of flow through the powerhouse. Flows downstream will be impacted due to the proposed limited peaking operation strategy	• Field investigation to determine amount and function of habitat in bypass reaches and downstream during limited peaking operations. • Flow in bypass reaches and downstream of facility established on basis of maintaining biological function
Drainage, flooding and drought patterns		X					• Minor changes in local drainage will occur due to facility, lay down, access road and transmission line construction. • Extreme flood levels may be somewhat higher in the head ponds due to the water level increase.	• A drainage network will be installed around the facility to ensure adequate site drainage. • Facility will be constructed to meet flood passage requirements.
Water temperature		X					• Changes in water temperature in head pond due to increased surface area and slower flow velocity anticipated to be negligible.	• No mitigation required – overall thermal regime of the river not likely affected.
Other (specify)				X			• No other components identified to date.	• N/A
Aboriginal Community Considerations								
First Nation reserves or other Aboriginal communities				X			• It is not known at this time if operation of the project will have an adverse effect on local Aboriginal communities	• Potentially affected First Nations will be consulted and mitigation undertaken as required.

Spiritual, ceremonial, cultural, archaeological, or burial sites				X			• Disturbance to spiritual, ceremonial, cultural, archaeological or burial sites could occur during construction and operation activities.	• Aboriginal consultation to identify local resources will be conducted to mitigate potential negative issues. Stage 1 and 2 Archaeological Assessment will be completed to identify local resources (or resource potential).
Traditional land or resources used for harvesting activities				X			• Effects to the aquatic and terrestrial environment (discussed above) may result in negative effects to traditional lands and resources used for harvesting activities	• Mitigation measures, as appropriate, are provided above.
Employment					X	X	• Construction and operation of the project near a First Nation will result in opportunities for employment of community members.	• N/A
Lands subject to land claims			X				• There are no known land claims.	• N/A
Economic development				X			• Unknown	To be determined
Other (specify)				X			• No other components identified to date.	• N/A
Land and Resource Use Considerations								
Access to inaccessible areas (land or water)		X					• Access road upgrading to accommodate construction equipment and material delivery will result in improved access to the areas by land. Access to the area by water will remain as is.	• Public access to the construction area will be prohibited to ensure public safety. Portage routes around the project could be constructed where required to ensure safe passage around during construction and operation.
Navigation	X						• Navigation and portage routes could be affected by the proposed developments	• Existing portage routes will be identified, and a commitment will be made to maintain or temporarily re-route portage routes during construction to ensure safe passage around the sites for canoeists/kayakers. Portage routes will be restored/ maintained during operation.

Riparian rights or privileges				X			• The project area, including the head pond shoreline will exist on provincial and private lands. At present, effects to riparian resource use are not known.	• Consultation with stakeholders will determine appropriate mitigation.
Recreational use – (land or water)				X			• Scenic attractions and aesthetic or recreation features along will be assessed. The full extent of effects to recreational use will be determined in consultation with project stakeholders.	• Additional mitigation measures will be determined in consultation with project stakeholders.
Angling and hunting opportunities				X			• The extent of hunting and angling use within the project area is currently unknown; however these activities likely take place in the vicinity.	• Effects to angling and hunting opportunities will be determined in consultation with project stakeholders. • Appropriate mitigation measures will be determined based on stakeholder consultation.
Trapping activities				X			• If the project is located within licensed trapping area(s), project construction and operation, including head pond filling may result in adverse effects to harvest success.	• The current use of the area for trapping will be determined during stakeholder consultation • Appropriate mitigation measures will be determined based on stakeholder consultation.
Baitfish harvesting activities				X			• Current harvesting sites are unknown. If harvesting is going on then some effects could occur during construction.	• Consultation will be required with bait fishermen to identify harvesting areas and assess effects.
Views or aesthetics				X			• Construction and operation of the project will result in a change to aesthetics of the area. The determination of this effect as positive or negative is subjective.	• Requirements for compensation flow or other aesthetic requirements will be determined in consultation with project stakeholders and in consideration of area usage (based upon a visitor usage survey).
An existing land or resource management plan			X				• The study area lies within the Abitibi River Forest management Plan.	• To be determined
An existing water management plan			X				• There is an existing water management plan for the Spanish/Vermilion Rivers.	• An amendment to the existing WMP will have to be made prior to operation of the new site.
Protected areas				X			• Unknown at this known	• To be determined.
Other (specify)				X			• No other components identified to date.	• N/A

