YELLOW FALLS HYDROELECTRIC PROJECT
ENVIRONMENTAL ASSESSMENT

File No. 160960168

Prepared for:

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Yellow Falls Hydroelectric Project Facts

Operating Characteristics		
Drainage Area	9,111	km^2
Inflows (from WSC Smooth Rock Falls Gauging Station - 1922-1995)[1]		
Minimum	7.6	m^3/s
Average	103	m^3/s
Maximum	1,134	m^3/s
Flood Inflows		
1:100 yr	1,164	m^3/s
1:1,000 yr	1,414	m^3/s
1:10,000 yr	1,946	m^3/s
Probable Maximum Flood (PMF)	3,893	m^3/s
Normal Headpond Level	244	m
Normal Tailwater Level	232	m
Gross Head	12	m
Headpond Area	160	ha
Project Components		
Powerhouse (concrete gravity dam)		
Plant Capacity (2 units)	16	MW
Maximum Plant Flow (2 units)	162.38	m^3/s
Minimum Plant Flow (1 unit)	24.36	m^3/s
Minimum Release Flow	15.0	m^3/s
Average Annual Energy	69.5	GWH
Capacity Factor	51.2	%
Gated Spillway		
Number of Gates (5 m high x 6 m wide)	17	
Gate Sill Elevation	239.0	m
Discharge Capacity[2]	120.0	m^3/s
Spillway Design Flow		
Normal headpond level[3]	2,106	m^3/s
1 m surcharge	2,914	m^3/s
Dam crest	3,906	m^3/s
Retaining Wall		
Length	104.0	m
Crest Elevation	245.0	m
Maximum Height	2.5	m
Crest Width	6.0	m

[1] Data from the Water Survey of Canada ("WSC")_Gauging Station is only available from 1922 to 1995. After this time, the gauging station ceased operation
[2] Discharge capacity is per gate at normal operating level
[3] >10,000 year flood inflow at normal headpond level

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1.0 Introduction

Yellow Falls Power Limited Partnership ("YFP") is proposing to build, own, and operate a 16-megawatt ("MW") waterpower project at Yellow Falls on the Mattagami River, approximately 19 kilometres upstream (south) of Smooth Rock Falls, Ontario (**Figure 1.1**).

The environmental assessment ("EA") process for the Project addresses regulatory requirements outlined in the *Ontario Environmental Assessment Act* under Ontario Regulation 116/01 ("O. Reg. 116/01"), the *Canadian Environmental Assessment Act*, and the 1990 Ontario Ministry of Natural Resources ("MNR") *Waterpower Program Guidelines* ("WPPG").

Ontario Regulation 116/01 requires preparation of an Environmental Screening Report ("ESR"). If the potential effects of a Project require additional detailed study, the proponent may be required to prepare an Environmental Review Report ("ERR"), which contains more detail than an ESR. YFP and Stantec Consulting Ltd. ("Stantec") have elected to proceed directly to the ERR stage since it was recognized that detailed study would be required at the outset of the Yellow Falls Hydroelectric Project.

The *Canadian Environmental Assessment Act* requires an Environmental Screening Assessment, including preparation of an Environmental Impact Statement ("EIS"). The WPPG require preparation of a Project Information Package ("PIP"). Many requirements of these processes are similar or overlap significantly (**Section 1.11.5**).

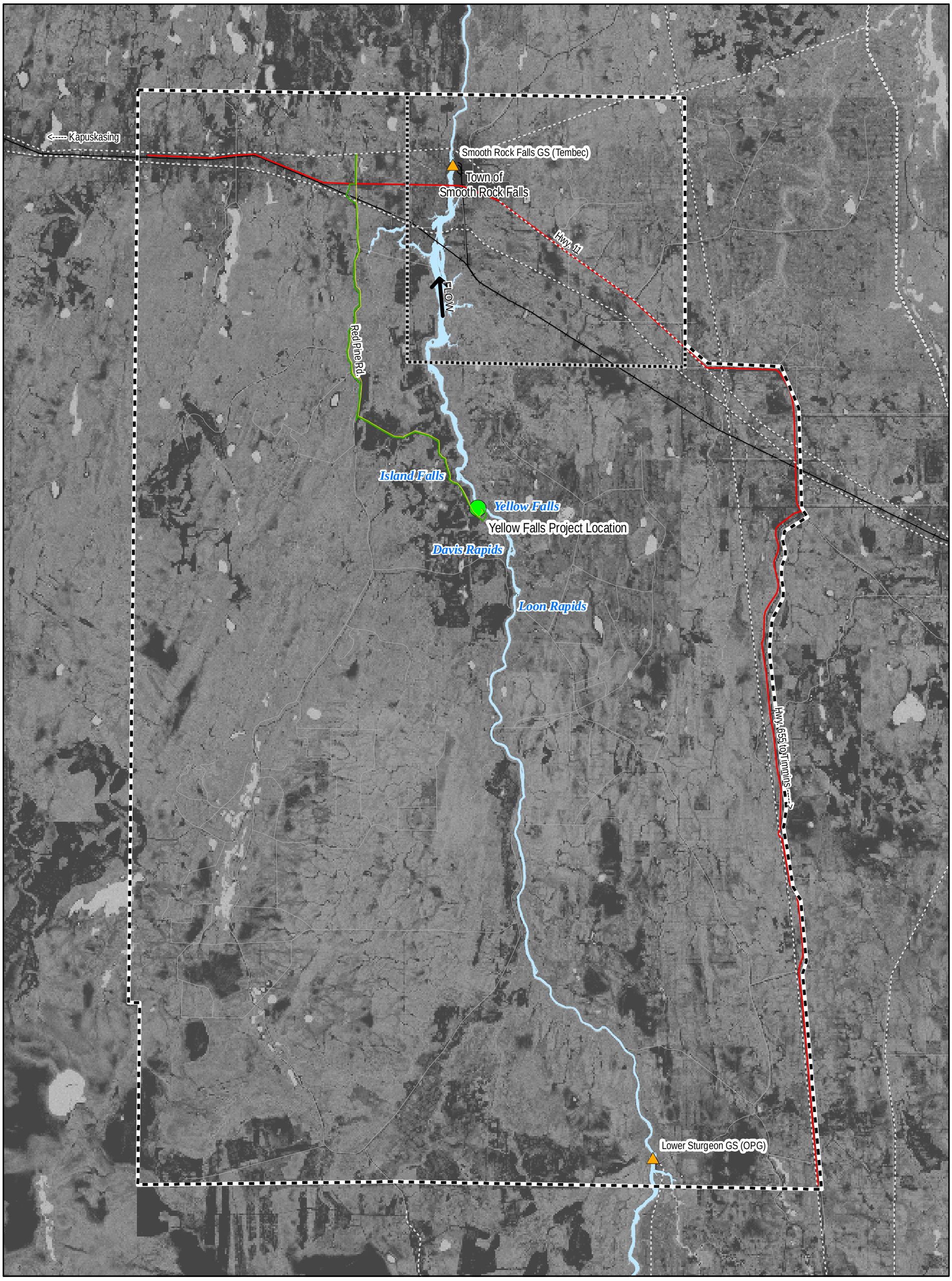
This report has been prepared as a coordinated document consistent with the *Canada-Ontario Agreement on Environmental Assessment Coordination* and Section 4.3 of the Ontario Ministry of Natural Resources ("MNR") Waterpower Site Release and Development Review Policy (MNR, 2007). This coordinated report is consistent with the requirements of the three above-mentioned processes, and is referred to as the "EA Report." To this end, the Yellow Falls Hydroelectric Project EA Report includes:

- Introduction and proponent information (**Section 1.0**)
- Project information (**Section 2.0**)
- A screening of environmental[4] features potentially affected by the Project (**Section 3.0**)
- A description of the existing natural and socio-economic environment (**Section 4.0**)
- Description and results of consultation activities undertaken with government agencies, First Nations, the community, and other interested parties (**Section 5.0**)
- Assessment of potential Project-related effects, recommended mitigation and protection measures, and significance of net effects (**Section 6.0**)

[4] The term "environment" is defined herein to include natural, physical, biological, agricultural, socio-economic, and historical and archaeological components.

- Cumulative effects assessment (**Section 7.0**)
- Details regarding compliance with the Mattagami River Water Management Plan (**Section 8.0**)
- Inspection and monitoring (**Section 9.0**)
- Conclusions and signatures of environmental professionals (**Section 10.0**)
- Concordance Tables (**Appendix E2**) outlines various agencies' comments, and how and where they were addressed in the EA.

Records of consultation activities and technical reports are provided as appendices to this EA Report



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Source:
Airphoto: LANDSAT 7, 2002.
Base Map: LIDS, 2006.

- Study Area
- Smooth Rock Falls Town Limits
- Yellow Falls Project Location
- Existing 115 kV Power Line
- Proposed Transmission Line
- Proposed Acess Road

N W E S

Stantec

0 1 2 3 4 Kilometers

1:200,000

Key Map

PREPARED FOR:

YELLOW FALLS LP
ENVIRONMENTAL ASSESSMENT REPORT

FIGURE NO. 1.1

STUDY AREA

Initiated: January 28, 2007
Revised: October, 2008

1.1 PROPONENT INFORMATION

The lead proponent for the Yellow Falls Hydroelectric Project is YFP. Carlex Corporation Inc. ("Carlex") is the general partner of YFP and the limited partners of Carlex are Canadian Hydro Developers, Inc. (50%) and two individuals (25% each). YFP will draw directly upon the proven construction and operation experience of Canadian Hydro Developers, Inc. ("Canadian Hydro") for the Yellow Falls Hydroelectric Project.

