Waterpower on the Vermilion
Addressing Multiple Objectives

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Presented to: City of Greater Sudbury Planning Committee, March 23, 2011

Xeneca Power Development Inc.

Thank you

- Xeneca thanks the City of Greater Sudbury for providing the opportunity to present our Vermilion River Projects.
- This presentation is part of our efforts toward public consultation. Public Information Centres (PICs) are planned for 2011. Outreach also includes a comprehensive website, newspaper advertising and e-mail links to deal with the many questions we expect to receive about the projects.
- Any interested person that would like information about projects, or to make comments to Xeneca about the project is encouraged to contact Xeneca. Xeneca wants to receive local input so we can address their questions!
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Outline

- Part 1: a bit of history of waterpower
- Part 2: process leading up to this project
- Part 3: engineering details of Vermilion projects
- Part 4: addressing stakeholder & community issues with engineering solutions

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Waterpower History

Decew Gristmill 1872

Mechanical mills pre-dated electricity in Ontario. Waterpower technology, even in its simplest form had a profound effect on productivity and daily life in Ontario from early settler's days onward.

Decew mill horizontal axial turbine 15" dia, 40 ft head
Mechanical Power output = 49 horsepower or 36 kW
Sawmill undershot wheel 6' dia., 3.5 ft head {estimated}

Almonte Electric 1908

1900+ towns started their own electricity plants like this one near Ottawa to meet growing interest in electricity. These were typically 1 to 10 MW (small).

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Waterpower History (cont'd)

Water goes big 1930+

Hydro projects grew to grand scale till 1960's but few large hydro sites exist in Ontario and even fewer are close enough to the big cities. Photo: DesJoachims, a 429 MW plant, 1950. Three Gorges Dam in China is 22,000 MW. Ontario is limited by topography and rain fall.

Coal is King 1940+

Lakeview station (2,400 MW) commissioned in 1962, now defunct. Coal began to play a growing role as Ontario was running out of accessible waterpower Site locations and nuclear was still in its infancy.

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Waterpower History (cont'd)

Nuclear quenches thirst for power 1966+

Large plants are needed to fill the over growing cities. This plant is Bruce Nuclear commissioned in 1978 on Lake Huron. Large plants meant large transmission ines to connect cities to the generation source.

Green, clean revival

Small hydro comes back with the move to more renewable power like this new powerhouse in Almonte related to the redevelopment of the 1908 project (5 MW). History meets renaissance!

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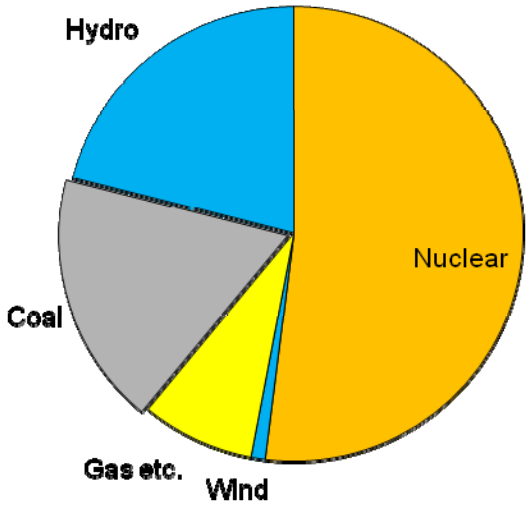
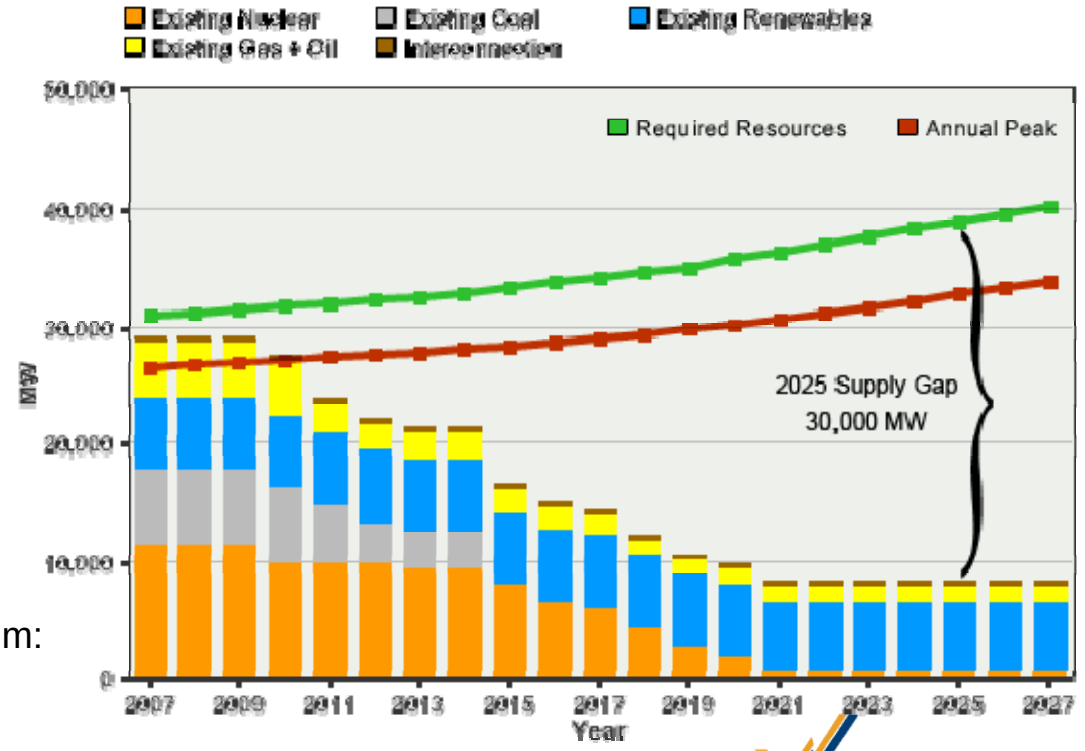
Our aging supply mix