Cultural Heritage Resources Considerations								
Archaeological sites				X			• Archaeological sites are known to exist within the project area.	• Stage 1 and 2 Archaeological Assessment will be completed to determine potential effects. • Appropriate mitigation measures will be proposed based on assessment findings as required.
Buildings or structures				X			• Structural resources potentially affected by the project are currently unknown.	• Appropriate mitigation measures will be proposed as required.
Cultural heritage landscapes				X			• It is unknown whether a cultural heritage landscape assessment will be required for the project.	• Appropriate mitigation measures will be proposed based on assessment findings as required.
Other (specify)				X			• No other components identified to date.	• N/A
Social and Economic Considerations								
The Location of people, businesses, institutions, or public facilities				X			• Social economic resources to the community will be identified. Potential effects will be determined in consultation with local residents, business owners and other stakeholders.	• Appropriate mitigation measures will be determined based on stakeholder consultation.
Community character, enjoyment of property, or local amenities				X			• Effects to community character, enjoyment of property and local amenities are unknown.	• To be determined
Employment					X	X	• The construction and operation of the project will require local and non-local employment based on qualification.	• N/A

Public health and/or safety		X					• Construction and operation of the project will pose public safety concern and risk.	• Prevention of public access to the construction site through use of signage, gates and fencing among other security procedures as required. • Proper barriers and warning devices installed following construction to restrict public access to intake/tailrace areas during operation, including safety booms, fencing and signage.
Local, regional, or provincial economies					X	X	• Economic benefits will include employment, expenditures on materials, equipment and services, contribution of renewable energy to the Provincial supply mix.	• N/A
Tourism values				X			• See “Recreational Use” above.	• N/A
Water supply				X			• It is currently unknown whether the river is a water supply for individuals or local communities. For potential effects to water quality, please see “Water Quality or Quantity” above.	• Appropriate mitigation measures will be proposed as required.
Aesthetic image of the surrounding area				X			• See “Views or Aesthetics” above.	• N/A
Other (specify)				X			• No other components identified to date.	• N/A
Energy/Electricity Considerations								
Reliability (e.g. voltage support)					X		• New power generation units are of a relatively small capability, and operation of them in parallel with the existing power grid will provide minor impact on the overall power system reliability and power quality - voltage and frequency.	• N/A • Appropriate mitigation technical measures will be proposed in protection and control to minimize a power outage.
Security (e.g. Black Start)					X		• Operation of the projects will improve distribution customer service reliability in	• The island mode of operation could require the change of the interconnection

							this area. The power generation units will be able to provide a black start and island mode of operation (assuming that is allowed by HONI) to continue to supply or electrically energize in a safe, controlled and reliable manner, part of the distribution system, including customer load that is separated from the rest of distribution system.	protection and control scheme/settings in the HONI distribution system. Further consultation with HONI required.
Electricity flow patterns				X			• Operation of the new power generation units will redistribute power flow in the existing distribution system.	• Appropriate mitigation technical measures will be proposed in the control system of the power grid and new generation units if required.
Other (specify)		X		X			• Operation of the new power generation units will affect existing protection and control settings in the distribution system. • Oil filled electrical and mechanical equipment can potentially spill oil into the Environment.	• Appropriate mitigation technical measures will be proposed in protection and control system of the power grid. • Appropriate preventive measures will be proposed to eliminate the risk.