Canadian Hydro has been publicly listed since 1990 (TSX: KHD). Canadian Hydro owns and operates 20 renewable energy facilities, including seven hydroelectric plants in Alberta and British Columbia and five hydroelectric plants in Ontario. Canadian Hydro's Ontario hydroelectric plants include:

- Moose Rapids (Wanapitei River)
- Ragged Chute (Montreal River)
- Appleton (Mississippi River)
- Galetta (Mississippi River)
- Misema (Misema River).

In addition to the Yellow Falls Hydroelectric Project, Canadian Hydro is currently constructing its Melancthon II and Wolfe Island Wind Projects, also awarded RES Contracts under RFP II. Canadian Hydro is recognized as one of Canada's premier developers of EcoLogo® certified low-impact renewable energy projects.

Below is the key corporate information for YFP/Canadian Hydro; additional information on the company and its projects is available at: www.canhydro.com.

- John Keating: Chief Executive Officer, Canadian Hydro Developers, Inc.
- Ross Keating: President and Chief Development Officer, Canadian Hydro Developers, Inc.
- Keith O'Regan: Chief Operating Officer, Canadian Hydro Developers, Inc.
- Kelly Matheson: Manager, Environmental Affairs, Canadian Hydro Developers, Inc.
- Robert Guzwell, Assistant Manager, Hydro Operations, Canadian Hydro Developers, Inc.
- Scott Hossie: Ontario Manager – Environmental, Canadian Hydro Developers, Inc.
- James Doak Children's Trust: Limited Partner, Yellow Falls Power Limited Partnership
- David Smith: Limited Partner, Yellow Falls Power Limited Partnership

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1.2 TITLE OF PROJECT

The proposed hydroelectric development is titled the “Yellow Falls Hydroelectric Project”. Throughout this EA Report, the terms “Project” and “Yellow Falls Hydroelectric Project” are used interchangeably.

1.3 PROJECT LOCATION

The Project is situated in the District of Cochrane, in north-eastern Ontario. The Yellow Falls Hydroelectric Project occupies Crown Land in the geographic townships of Bradburn, Sydere, and Haggart. The proposed powerhouse and dam structure is located on the Mattagami River approximately 19 km downstream from the Town of Smooth Rock Falls (**Figure 1.1**).

1.4 NAMEPLATE CAPACITY OF HYDROELECTRIC PLANT

The Mattagami River has been used to produce hydroelectric power for almost 100 years. The flow characteristics of the Mattagami River at Yellow Falls provide excellent potential for hydroelectric power generation and make this area particularly suitable for the installation of the proposed Project.

As designed, the Yellow Falls Hydroelectric Project has a nameplate capacity of 16 MW, and will be powered by two kaplan-type water turbines. The Project will generate an estimated 69,467 megawatt hours (“MWh”) per year of renewable energy. This is enough electricity to power approximately 6800 average Ontario homes (based on 10.3 MWh/household; StatsCan, 2005). The total anticipated capital cost for the 16 MW waterpower project is approximately $70 million.

1.5 GOVERNMENT OF CANADA

The Government of Canada, through various initiatives over time, such as creation of the ecoENERGY for Renewable Power Program and ratification of the Kyoto Protocol, has outlined an evolving policy framework to foster the development of renewable energy sources such as hydropower within Canada and honour our international environmental commitments.

It is the intention of YFP to apply to Natural Resources Canada ("NRCan") for funding under the ecoENERGY for Renewable Power Program for the Project. Development of the Project may assist Canada in meeting its international commitments.

1.6 GOVERNMENT OF ONTARIO

The Province of Ontario reorganized the management of its electrical transmission and generation systems following legislative approval of the *Electricity Competition Act, 1998*. This process involved restructuring the former Ontario Hydro into Ontario Power Generation Inc. ("OPG"), responsible for the bulk of the province's electricity generation, and Hydro One Networks Inc. ("HONI"), responsible for the bulk of the electricity transmission system within the province.

Restructuring of Ontario Hydro also resulted in new organizations with specific areas of control and dedicated responsibilities and assignment of additional responsibilities to existing organizations:

- Ontario Power Authority ("OPA") is responsible for the: long-term generation supply mix, Integrated Power System Plan ("IPSP") which will identify the conservation, generation, and transmission investments that are needed to ensure a reliable, sustainable power supply for the province, and the province's electricity Request For Proposals ("RFP") and Renewable Energy Standard Offer Program. The OPA's website contains additional information: www.powerauthority.on.ca.

- Independent Electricity System Operator ("IESO") manages the reliability of Ontario's power system and forecasts the demand and supply of electricity. The IESO also operates the wholesale electricity market, while ensuring fair competition through market surveillance. Information on the IESO is provided on their website: www.ieso.ca.

- Ontario Ministry of Energy and Infrastructure ("MOEI") is directly responsible for all aspects of electricity generation and delivery in Ontario. In turn, the MOEI designs laws, provides directives, and is the governing body for the organizations noted above and below. Additional information on the MOEI is provided on their website at: www.energy.gov.on.ca.

- Ontario Energy Board ("OEB") existed prior to the implementation of the *Electricity Competition Act, 1998* and has retained its role as an independent

adjudicative/administrative tribunal responsible for regulating Ontario's natural gas and electricity sectors. Part of the OEB's mandate is to protect the interests of consumers with respect to prices and the reliability and quality of electricity service. Additional information on the OEB is available on their website: www.oeb.gov.on.ca.

1.7 PROJECT HISTORY

1.7.1 Original Activities

The original application for Location Approval was submitted to the MNR in 1986 by Joe Crawford and Leo Callahan. In 1987, the MNR reserved the Island Falls and Yellow Falls sites for Crawford and Callahan. The Location Approval was subsequently placed into CalFord Corporation. In 1988 CalFord Corporation exchanged the Approval for units in YFP. In 1993, CalFord Corporation sold all of their shares back to YFP, permanently exiting the limited partnership. Carlex, a private company registered in the Province of Ontario and held by James Doak and David Smith in 1988, was the general partner of YFP.

In a letter dated 31 August 1988 to YFP, the MNR confirmed that the Location Approval for both the Yellow Falls and Island Falls sites under the *Lakes and Rivers Improvement Act* ("LRIA") would remain in force until 31 October 1988. At that time, the proponent was to have submitted a background information package to the MNR and consulted with various stakeholders.

On 01 December, 1988, after having reviewed the information provided by YFP prior to the 31 October 1988 deadline, the MNR concluded that site approval would remain in effect provided that additional approvals were obtained prior to undertaking any physical changes to the topography or hydraulics of the affected river stretch.

Building upon the requirements contained in the August and December 1988 MNR letters, YFP submitted the "Yellow Falls Development Environmental Appraisal" dated May 1989. This document outlined the scope of field work proposed by YFP to address the MNR's information requests. Following their review of the proposed scope of work, in a letter dated June 12, 1989, the MNR noted that the proposed study would address most of their concerns, with a few minor adjustments.

With these clarifications in hand, YFP prepared Environmental Appraisal and Technical Appraisals (1990). These documents were designed to partially fulfill aspects of the MNR's PIP requirements as outlined in the MNR's WPPG. Comments regarding the Environmental Appraisal were subsequently provided by the MNR on 15 August, 1991.

Following receipt of the comments, development of the sites was delayed as a result of the Moose River Basin resource planning exercise and the 1993 Ontario Hydro non-utility generation moratorium.

1.7.2 Competitive Electricity Market

The Government of Ontario subsequently passed the *Electricity Competition Act, 1998*. This Act was designed to create a level playing field with respect to regulatory requirements for public and private companies, while improving the Government's standards for environmental protection in a competitive electricity market.

With a competitive electricity market appearing to take shape, YFP submitted a full PIP to the MNR on 17 February, 1999. At that time, it was believed the Government would proceed expeditiously with its plan to bring competition to the Ontario electricity market place. However, following a series of market and political developments, the Government implemented price caps for various consumers, effectively stalling a competitive market. Once again, this created a set of economic conditions that were not favourable for development of the Project.

Following the enactment of the *Electricity Competition Act, 1998* changes were made to the provincial *Environmental Assessment Act* ("OEAA"), to streamline the assessment process. As a result, the Ministry of the Environment ("MOE") developed new environmental assessment requirements for electricity projects, which were released in March 2001, and applied equally to public and private sector proponents. These requirements are documented Regulation 116/01 and the March 2001 "Guide to Environmental Assessment Requirements for Electricity Projects" ("EA Guide").

Building upon the continuing evolution of Ontario's electricity market, and previous work completed for the Yellow Falls Hydroelectric Project, YFP reactivated the Project in 2001, after re-evaluating economic conditions, power demand conditions, and financing options. At the time, it was decided to locate the facility at Island Falls to take advantage of additional head available at that location, allowing construction of a generating plant with a nameplate capacity of 20 MW.