Ontario Supply Mix Today



The big supply problem



The growing supply gap could come from:

- New nuclear
- Keeping waterpower operational
- Adding gas for peaking load
- Diversifying the supply mix
- (small hydro, distributed generation, other…)

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Why renewables?

- Wind, solar and small hydro have a role to play in diversification of the supply mix:
  - Increased system reliability on local level
  - Decreased need for new transmission lines
  - Part of global trend to go green
  - Make communities part of the solution

- Renewables will not fix Ontario's overall supply gap, but they have an important role to play.
- Nuclear is needed to strengthen our base load supply. Gas and large hydro is needed to meet peak load flexibility. Renewables are required to diversify our supply mix.

(Photo Credit: sustainabilityninja.com)

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Waterpower Industry in Ontario

- Ontario has had an active waterpower industry for many decades – engineering, equipment manufacturing, service companies.

- Industry growing globally
  - projected 850,000 MW today to 1,425,000 MW by 2030
  - $ 3 Billion global market
  - Opportunity for Ontario waterpower industry

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Small is Beautiful (& Green)

- What makes small waterpower green?
- To be green, small waterpower has to meet multiple criteria:
  - Under 10 MW
  - Minimal or no storage (less than 48 hrs)
  - Minimal environmental impact (eg. fish)
  - Small physical and ecological footprint.
- Facilities that meet green criteria are eligible for "EcoLogo Certification" from the Canada government.
- Xeneca strives to obtain EcoLogo Certification for each project as a reflection of our efforts to be green.
- Being green means making extra effort in the engineering process to address environmental issues and stakeholder questions.