6. References

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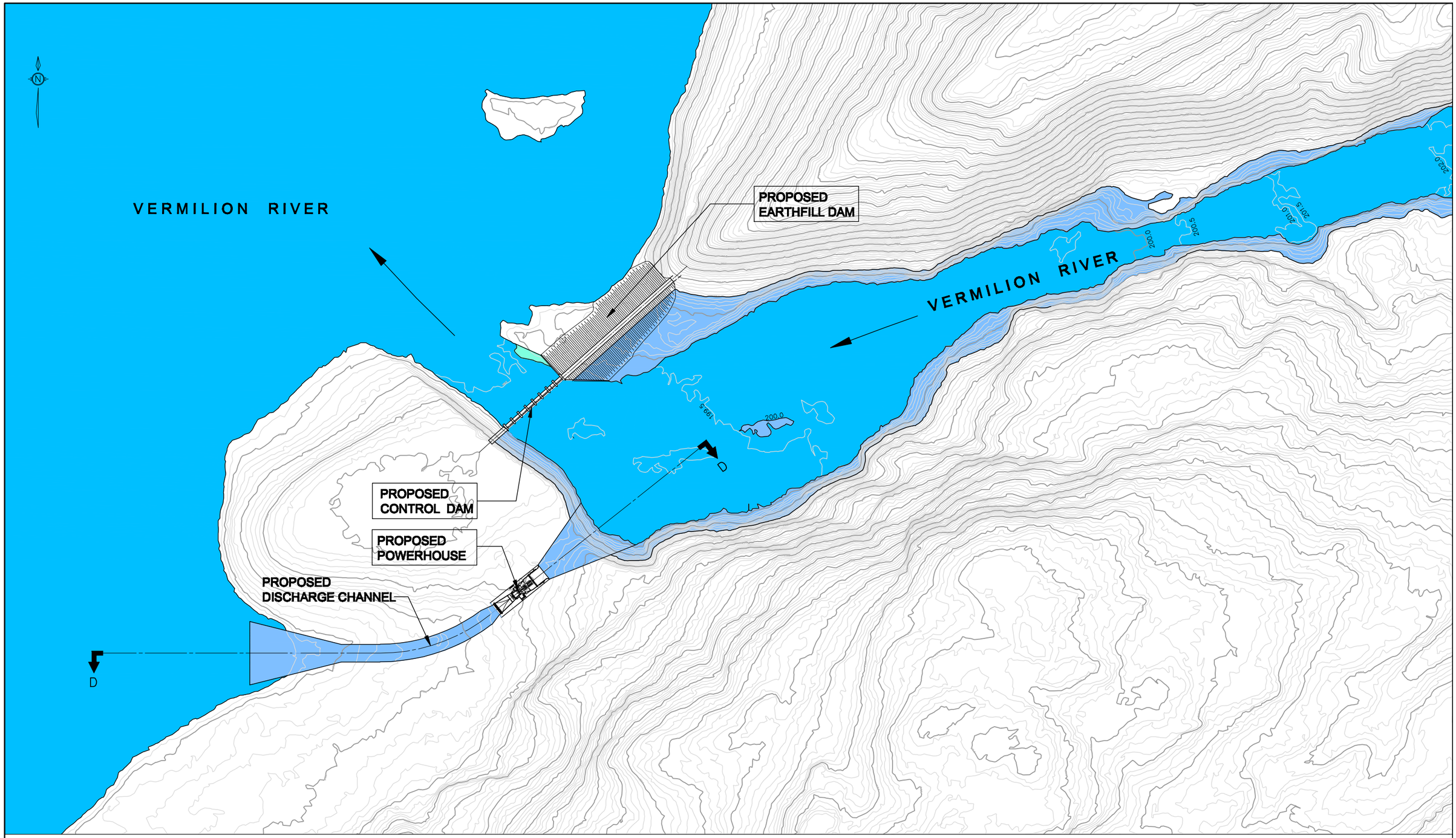
APPENDIX A

Conceptual Plates and Figures for Wabageshik Rapids



NOTE:

1. TOPOGRAPHIC BASE MAPPING PREPARED BY AIRBORNE LIDAR BY TERRAPOINT, FALL 2009. CONTOUR INTERVAL IS 0.5 METRES. PROJECT COORDINATE SYSTEM IS NAD1983, UTM ZONE 17N.
2. CONTOURS SITUATED IN RIVER CORRESPOND TO WATER SURFACE ELEVATIONS.

SCALE 1:2000 Metric

0 10 20 30 40 50 100 Metres

LEGEND:

- EXISTING WATER LEVEL (APPROXIMATE)
- PROPOSED HEADPOND INUNDATION & INTAKE CHANNEL
- PROPOSED CLEARING

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XENECA POWER DEVELOPMENT INC.