On October 11, 2001, the MNR confirmed with YFP that they remained the Applicant of Record at Island Falls. As the Applicant of Record, the MNR offered YFP the opportunity to submit an updated AIR package to be used towards Location Approval.

In January 2002, YFP submitted an updated AIR package to the MNR for review. Following MNR review as recorded in their July 5, 2002 letter, the MNR found the package to be acceptable and the application for a waterpower site was considered complete. However, changing market conditions once more put the Project on hold. The July 2002 letter subsequently requested preparation of a document that met the requirements of both Regulation 116/01 and the WPPG.

1.7.3 Recent Activities

In 2004, YFP executed a joint venture agreement with the Canadian Renewable Energy Corporation ("CREC"). Under the terms of this agreement CREC was to continue development

of the Project on behalf of the joint venture. Also in 2004, the Government of Ontario released its first competitive Request for Renewable Energy Proposals ("RFP I") in an attempt to create market conditions conducive to electrical generation development. CREC bid the Island Falls Hydroelectric Project into RFP I and it is understood that the bid passed the technical requirements.

Although the Project was ultimately not successful in RFP I, it remained economically viable. In January 2005 Canadian Hydro acquired 100% ownership in CREC, including the joint venture agreement with YFP. Since January 2005, YFP and Canadian Hydro have reorganized YFP such that Carlex is the general partner of YFP (**Section 1.1**).

1.7.4 Electricity Contract

Building upon the past activities of the Project, YFP bid the Island Falls Hydroelectric Project into the Government of Ontario's second RFP for up to 1,000 MW of renewable energy. On 21 November 2005 the Ontario Power Authority ("OPA") awarded YFP a 20-year Renewable Energy Supply Contract for the Project. The RFP II process was open to renewable energy projects with a nameplate capacity greater than or equal to 20MW.

As a result of the modification to the dam and powerhouse location, and the consequent reduction in Project nameplate capacity to 16 MW, the Project no longer meets the original requirements of RFP II. YFP will therefore make alternative contract arrangements for the sale of the electricity generated from the Project. Although not required prior to commencement of operations, YFP is confident that an alternative contract arrangement will be obtained prior to commissioning of the Project.

Upon expiration of the existing contract, a new contract may be entered into if available, or the electricity generated by the Project may be sold into the electricity market at market price.

1.7.5 Project Optimization

In August 2005, the EA process was started as required under O. Reg. 116/01. Since August 2005, extensive aquatic and terrestrial studies have taken place, and the proponent has engaged aboriginal communities, agencies, and the public in the Project, including two public open houses, community meetings, several newsletters, and extensive email correspondence. In November, 2007 a Draft EA was released for first nation, agency, and public review. Several public and agency comments were received, particularly from the Ministry of Natural Resources and the Friends of the Mattagami River (a local interest group).

During the public review of the Draft EA, and subsequent consultation with agencies and the public, a potential Project modification was identified that would address many of the concerns raised during the review of the Draft EA. YFP made a decision to undertake the modification and relocate the dam and powerhouse structures two kilometres upstream of Island Falls to Yellow Falls.

The Yellow Falls site offers less head and the project nameplate capacity changed from 20 MW to 16 MW. However, the change in location also provides numerous benefits, including the continued use of the Island Falls site for recreation, reduced potential for disruption of identified fish habitat immediately downstream of Island Falls, and maintenance of some morphological diversity in the Mattagami River between Lower Sturgeon GS and Smooth Rock Falls GS.

1.8 PROJECT PURPOSE

The Yellow Falls Hydroelectric Project will assist the:

- Government of Canada in fulfilling our international commitments to reduce greenhouse gas emissions.
- Government of Ontario in meeting its renewable energy supply commitments, while assisting with the Government's coal-fired generation reduction program.
- Government of Ontario in fulfilling its goals and principles of establishing a clean and healthy environment, economic growth, and strong communities for the long-term
- Continued development of Canadian Hydro's low-impact, renewable energy portfolio in Ontario.

1.9 PROJECT NEED, DISADVANTAGES, AND ADVANTAGES

1.9.1 Project Need

The need for new, renewable electricity generation capacity in Ontario is documented in the Independent Electricity System Operator ("IESO") document entitled: *10-Year Outlook: An Assessment of the Adequacy of Generation and Transmission Facilities to Meet Future Electricity Needs in Ontario, From January 2006 to December 2015* (http://www.theimo.com/imoweb/monthsYears/monthsAhead.asp). This report (August, 2005) outlines significant challenges for Ontario's electricity generation system over the next ten years, including the phase out of coal-fired generation, aging generation facilities, and the continued increase in demand for electricity which will contribute to the need for new generation and transmission facilities.

The OPA, responsible for ensuring a long-term supply of electricity and offering advice to the Government of Ontario on its future energy mix, believes that Ontario's energy sector is at a turning point in its history. Province-wide electricity producing capability is lower than 12 years ago, while demand has grown significantly. Renewable sources, according to the OPA, offer considerable long-term potential to provide a significant share of future electricity needs.

In response to the predicted electricity shortfalls, and after reviewing various power generation alternatives, the Ontario Ministry of Energy announced the second and third Renewables RFPs in April 2005. The second Renewables RFP ("RFP II") called for up to 1,000 MW of new renewable energy supply from generation facilities between 20 MW and 200 MW. The nine winning projects for RFP II were announced on 21 November 2005, totaling 975.25 MW of new

renewable supply. Additional information on this RFP is available on the Renewables II homepage (http://www.ontarioelectricityrfp.ca/RenewablesRFP/Index.aspx?id=28).

Building upon these activities, and at the request of the Minister of Energy, the OPA released its *Supply Mix Advice Report* (OPA, 2005), which included recommendations to the Minister on options for the future development of Ontario's electricity system. The report was prepared to supply the Minister with advice on the appropriate mix of electricity supply sources to satisfy the expected electricity demand in Ontario until 2025. The report concludes the province should "pursue an aggressive course for renewables within current constraints, while looking at ways to reduce these constraints." When planning the future supply mix the OPA found that most Ontarians rank reliability of supply as the most important factor, followed closely by stable electricity rates and environmental considerations (OPA, 2005). Currently, renewable sources, including hydropower and wind, account for 23% of Ontario's energy production. The OPA recommends increasing that amount to 43% by 2025. The Government of Ontario (2007) has directed the OPA to plan for coal-fired generation in Ontario to be replaced by cleaner sources in the earliest practical time frame. Renewables, along with gas-fired generation, are expected to make up for a shortfall in generating capacity as a result of the closure of coal-fired generating stations (OPA, 2005).

On June 13, 2006 the Minister of Energy directed the OPA to develop an Integrated Power System Plan ("IPSP") that includes the development of 2,700 MW of new renewable electricity generation, including hydropower, by 2010. The OPA has since released a series of discussion papers regarding Ontario's electricity supply. In Discussion Paper 4 (OPA, 2006a), the OPA includes potential new hydroelectric capacity of 728 MW by end of 2015 in their supply resource considerations. The OPA (2006b) considers renewable electricity resources to be an important pillar of environmental sustainability.

On August 29, 2007 the IPSP was filed with the Ontario Energy Board ("OEB") for examination and approval. In the IPSP, development of renewable generation is planned to increase from the 2003 baseline renewable generation capacity by approximately 3,000 MW in 2010, and is planned to increase from 2003 baseline by approximately 16,000 MW in 2025. The Yellow Falls Hydroelectric Project is included as a committed resource in the IPSP as a hydroelectric generator with a RES contract (Ontario Power Authority, 2007). Renewable generation, along with other resources such as conservation and demand management, is required to make up a shortfall in capacity caused by planned closure of coal-fired generation in 2014 and growth of Ontario's economy (**Figure 1.2**).