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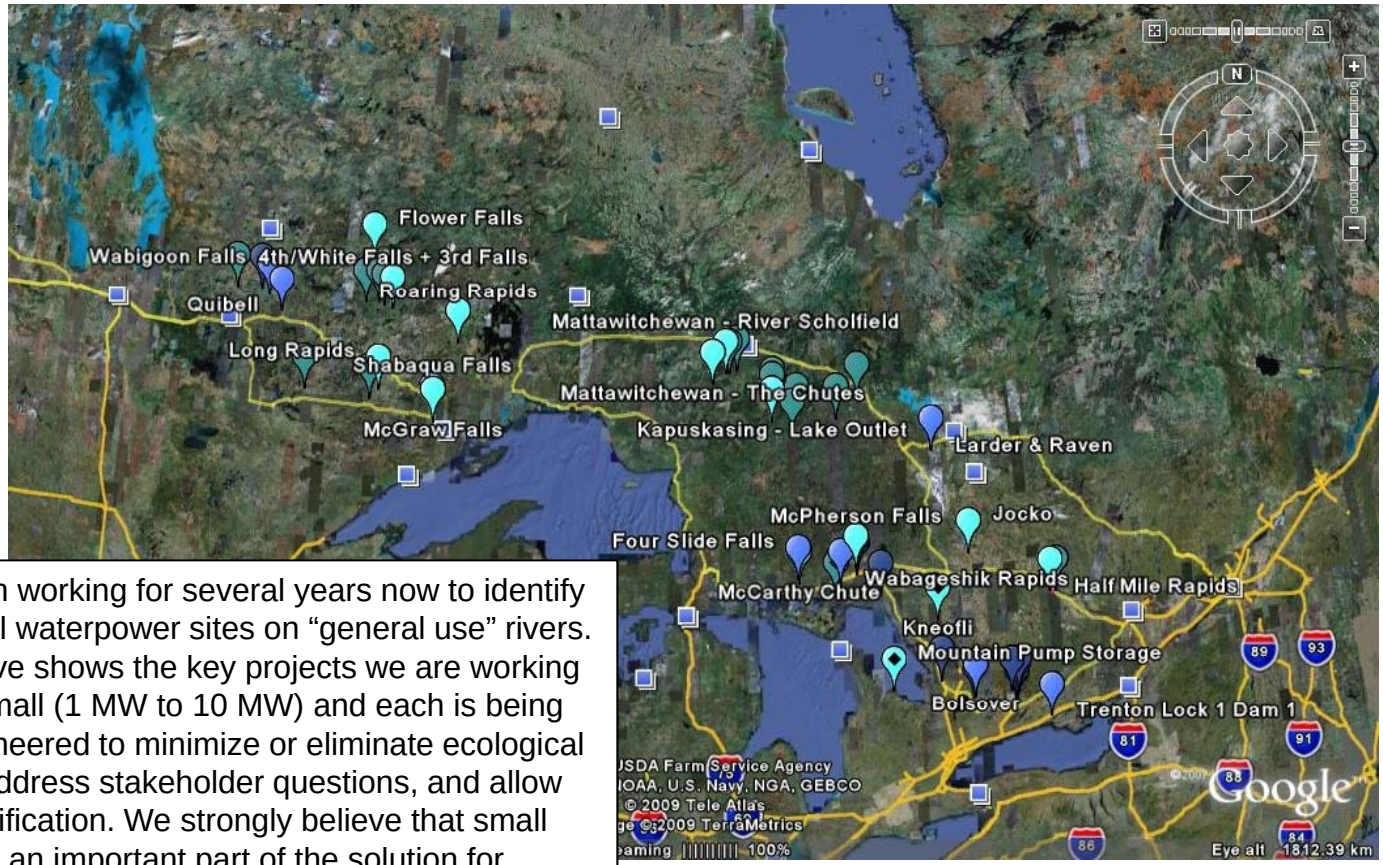
Xeneca's Mission: identify and build multiple small waterpower projects throughout Ontario



We have been working for several years now to identify potential small waterpower sites on "general use" rivers. The map above shows the key projects we are working on. Each is small (1 MW to 10 MW) and each is being carefully engineered to minimize or eliminate ecological impact, and address stakeholder questions, and allow EcoLogo Certification. We strongly believe that small waterpower is an important part of the solution for Ontario's electricity supply mix and the right thing to do from a sustainability point of view.