WABAGISHIK RAPIDS - VERMILION RIVER HYDROPOWER DEVELOPMENT

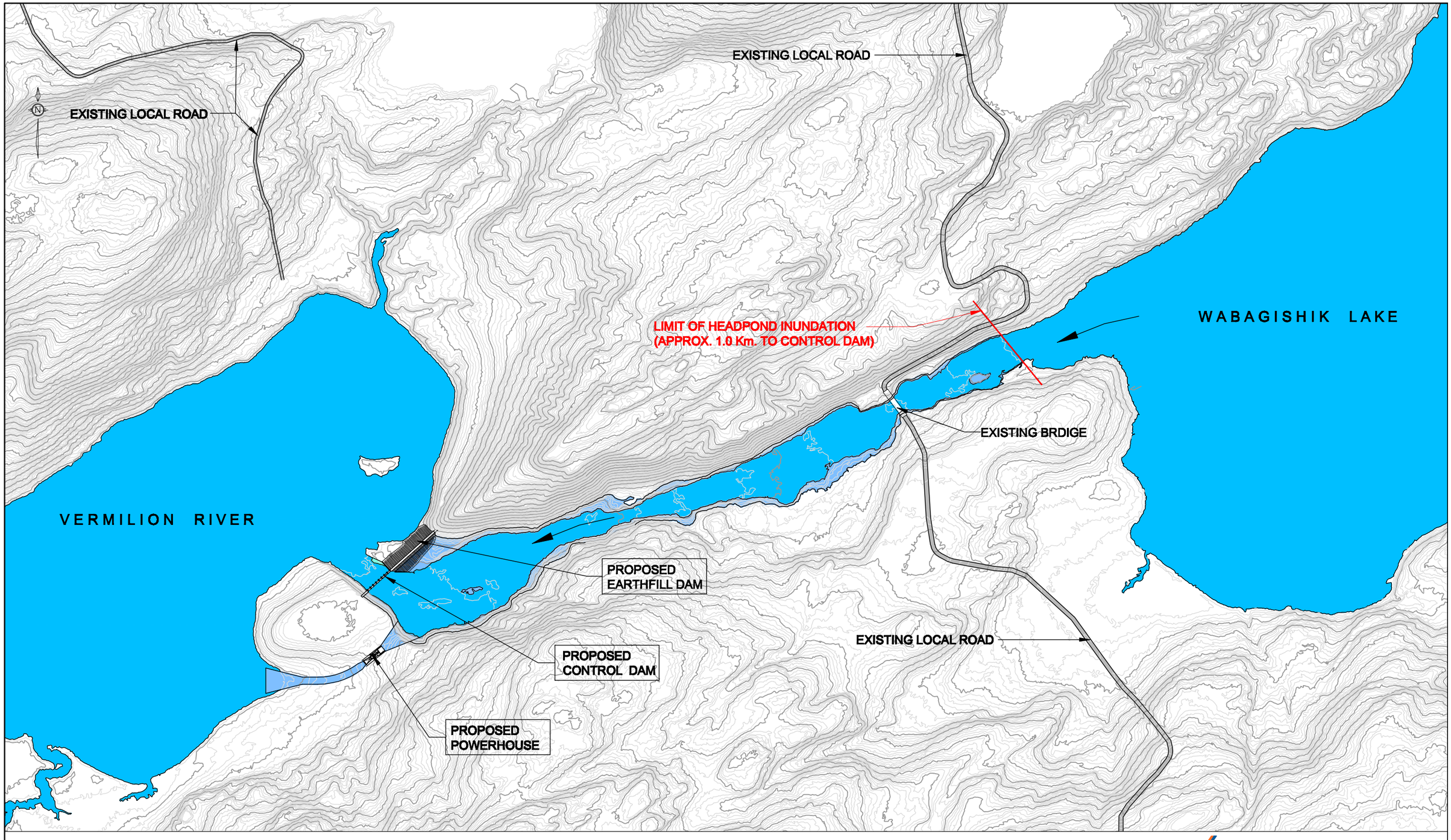
CONCEPTUAL SITE DEVELOPMENT LAYOUT

HATCH

PLATE 1

REV 0

Plot Scale
Oct 28 , 2010 , 11:36am
Drawing Name: P:\XENECA\333443\CAD\C\VERMILION RIVER\WABAGISHIK RAPIDS\PLATE - 1 NO ACCESS ROAD.dwg
Login name: yuzo50093



NOTE:

1. TOPOGRAPHIC BASE MAPPING PREPARED BY AIRBORNE LIDAR BY TERRAPOINT, FALL 2009. CONTOUR INTERVAL IS 0.5 METRES. PROJECT COORDINATE SYSTEM IS NAD1983, UTM ZONE 17N.
2. CONTOURS SITUATED IN RIVER CORRESPOND TO WATER SURFACE ELEVATIONS.

SCALE 1:5000 Metric

0 20 40 60 80 100 150 200 250 Metres

LEGEND:

- EXISTING WATER LEVEL (APPROXIMATE)
- PROPOSED INCREMENTAL HEADPOND INUNDATION (EL. 205.00)

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XENECA POWER DEVELOPMENT INC.

WABAGISHIK RAPIDS - VERMILION RIVER HYDROPOWER DEVELOPMENT

ESTIMATED HEADPOND INUNDATION

PLATE 4

HATCH

REV 0

Plot Scale
Nov 01 , 2010 , 11:00am
Drawing Name: P:\XENECA\333443\CAD\C\VERMILION RIVER\WABAGISHIK RAPIDS\DWG - NO ACCESS ROAD\PLATE - 1 & 4 - NO ACCESS ROAD.dwg
Login name: yuzo50093

Wabageshik Rapid G.S.

Lines and Roads Map

Xeneca Power Development Inc.

Project: F000645

N

Wabageshik Rapid

18M2 Feeder

FINN RD

JACKLIN RD

DUPUIS RD

C.T.R. ST

DUPLESSIS RD

QUEENSWAY AVE

PENAGE LK RD

HWY 6

LANG LK RD

ST

Legend

- Site Location
- Point of Connection (PC)
- Point of Common Coupling (PCC)
- 44kV Line
- Access Road
- Access Road
- Primary Road
- Secondary Road
- Tertiary Road

Meters

0 500 1,000 1,500 2,000

Conceptual Route Selections are to be verified by field studies and are subject to a Patent Land Review prior to approval for Construction.

442000 444000 446000 448000 450000 452000 454000

5132000 5130000 5128000 5126000 5124000 5122000 5120000 5118000 5116000 5114000 5112000

F000645N105003ProjectAreaS1