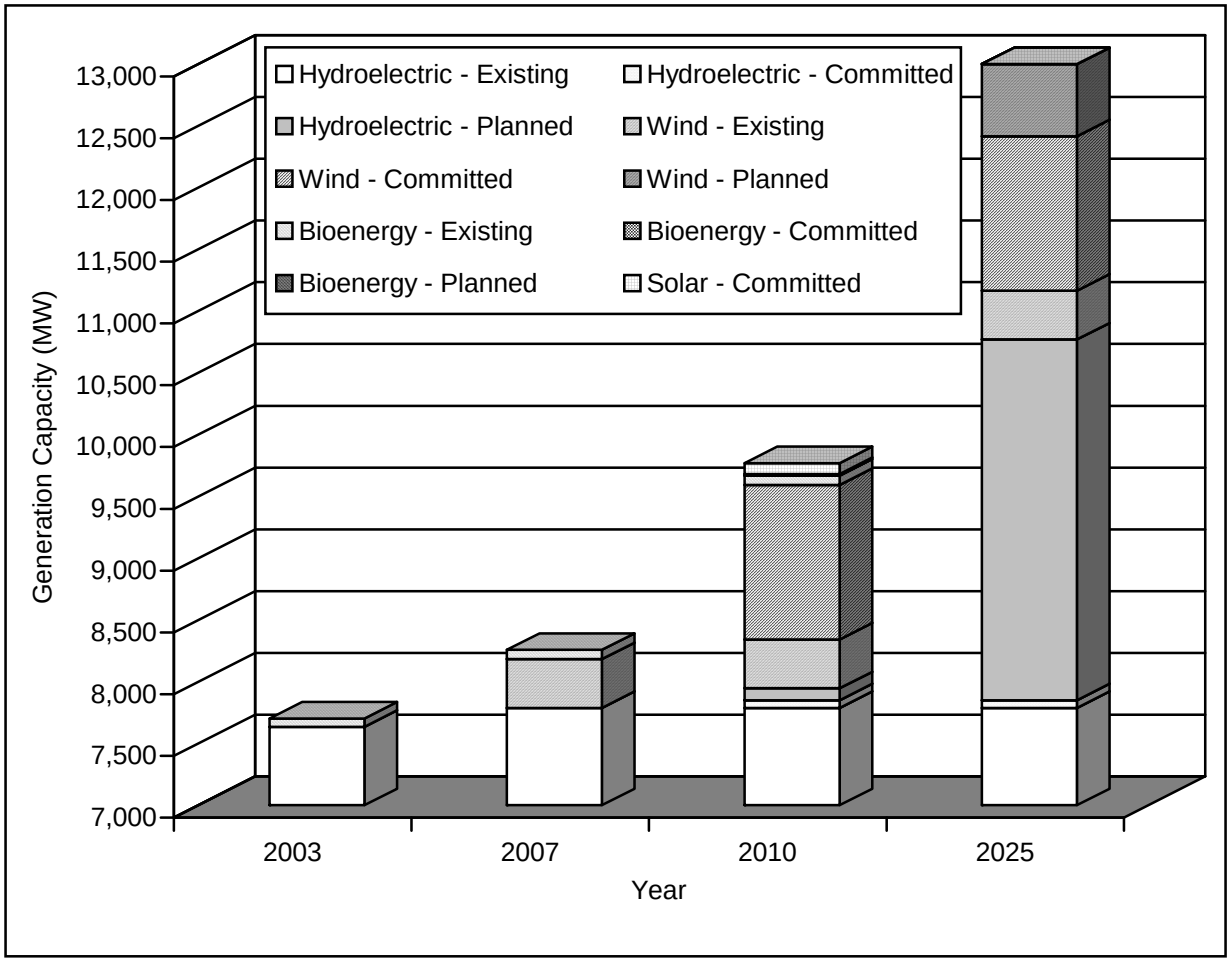

Figure 1.2 Planned Renewable Generation Capacity from 2003 to 2025

1.9.2 Project Disadvantages

Most human activity has the ability to positively or negatively affect the environment, and the same is true for electricity generation. Since the mid-twentieth century, electricity has been an essential part of human life. Electricity powers appliances and office equipment, heats homes, schools, and hospitals, and plays an integral role in the manufacturing of the products we use every day.

In comparison to other forms of generation (such as coal), run-of-the-river hydroelectricity has relatively few environmental effects. However, there are some real and perceived disadvantages of the Project, which include:

- Potential alteration of fish habitat
- Potential barriers to fish passage

- Clearing of timber resources for access roads, transmission line, and headpond
- Potential alterations to river flow
- Potential alterations to river shape
- Potential alterations to the local viewscape
- Potential changes to sediment deposition in the Mattagami River
- Potential effects to wildlife
- Potential effects to cultural heritage resources
- Potential infringement on traditional lands used by First Nations
- Potential loss of recreational opportunities

These potential effects may be reduced or eliminated through the application of avoidance, mitigation, or protection measures. Additional information on the real and perceived disadvantages of the Project is provided in **Section 6**. As appropriate, **Section 6** also outlines mitigation and protection measures recommended to avoid, minimize, or offset any potentially adverse environmental effects.

1.9.3 Project Advantages

The benefits of the Yellow Falls Hydroelectric Project include:

- A construction labour force requirement of approximately 100,000 person-hours.
- During construction, the Project will result in the equivalent of approximately 95 full-time jobs and 134 indirect or induced full-time jobs.
- Two full time operations/maintenance staff will be required for the duration of operations.
- An additional contracted labour force will be retained during periodic overhaul and maintenance.
- The construction phase will generate expenditures on goods and services of approximately $70 million, a significant portion of which will remain in the regional economy.
- It is anticipated that operations and maintenance costs for the Project will be approximately $680,000 annually.
- Significant tax revenues to be paid to the province with minimal demand for government services. The total tax bill for the Project is estimated at approximately $336,480 per year.
- Indirect economic effects related to increased manufacturing and service supply.

Furthermore:

- Hydroelectricity is highly reliable and very efficient.

- The Hydroelectric generation process does not directly produce air pollution during operation, and assists in offsetting emissions from other energy sources.
- Hydroelectricity is associated with few environmental effects compared with fossil fuel electricity generation.
- Hydroelectric generation does not directly contribute to global climate change through operation.
- Using hydroelectricity in place of conventional carbon-based energy reduces generation of smog and acid rain.
- Hydroelectric generating facilities have a long lifespan, often approaching 100 years.

1.10 PROJECT SCOPE

Scope was determined through analysis of regulatory requirements, correspondence with federal and provincial authorities, project construction, operation, and decommissioning activities, and professional judgment regarding the well-established potential effects of run-of-river hydroelectric plants.

The scope of this EA includes direct potential effects of all undertakings associated with the Project including construction, operation, and decommissioning or refurbishment of the proposed hydroelectric plant (including potential upstream and downstream effects), access roads, and transmission facilities. Indirect effects on air quality, safety, and fish have been included in the Project scope. In addition, cumulative effects of the Project and existing or proposed undertakings within the Study Area are addressed.

1.10.1 Study Area

The Mattagami River has been used to produce electricity for over 90 years, and today the river system supports ten generating stations for a combined installed capacity of approximately 510 MW, including stations owned and operated by Ontario Power Generation (“OPG”), Tembec Industries Inc. (“Tembec”), and Brookfield Renewable Power Inc. Eight of the ten generating stations (“GS”) in the river system are located on the Mattagami River. Two generating stations are located in the Study Area. Lower Sturgeon GS, owned by OPG is located upstream of the proposed Project, while Smooth Rock Falls GS, owned by Tembec, is located downstream.

The Study Area for the EA was determined using professional judgment regarding the geographically predictable environmental effects of hydroelectric generation facilities, and includes upstream and downstream existing hydropower facilities on the Mattagami River. The Study Area for the Project extends from the Town of Smooth Rock Falls, south to the Lower Sturgeon Generating Station, east to Provincial Highway 655, and west to the boundaries of Haggart, Sydere, Laidlaw, Kirkland, and Wilhelmina geographic townships (**Figure 1.1**).

The Study Area encompasses the zone potentially affected by the construction and operation of Project components, including the proposed generating station, headpond, potential aggregate

extraction areas, proposed access roads, and transmission facilities. As **Figure 1.3** shows, data collection is refined throughout the EA Process based on environmental data, stakeholder input, and design evolution. As such, field work pertaining to the EA is conducted at a more detailed level, necessitating study areas that are limited to the areas of potential effects. For example, vegetation investigations took place in the areas proposed for access roads, transmission lines, and project facilities. Aquatic sampling took place in areas likely to be affected by the Project. The specific study areas for these components are smaller than the overall Study Area used for baseline data collection and reflect an increased level of detail pertaining to specific effects.