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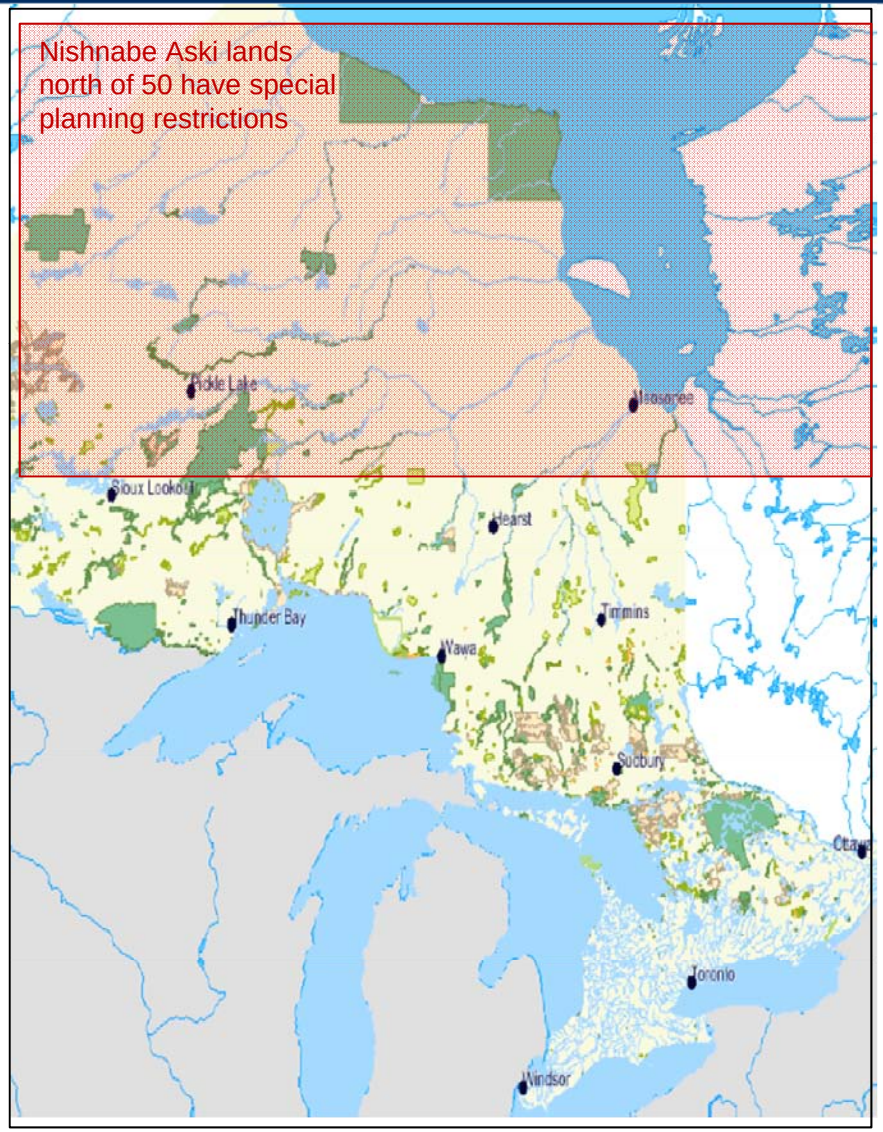
“Its not easy being green”

(Kermit the Frog)



Government restricts where sites can go:
In addition to the EcoLogo criteria, project sites must be on “**general use**” rivers, and not in:

- Wilderness parks
- Natural environment parks
- Waterway parks
- Nature Reserve Parks
- Recreation Parks
- Historical Parks
- Conservation Reserves
- National Parks
- First Nation Reserves
- Nishnawbe Aski Lands (North of 50)

Many rivers and most potential project sites are affected by one or more of these planning constraints.

Planning constraints are a key factor in the focus on a limited number of small (1 MW to 10 MW) project sites.

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Vermilion River Projects

- All four projects – McPherson Falls, Cascade Falls, Soo Crossing and Wabagishik all meet the criteria demanded for a green, environmentally friendly, small waterpower project.

- Hydrology and topography show the Vermilion sites have good generation potential with a total installed capacity of about 11.8 MW.

- Supports development of renewable energy that will power between 500 and 700 households per MW. Combined, the Vermilion projects will produce enough energy for more than 8000 homes.

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Vermilion River Projects

- There is also a significant return to the people of Sudbury. Royalties and fees of approximately $5 million per MW are paid to the municipality over the next 40 years.

- That's well in excess of $50 million!

- In addition, during construction Xeneca strives to procure its goods and services locally. On average about $2.5 million per MW or approximately $30 million will be spent locally on labour, trucking, steel, equipment rental, surveying, legal and professional services, food, fuel and accommodation.