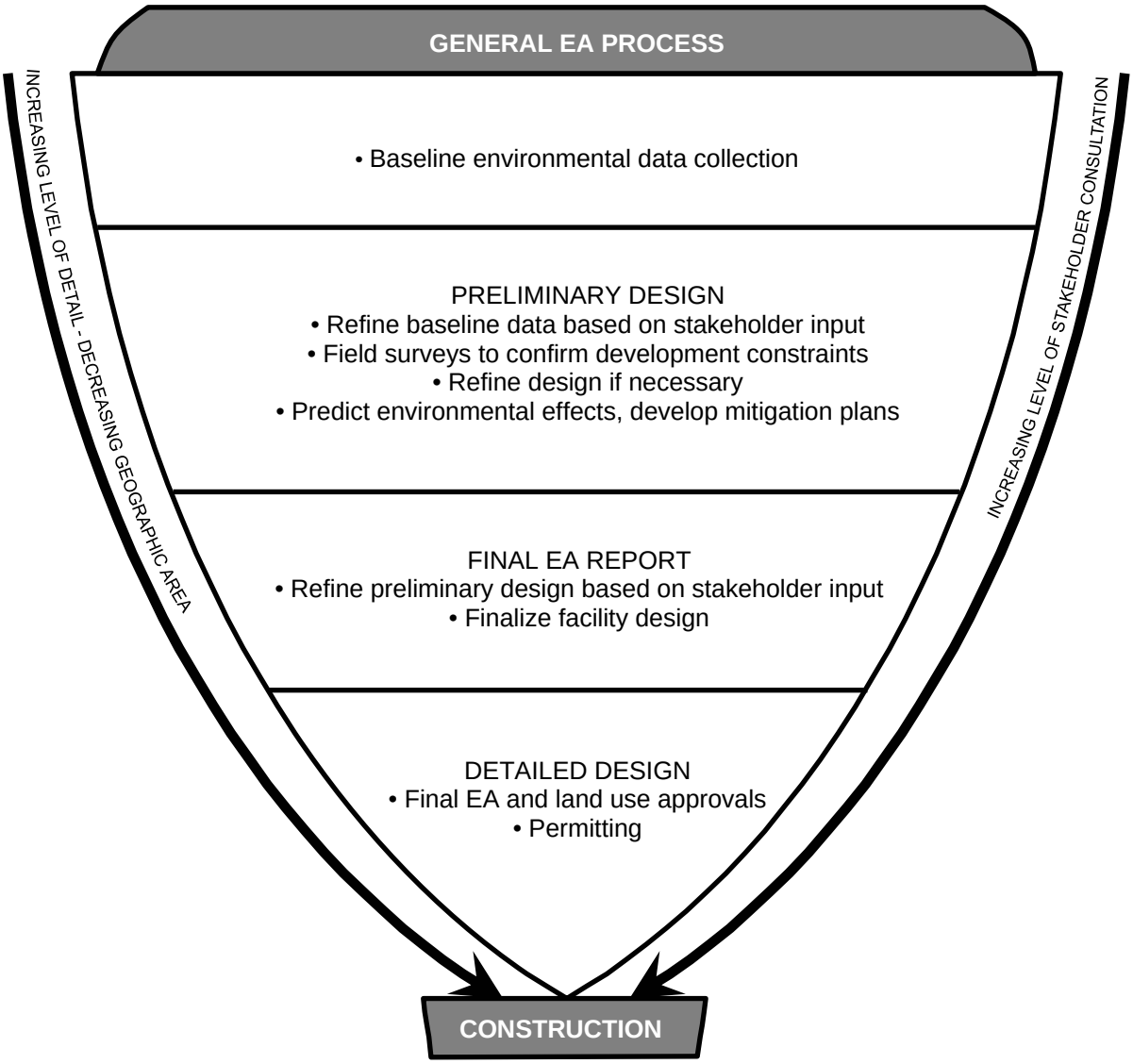

Figure 1.3 General EA Process

1.10.2 Timeframe

This report examines the construction, operation, and decommissioning stages of the Project. The Proponent plans to start construction in the first quarter of 2009, subject to regulatory approval. Construction is expected to be completed within a two-year timeframe. The Project is conservatively estimated to be in operation for 50 years, at which time, operation may continue, or the facility may be decommissioned or refurbished. In actuality, this time frame could be as long as 100 years, as demonstrated by other hydropower plants in Ontario.

In this EA Report, project-related environmental effects are addressed throughout the Project lifecycle. Decommissioning or repowering of the Project is discussed separately since potential effects will occur at least 50 years in the future, resulting in a higher degree of uncertainty.

1.11 REGULATORY REQUIREMENTS

The Yellow Falls Hydroelectric Project is subject to three environmental and planning review processes overseen by the MNR, MOE, and the Canadian Environmental Assessment Agency ("CEA Agency"). In addition, the Project will be consistent with the Ontario Ministry of Municipal Affairs and Housing ("MMAH") 2005 Provincial Policy Statement ("PPS"), which contains provisions for the implementation of renewable energy systems. Each review process is described in detail in the following sections (**Figure 1.4**). A synopsis of additional permits, approvals, and regulatory processes is provided in **Appendix D**.

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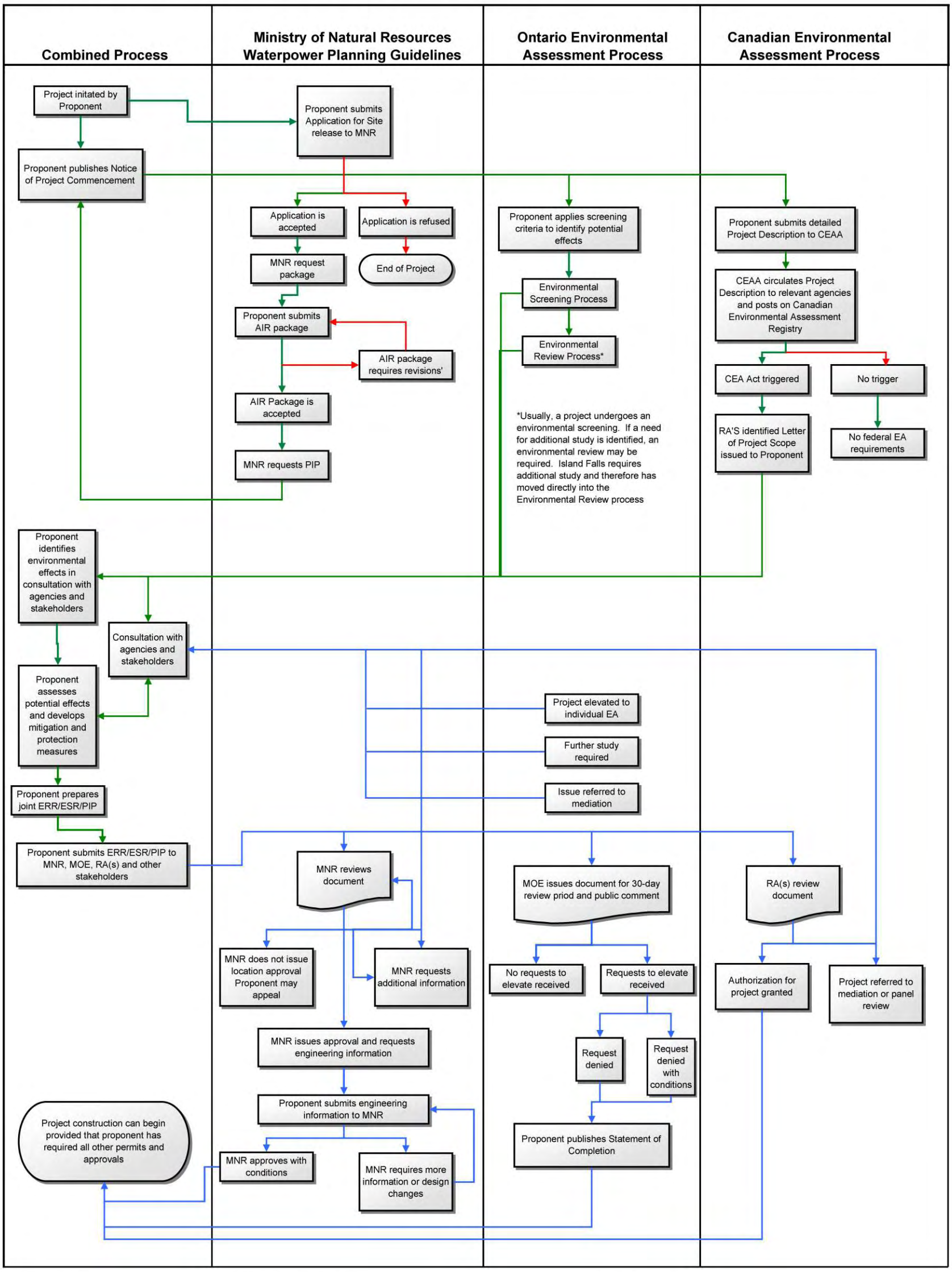

References:

MNR; 1990. Water Planning Guidelines

MOE; 2001. Guide to Environmental Assessment Requirements for Electricity Projects

List of Acronyms:

MNR - Ontario Ministry of Natural Resources
CEAA - Canadian Environmental Assessment Agency
CEA Act - Canadian Environmental Assessment Act
EA - Environmental Assessment
ESR - Environmental Screening Report
ERR - Environmental Review Report
PIP - Project Information Package
MOE - Ministry of the Environment
WPPG - Waterpower Planning Guidelines

Flowchart Key

Current Project Pathway

Past Potential Project Pathway

Future Potential Project Pathway

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ENVIRONMENTAL ASSESSMENT REPORT

FIGURE NO.
1.4

TITLE
INTEGRATED ENVIRONMENTAL ASSESSMENT PROCESS

Initiated: June, 2007
Revised: October, 2008

Stantec

Yellow Falls Power LP

1.11.1 Ontario Environmental Assessment Act ("EA Act")

The Ontario Environmental Assessment Act ("EA Act") and associated regulations determine which projects must undergo an EA in Ontario. The *Electric Projects Regulation* ("O. Reg. 116/01") has adapted the EA Act to ensure that the environmental effects of new private and public sector electricity projects are assessed. O. Reg. 116/01 and the associated "Guide to Environmental Assessment Requirements for Electricity Projects ("EA Guide") sets out the Environmental Screening Process ("ESP") as a proponent driven, self-assessment process. The proponent is responsible for determining if the Project falls within the ESP and when to formally commence the process. The proponent is also responsible for determining the time required to adequately conduct the ESP and when to publicly release Project documentation and/or solicit comments from stakeholders.

New electricity projects are classified into one of three categories under O. Reg. 116/01:

- Category A: projects that are expected to have minimal potential environmental effects and do not require approval under the EA Act.
- Category B: projects that have potential environmental effects that can probably be mitigated but require approval through the ESP.
- Category C: projects that have known potentially significant environmental effects and require the preparation of an individual environmental assessment under the EA Act.

All projects subject to the ESP require proponents to apply a series of screening criteria to identify the potential environmental effects of the project. An environmental review is required if potential concerns raised during the screening stage dictate a need for additional detailed studies. The proponent may choose to carry out an Environmental Review if potentially significant environmental effects or public issues arise that require more detailed study and assessment.

Based on the MOE's categorization of electricity projects, hydropower facilities under 200 megawatts ("MW") in generating capacity are classified as Category B projects and are subject to approval under the ESP. Stakeholder consultation, coupled with the results of the screening criteria checklist, has determined that detailed studies and assessment need to be carried out for this Project and necessitate an environmental review. This Environmental Review Report ("ERR") has been prepared to address the need for greater scrutiny of potential environmental effects.

1.11.2 Ministry of Natural Resources Waterpower Program Guidelines

The Yellow Falls Project was initiated in 1986. Therefore, the MNR has confirmed that the Yellow Falls Hydroelectric Project will be reviewed and assessed under the 1990 WPPG.

At the start of the project, a proponent must submit an Application for Site Release to the MNR. The Application for Site Release, if accepted, secures a waterpower site for potential future development. Following acceptance of the Application for Site Release, the proponent must

submit an Application Information Requirements ("AIR") package. Once the AIR package is accepted, the MNR requests a Project Information Package ("PIP"), which requires effects assessment. The MNR have previously accepted the Application for Site Release (1987) and AIR package (2002) for the Project. This Report represents the PIP component of the waterpower application process.

The proponent will be required to obtain work permits for construction activities associated with the Project. The work permits will be evaluated based upon the information contained within this PIP, as well as technical drawings and site-specific environmental protection measures associated with construction.

The MNR and proponent determine the terms and conditions of the Waterpower Lease Agreement ("WPLA") during the process defined in the WPPG to create a "requisition to issue a lease." Subsequently, the WPLA is prepared and signed before the facility commissioning stage.

Finally, monitoring to assess the potential environmental effects of the project is to be undertaken by the District, Regional Engineer, the proponent, and/or an independent third party as negotiated during the WPPG process. Monitoring costs are the responsibility of the proponent as negotiated during the WPPG process.

1.11.3 Provincial Policy Statement

The 2005 Provincial Policy Statement ("PPS") provides policy direction on matters of provincial interest related to land-use planning and development. As a key part of Ontario's policy-led planning system, the PPS sets the policy foundation for regulating the development and use of land. The PPS is issued under the authority of Section 3 of the Planning Act and requires that decisions affecting planning matters "shall be consistent with" policy statements issued under the Act.

As described in Section 6.0 of the PPS, the Project is not considered *Development* as defined by the PPS. Further, the Project is undergoing a federal and provincial environmental screening, and as such will be constructed and operated in accordance with Federal and Provincial requirements. The PPS (2005) contains several key sections related to renewable energy facilities, including hydroelectric generation, which is defined as *Infrastructure* in the PPS.

Section 1.1.5 Rural Areas in Territory without Municipal Organization: The focus of development activity shall be activities and land uses related to the management or use of resources and resource-based recreational activities.

Section 1.5.1 Public Spaces, Parks, and Open Spaces: Healthy, active communities should be promoted by:

- Providing for a full range and equitable distribution of publicly-accessible built and natural settings for recreation, including facilities, parklands, open space areas, trails and, where practical, water-based resources
- Providing opportunities for public access to shorelines
- Considering the impacts of planning decisions on provincial parks, conservation reserves and conservation areas.

Section 1.7.1 Long-Term Economic Prosperity: should be supported by…providing opportunities for increased energy generation, supply, and conservation, including alternative energy systems and renewable energy systems

Section 1.8 Energy and Air Quality: planning authorities shall support energy efficiency and improved air quality through land-use and development patterns which…promote design and orientation which maximize the use of alternative or renewable energy, such as solar and wind energy…(1.8.1 e); and increased energy supply should be promoted by providing opportunities for energy generation facilities to accommodate current and projected needs, and the use of renewable energy systems and alternative energy systems…(1.8.2).

Section 2.1 Natural Heritage: Natural features and areas shall be protected for the long term.

- The diversity and connectivity of natural features in an area, and the long-term ecological function and biodiversity of natural heritage systems, should be maintained, restored or, where possible, improved, recognizing linkages between and among natural heritage features and areas, surface water features and ground water features.
- *Development* and *site alteration* shall not be permitted in *fish habitat* except in accordance with *provincial* and *federal requirements*.

Section 2.2 Water: Planning authorities shall protect, improve or restore the quality and quantity of water by:

- Using the watershed as the ecologically meaningful scale for planning
- Minimizing potential negative impacts, including cross-jurisdictional and cross-watershed impacts
- Identifying surface water features, ground water features, hydrologic functions and natural heritage features and areas which are necessary for the ecological and hydrological integrity of the watershed;
- Implementing necessary restrictions on development and site alteration to protect all municipal drinking water supplies and designated vulnerable areas; and protect, improve or restore vulnerable surface and ground water, sensitive surface water features and sensitive ground water features, and their hydrologic functions
- Maintaining linkages and related functions among surface water features, ground water features, hydrologic functions and natural heritage features and areas
- Promoting efficient and sustainable use of water resources, including practices for water conservation and sustaining water quality

- Ensuring stormwater management practices minimize stormwater volumes and contaminant loads, and maintain or increase the extent of vegetative and pervious surfaces.

2.6 Cultural Heritage and Archaeology: *Significant built heritage resources* and *significant cultural heritage landscapes* shall be *conserved*.

- *Development* and *site alteration* shall only be permitted on lands containing *archaeological resources* or *areas of archaeological potential* if the *significant archaeological resources* have been conserved by removal and documentation, or by preservation on site. Where *significant archaeological resources* must be preserved on site, only *development* and *site alteration* which maintain the heritage integrity of the site may be permitted.

The Project will be consistent with the policies set out in the PPS (see **Section 6.7.2**).

1.11.4 Canadian Environmental Assessment Act

Federal government agencies follow a four-step process to determine if the *Canadian Environmental Assessment Act* ("CEAA") applies to a project. The Canadian Environmental Assessment Agency ("CEA Agency") may assist federal agencies in making their determination and in coordinating scoping and comments:

Step 1: Does CEAA Apply?

The CEAA requires federal authorities to undertake environmental assessments of projects when they are proponents, or when they are proposing to take one of the following actions that would enable a project to proceed, in whole or in part, by:

- Providing some form of financial assistance to the project
- Having the administration of federal lands and selling, leasing, or otherwise disposing of those lands or any interest in those lands
- Issuing a permit, license, authorization, or other regulatory approval listed in the Law List Regulations.

The proposed Project will require authorization under the *Fisheries Act*, the *Navigable Waters Protection Act*, and the *Canadian Transportation Act* (**Appendix D**). As a result, the Department of Fisheries and Oceans Canada ("DFO"), and Transport Canada ("TC") have been identified as Responsible Authorities ("RAs"). Environment Canada ("EC") and Health Canada ("HC") have been identified as expert Federal Authorities ("FAs").

In addition to the federal permits required by the Project, the Project may be eligible for federal funding resulting from the Federal Government's recent announcement of the ecoENERGY Program. This program includes the ecoENERGY Renewable Initiative which consists of funding to support the development of renewable energy resources, including waterpower. YFP has applied under the ecoENERGY program and NRCan has also been identified as a RA.

Since it has been determined that the CEAA is applicable, the next step is to identify the type of study required.

Step 2: Identification of Study Type

There are two general types of studies identified under CEAA: *Self-Directed* and *Public Review*. Self-directed projects are further classified into screenings and comprehensive studies. The need for the RA to undertake a comprehensive study is determined by the *Comprehensive Study List Regulations*. Hydroelectric projects are not required to undergo a Comprehensive Study since they are not on the *Comprehensive Study List Regulations. Comprehensive Study List Regulations* include (DFO, 2006**)**

- Construction, decommissioning, or abandonment of waterpower projects with a capacity of 200 MW or more,
- Expansion of an existing waterpower project that would result in an increase of capacity of 50 percent or more and 200 MW or more.

Since the Yellow Falls Project has a proposed nameplate capacity of 16 MW, it has been determined by the RAs that a screening level EA must be carried out, and preparation of an Environmental Impact Statement ("EIS") is required. Approximately 95% of self-directed environmental assessments conducted under CEAA are screenings. In a screening study, the RAs, in conjunction with FAs, determines the scope of the study, and ensures the proponent prepares an appropriate screening study. Screening studies are typically undertaken for smaller-scale projects with minor, predictable, and mitigable environmental effects.

Step 3: RA Determination

The RA's determination concerns the likelihood of significant adverse environmental effects. The three determination options available to the RA are:

1. The project is not likely to cause significant adverse environmental effects. Following this determination, the RA may exercise any power or perform any duty or function that would permit the project to be carried out in whole or in part.
2. The project is likely to cause significant adverse environmental effects that cannot be justified. Following this determination, the RA may not exercise any power or perform any duty or function that would permit the project to be carried out in whole or in part.
3. It is uncertain whether the project is likely to cause significant adverse environmental effects, or the project is likely to cause significant adverse environmental effects that may be justifiable or public concerns warrant referral to a mediator or review panel. Following any of these determinations, the RA must refer the project to the federal Minister of the Environment for a referral to a mediator or review panel.

Step 4: Review and Determination

The decision options for an RA following a review panel or mediation are as follows; the project is:

- Not likely to cause significant adverse environmental effects or the project is likely to cause significant adverse environmental effects that can be justified in the circumstances. Following this determination, the RA may exercise any power or perform any duty or function that would permit the project to be carried out in whole or in part, or
- Likely to cause significant adverse environmental effects that cannot be justified. Following this determination, the RA may not exercise any power or perform any duty or function that would permit the project to be carried out in whole or in part.