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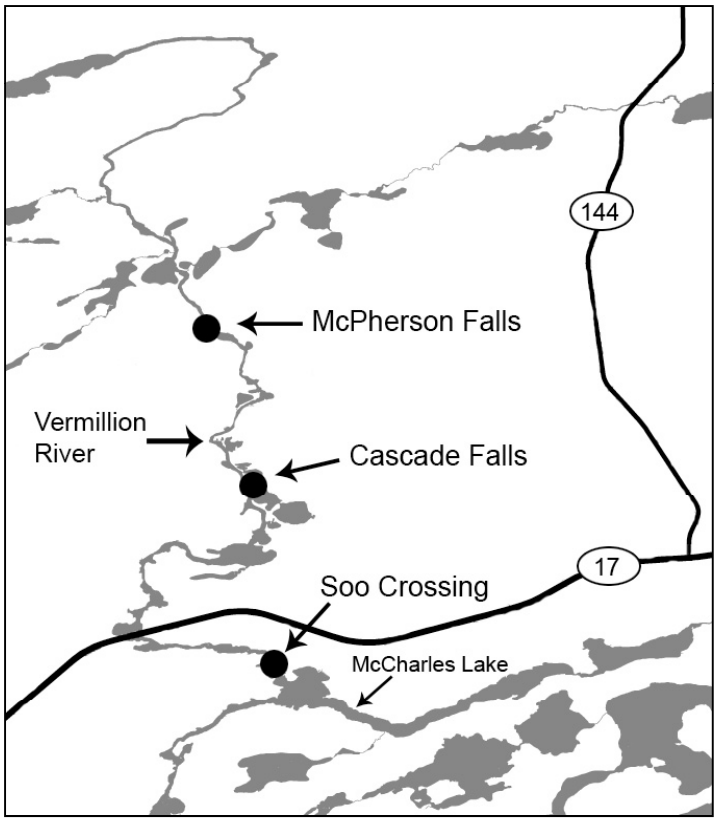
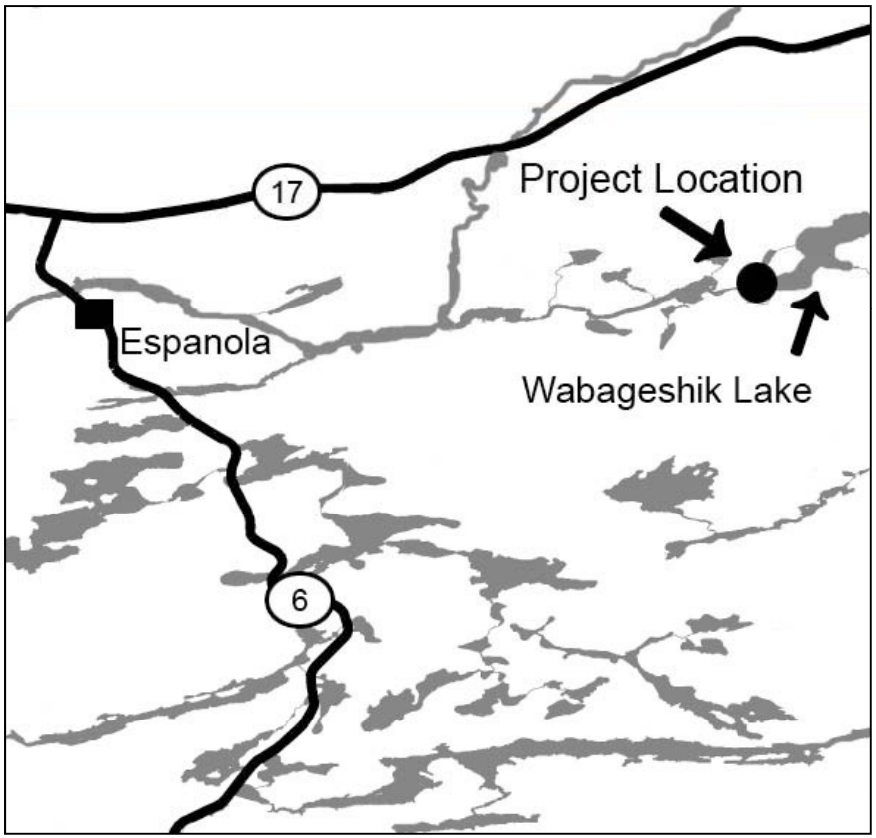
Site locations