1.11.5 Coordination of EA and WPPG Requirements

Although coordination procedures have been established by CEAA and the MOE to facilitate a single EA and review process for a proposed project involving both jurisdictions, there can still be considerable overlap in jurisdictional authority among different federal, provincial and municipal agencies. In addition to federal and provincial requirements, this EA Report also considers requirements presented in the 1990 MNR WPPG (**Section 1.11.2**). Interaction and overlap between EA and WPPG processes are described in **Figure 1.4**. A summary of additional regulatory requirements is provided in **Appendix D**. Overall, the EA and the WPPG processes are similar, and their purposes are too:

- Identify and evaluate social, economic and environmental effects of the Project
- Conduct public, agency and First Nation consultation
- Provide a structured framework to assist public officials in making sound decisions
- Seek approvals and endorsement from regulatory agencies

Recently, there has been an initiative between the federal and provincial governments to coordinate their respective EA approvals processes as part of the *Canada-Wide Accord on Environmental Harmonization*. Canada and Ontario are parties to a 2004 bilateral agreement on EA cooperation, which provides the public, proponents and governments with greater consistency, predictability, and timely and efficient use of resources where both parties are required by law to assess the same proposed project. As a result of this EA bilateral agreement, a proponent of a project that falls under both the Ontario and federal EA processes must prepare an EA report in accordance with regulatory requirements, guidelines, or scoping documents as mandated by both the provincial and federal governments. The federal government also has EA cooperation agreements with Alberta, British Columbia, Saskatchewan, Manitoba, Quebec and the Yukon.

1.11.6 MNR Resource Stewardship and Facility Development Class EA

Typically, the requirements of MNR's Class Environmental Assessment for MNR Resource Stewardship and Facility Development Projects ("MNR Class EA") must be satisfied before issuance of a work permit or land use permit. The MNR Class EA ensures that the MNR, its partners, and disposition applicants meet the requirements of the EAA by considering the potential environmental effects of proposed projects. Provided that the process set out in the MNR Class EA is followed, projects and activities included in the Class EA, including the issuance of a work permit, do not require formal review and approval under the OEAA.

However, Section 2.6.2 of the MNR Class EA provides that projects subject to the ESP are not subject to the MNR screening criteria. Instead, proponents are required to fulfill their OEAA requirements under the ESP before going to the MNR to apply for dispositions such as work permits which will also be used to fulfill any obligations through the MNR Class EA.

Although not expressly required, a concordance table based upon the MNR Class EA screening criteria is provided below. The purpose of **Table 1.1** is to list the sections of this EA where MNR screening criteria has been addressed.

Table 1.1 Class EA for MNR Resource Stewardship and Facility Development Projects: Screening Criteria

Screening Criteria	Section(s) in EA
Natural Environment Considerations	
Air quality	Section 6.3.1, Appendix F
Water quality or quantity (ground or surface)	Section 6.2.4, 6.2.6, Appendix G
Species at risk or their habitat	Section 6.4.5, 6.5.2, Appendix G, H
Significant earth or life science features	Section 6.4.7, Appendix F, H
Fish or other aquatic species, communities, or their habitat (including their numbers, diversity, and movement of resident or migratory species)	Section 6.5, Appendix G
Land subject to natural or human made hazards	Section 6.7.3, Appendix F
Recovery of a species under a special management program (e.g. elk restoration)	Not applicable to Study Area
Ecological Integrity	Section 6.4, Appendix F, H
Terrestrial wildlife (including numbers, diversity and movement of resident or migratory species)	Section 6.4.4, Appendix F, H
Natural vegetation and terrestrial habitat linkages or corridors through fragmentation, alteration and/or critical loss	Section 6.4.1, Appendix F, H
Permafrost	Not applicable to Study Area
Soils and sediment quality	Section 6.1.3, 6.2.3, Appendix G
Drainage or flooding	Section 6.2.1, 6.2.2, 6.2.3, Appendix G
Sedimentation or erosion	Section 6.2.3, 6.2.4, Appendix G
Release of contaminants in soils, sediments	Section 6.12
Natural heritage features and areas (e.g. areas of natural and scientific	Section 6.4.7, Appendix F, H

Table 1.1 Class EA for MNR Resource Stewardship and Facility Development Projects: Screening Criteria

Screening Criteria	Section(s) in EA
interest, provincially significant wetlands)	
Other (specify)	None
Land Use, Resource Management Considerations	
Access to trails or inaccessible areas (land or water)	Section 6.7.4, 6.9.3
Obstruct navigation	Section 6.8.6
Other resource management projects	Not Applicable to Study Area
Traffic patterns or traffic infrastructure	Section 6.8.10
Recreational importance – public or private	Section 6.7.4
Create excessive waste materials	Section 6.7.6
Commit a significant amount of a non-renewable resource (e.g. aggregates, agricultural land)	Section 6.1.1, 6.6.1
Noise levels	Section 6.3.3
Views or aesthetics	Section 6.9.4
Be a precondition or justification for implementing another project	Not Applicable
Adjacent or nearby uses, persons or property	Section 6.7
Other (specify)	None
Social, Cultural, and Economic Considerations	
Cultural heritage resources – including archaeological sites, built heritage, and cultural heritage landscapes	Section 6.9.1, Appendix F
Displace people, business, institutions, or public facilities	Section 6.8.2
Community character, enjoyment of property, or local amenities	Section 6.8.3, 6.8.4, 6.8.7, 6.9.2, Appendix F
Increase demands on government services or infrastructure	Section 6.8.1, 6.8.8
Public health and/or safety	Section 6.8.11
Local, regional, or provincial economies or businesses	Section 6.8.1, 6.8.4, Appendix F
Tourism values (e.g. resource-based tourist lodge)	Section 6.8.5, Appendix F
Other (specify)	None
Aboriginal Considerations	
First Nation reserves or communities	Section 6.10.1
Spiritual, ceremonial or cultural sites	Section 6.9.1, 6.10.1
Traditional land or resource used for harvesting activities	Section 6.10.2
Aboriginal values	Section 6.10
Lands subject to land claims	Section 6.10.3
Other (specify)	None

1.11.7 Other Environmental Permits and Approvals

Further permits and approvals may be required to construct and operate the Project following EA approval by a federal or provincial authority. A proponent may commence work to obtain

other permits and approvals during the EA process. A project may not receive permits or approvals or commence construction until it has first fulfilled EA requirements. **Appendix E2** outlines comments received from various agencies, and where they were addressed in the EA. The following subsections outline the key permits and approvals likely to be required from federal, provincial, and municipal levels of government. A synopsis of legislative requirements is provided in **Appendix D**.

1.11.7.1 Federal

Based upon previous hydroelectric development experience, the following permits and authorizations (**Table 1.2**) may apply, depending upon the final configuration of the Project.

Table 1.2 Federal Permits and Authorizations

Permit/Authorization	Administering Agency	Relevant Act or Regulation	Rationale
CEAA Authorization	CEAA	Canadian Environmental Assessment Act	Regulatory requirement
Navigable Waters Protection Act Approval	Transport Canada – Marine Safety	Navigable Waters Protection Act	Project located within a navigable watercourse
Explosives Magazine License – Purchase and Possession Permit	NRCan	Explosives Act	Explosives required for excavation of bedrock
Tree Clearing	EC	Migratory Birds Convention Act	Compliance with Migratory Birds Convention Act ensures the protection and conservation of migratory birds and their nests during forest-clearing activities
Order may be required under the Canadian Transportation Act	Canadian Transportation Agency	Canadian Transportation Act	Crossing agreement with Ontario Northland Railway.
Fisheries Act Authorization	Department of Fisheries and Oceans (“DFO”)	Fisheries Act	Harmful alteration, disruption, or destruction of fish and/or fish habitat Blasting in or near waterbodies Fish passage Provision of water flows Destruction of fish by means other than fishing

1.11.7.2 Provincial

There are a number of permits and authorizations that will be required to facilitate the development of the Yellow Falls Hydroelectric Project at the provincial level (**Table 1.3**). These requirements range from environmental assessment to interconnection with the province’s

electrical grid; their ultimate applicability will be determined based on the Project's detailed design.