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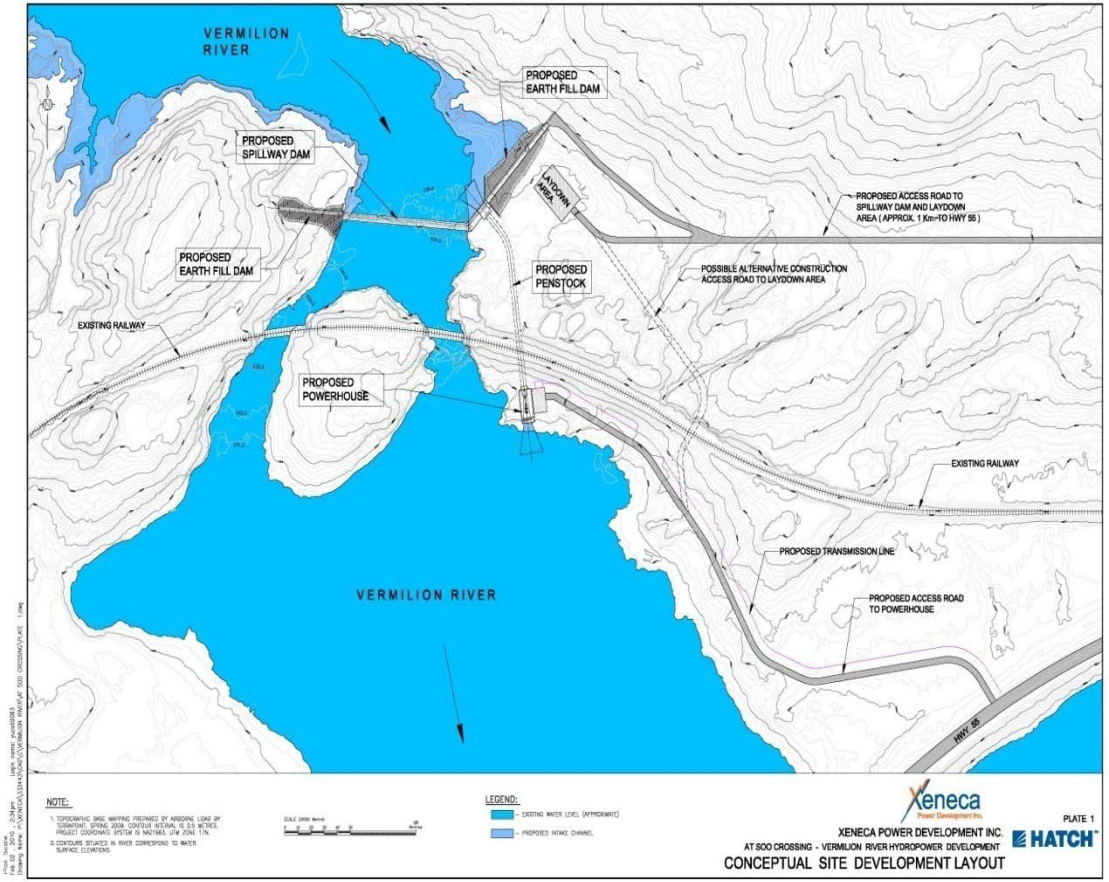
At Soo Crossing 4.3 MW

- Existing rapids/falls on Vermilion River ±70 m upstream of existing railway bridge, ±2.6 km downstream of Highway 17.
- Concrete spillway dam and fill embankments Penstock and powerhouse.
- ±1.5 km new access road to existing Hwy 55.
- <u>Xeneca requests City input and support.</u>



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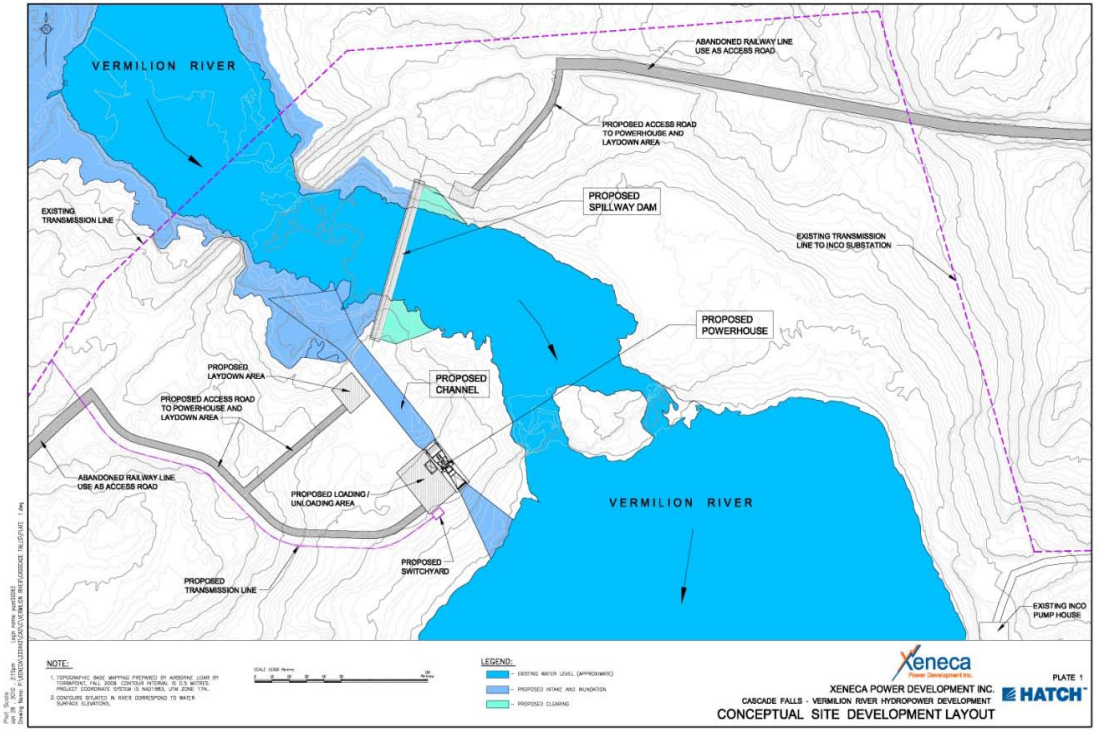
Cascade Falls 2.1 MW

- Existing rapids/falls on Vermilion River ±400 m downstream of hydro corridor, ±4.4 km upstream of Highway 17.
- Concrete spillway dam, intake channel and Powerhouse, transformer station.
- ±1.5 km new access road to existing Hwy 55.
- Xeneca requests City input and support.

NO IMPACT ON WATER INTAKE



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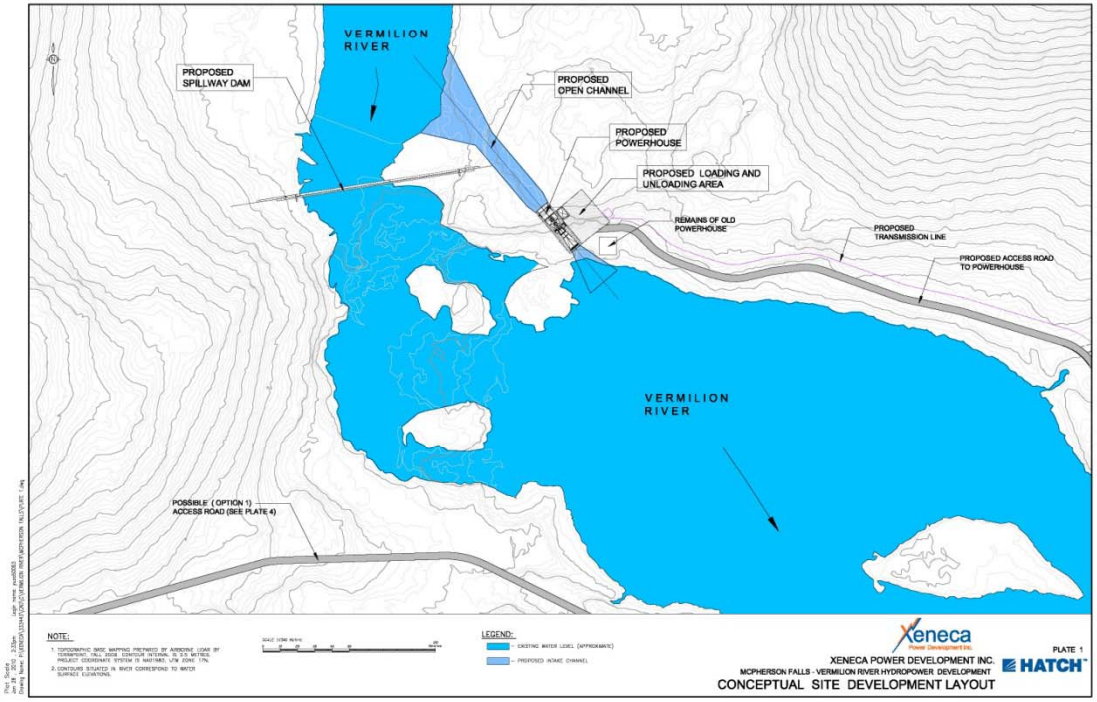
McPherson Falls 2MW

- Existing rapids/falls on Vermilion River ±8 km upstream of Highway 17.
- Concrete spillway dam Intake channel and Powerhouse, transformer station.
- ±3.5 km new access road to existing local road.
- <u>Xeneca requests City input and support.</u>



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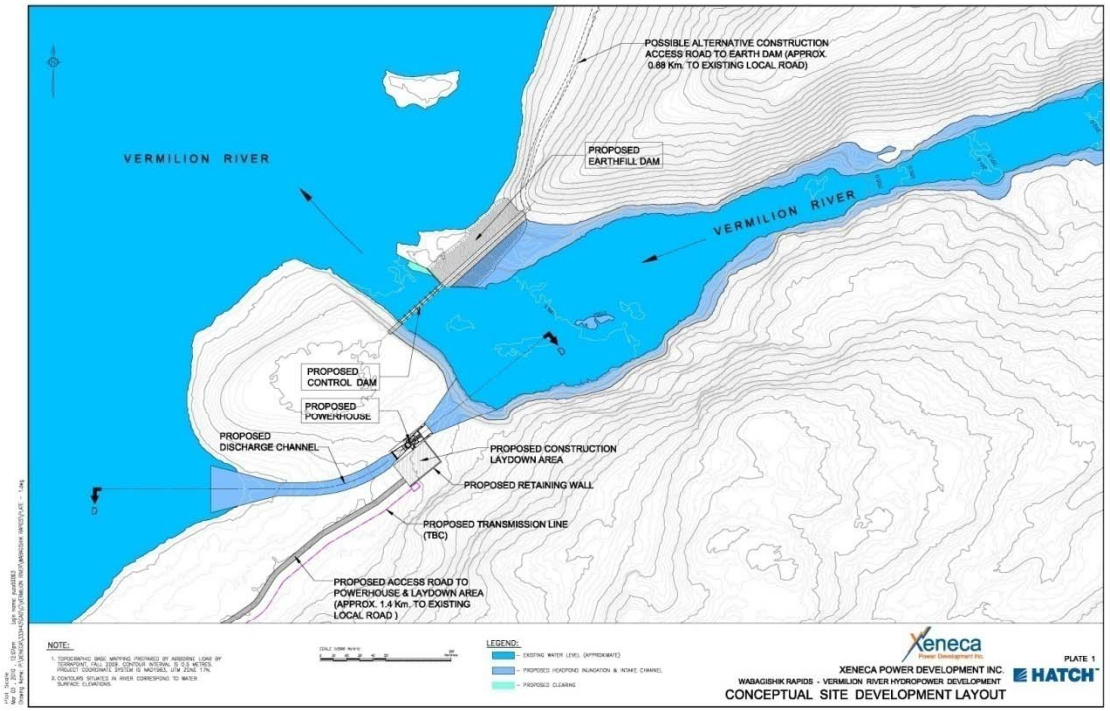
Wabagishik Rapids 3.4 MW

- Existing rapids/falls on Vermilion River approximately ±400 m downstream of existing road, approximately ±600 m downstream of Wabageshik Lake.
- Concrete spillway dam, Powerhouse, transformer station, ±500 m new access road to existing local road.
- <u>Xeneca requests City input and support.</u>



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Project Features

Least Environmental Impact of Early Options

Why?

- Small ecological footprint
- Only small sections of river affected
- Avoids impact on recreational uses

- Better aesthetics;
  - No large/unsightly conveyance systems
  - Low profile powerhouses can be tucked into natural depression and/or landscaped
  - Minimal excavation
- No large dams required

Engineering Design Solution

- Continues to be heavily directed by concerns & issues raised by community stakeholders

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Addressing Stakeholder Questions

- Various issues have been raised by stakeholders to-date:
  - Fish and canoe passage over or around structures
  - Sharing water between municipal needs, recreation and power production
  - Public safety
- Xeneca has been working actively to address issue with engineering solutions:
  - Project design study
  - Safety study
  - Hydraulic modeling study

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Class EA Process

- Xeneca to share information with public
- Xeneca open to public input, ideas and designs

Process is at an early stage with plenty of time for consultation and project review

Process is proponent driven and comments must be directed to Xeneca

Final design and concept is based on result of public and government agency input

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Challenge – water sharing

- *Will there be enough water for all considerations*
- *YES!*
- *Water flow must ensure ecological integrity*
- *Navigability must be maintained*

- Xeneca Engineering can offer <u>solutions</u>
  - a lot is possible!

  ie: *ensure municipal infrastructure is not impacted*

  Improve control to reduce flooding or enhance flow during dry periods

  - *Look at flow needed and at what times*
  - *Look at managing plant output at a certain time or for special events!*

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Additional Benefits

- Can the project create benefits to river users, i.e. better portages, rest areas, boat launches? YES!

On another site Xeneca has retained a hydraulic laboratory to examine;

- Can the project create artificial waves? {It has been done elsewhere!}

- Can the Tailrace area below the Powerhouse be Sculptured to Create a Wave Feature?

Xeneca Engineering is looking for input from Local Stakeholders to Find Innovative Solutions!

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Public safety

- Will the Facility be Safe?
  - *Public Safety is Paramount*

- Safety plan in preparation by an independent engineer.

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Summary

- Placing a small waterpower project into a community creates challenges.
- *Xeneca is addressing these challenges through:*
  - Innovative and appropriate design features
  - Plant operation with recreational uses in mind
  - Public Safety oriented engineering to ensure the project is safe and the river accessible.

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