Table 1.3 Provincial Permits and Authorizations

Permit/Authorization	Administering Agency	Relevant Act or Regulation	Rationale
ESP – Category B Project	MOE	Ontario Environmental Assessment Act, Regulation 116/01	Regulatory requirement
Withdrawal Order	Ministry of Northern Development and Mines (MNDM)	Mining Act	Removal of area directly affected by project from land available for extractive resource claims
Forest Resource License	MNR	Crown Forest Sustainability Act	License to cut timber for transmission line, construction areas, access roads, and the headpond
Certificate of Approval – Air	MOE	Environmental Protection Act	Emissions from temporary concrete batching plant
Certificate of Approval – Air	MOE	Environmental Protection Act	Environmental noise emissions
Scientific Collection Permit	MNR	Fish and Wildlife Conservation Act	Fish collection and sampling as part of environmental assessment process
Permit to Take Water	MOE	Ontario Water Resources Act	Permit required to take water for the purpose for dewatering activities during construction
Location Approval	MNR	Lakes and Rivers Improvement Act	Approved use of the site for waterpower (not construction)
Waterpower Lease Agreement	MNR	Public Lands Act	Project complete and ready for commissioning.
Water Management Plan	MNR	Lakes and Rivers Improvement Act	Operation of a hydropower facility on the Mattagami River and incorporation of the Project into the existing Water Management Plan
Plans and specifications approval	MNR	Lakes and Rivers Improvement Act	Construction of waterpower facility
Logging Agreements for Headpond Area	MNR/Tembec	Crown Forest Sustainability Act	Clearing of the headpond area.
Work Permits	MNR	Public Lands Act	Geotechnical investigations, upgrades to access roads, installation of bridges, construction of dock facilities. Project Construction
Land Use Permits	MNR	Public Lands Act	Installation of transmission lines and docking facilities
Memorandum of Understanding	MNR	Public Lands Act	Installation of bridges and access roads
Easement	MNR	Public Lands Act	Inundation of headpond
Leave-to-Construct	Ontario Energy Board ("OEB")	Electricity Act	Development of a 115 kV transmission facility

Table 1.3 Provincial Permits and Authorizations

Permit/Authorization	Administering Agency	Relevant Act or Regulation	Rationale
Generator License	OEB	Electricity Act	License to generate electricity for commercial distribution
Customer Impact Assessment	Hydro One Networks Inc. ("Hydro One")	Electricity Act	Evaluation of potential effects to existing electrical customers
Section 81 Proposal	OEB	Electricity Act	Generator constructing transmission infrastructure
System Impact Assessment	Independent Electricity System Operator ("IESO")	Electricity Act	Potential effects of integrating the project within provincial transmission system
Connection Approval	IESO	Electricity Act	Physical interconnection with provincial transmission system
Encroachment Permit	Ministry of Transportation	Highway Traffic Act	Power line crossing and any other installation or works, upon, under or within the limits of a Provincial Highway
Permit for Category 9 Pit and Category 12 Quarry	MNR	Ontario Aggregate Resources Act	Permits required for the extraction of aggregate resources

1.11.7.3 Municipal

Since the Project is not located within the boundaries of the Town of Smooth Rock Falls, municipal permits are not required. However, YFP has undertaken ongoing consultation with the Town of Smooth Rock Falls throughout development of the Project. Communication with local interested parties, including the Town of Smooth Rock Falls, will be ongoing throughout the life of the Project.

1.12 AUTHOR OF THE EA REPORT AND TECHNICAL TEAM

An independent, multidisciplinary team of professionals led by Stantec Consulting Ltd. ("Stantec") has prepared this EA Report. Stantec has extensive experience preparing environmental reports for power projects in Ontario and worldwide. **Table 1.4** shows the key EA consultancy team, followed by general contact information for Stantec.

Table 1.4 EA Consultants and Primary Roles

Consultancy	Primary Role
Stantec	EA Author, Terrestrial and 2006 Aquatic Studies
Canadian Projects Limited	Engineering and Design
Woodland Heritage Services Limited	Stage I through III Archaeological/Cultural Heritage Assessment
Golder Associates Ltd.	2007 and 2008 Aquatic Studies
IBI Group	Economic Benefits Assessment
Timbercraft	Aggregate Permits and Approvals

Stantec Consulting Ltd.

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2.0 Project Information

2.1 HOW HYDROPOWER WORKS

Civilizations have been using water to do work for over 2000 years (IEA, 2005), and for the last 130 years, the energy of falling water has been used to produce electricity. The distance the water falls, water pressure, and water availability determine how much electricity can be generated. Creating a back-up of water in a headpond increases volume, pressure, and availability, increasing energy generated and ensuring a steady supply (**Figure 2.1**).

Electricity is produced by a dam with a headpond when water flows from the forebay (the portion of the headpond nearest the intake) into the intake and through the turbine, exiting on the other side of the dam. The force of the water flowing downhill turns the turbine, which turns the electrical generator. The generator is essentially a series of magnets surrounding copper coils that are spun to produce electricity. The electricity from the generator goes to a transformer, which converts the electricity to the appropriate voltage to be transmitted through power lines to end users.

The capacity of a generating station to produce electricity is usually expressed in Megawatts ("MW"). For a hydroelectric dam, megawatts are a way of expressing the rate at which falling water is converted to electricity (Boyle et al, 2003). One MW of electricity can power 10,000 household 100 W light bulbs. The amount of electricity produced over a period of time is usually expressed in Megawatt hours ("MWh").

The amount of electricity that a hydroelectric generating station can produce in a year is calculated using the following equation:

$$\text{Energy (MWh)} = \rho_{\text{water}} \bullet g \bullet \text{Head} \bullet \text{Discharge rate} \bullet \text{Time} \bullet \text{Turbine efficiency} \bullet \text{Electrical efficiency}$$

- p_{water} is the mass of water (approximately 1000 kg/m^3)
- g is the force of gravity (9.81 m/s)
- Head is the difference between the Headpond level and the Tailwater level, averaged over the year (m)
- Discharge rate is the daily flow (m^3/s)
- Time is the number of hours in one year (h)
- Turbine efficiency is a characteristic of the turbine at various discharge rates (%)
- Electrical efficiency represents the ability of generation equipment to convert the spinning force of the turbine into electricity (assumed to be 98%)

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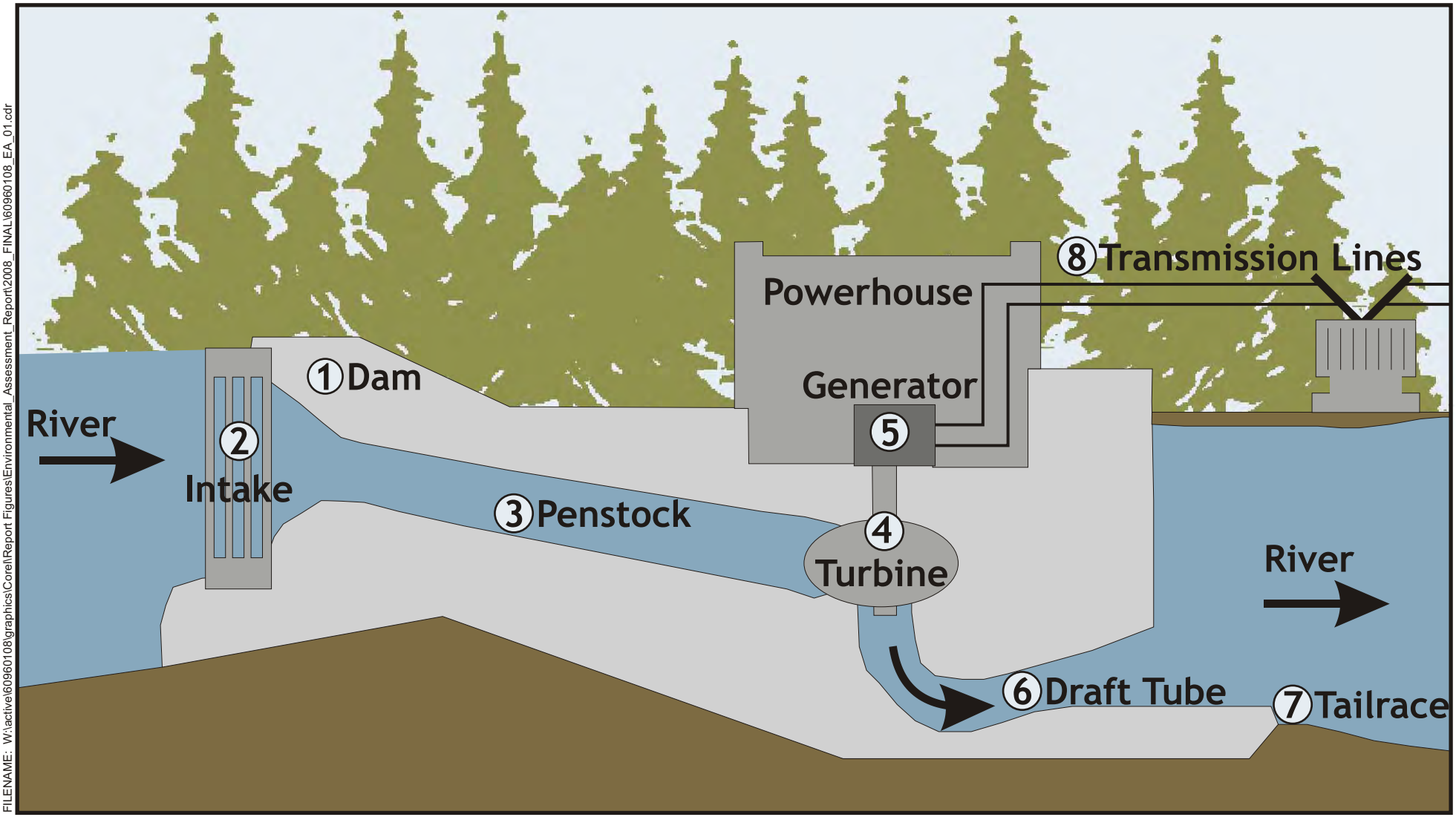

1. Dam: increases upstream water level, creating hydraulic pressure on the turbine. The dam for the Yellow Falls Hydroelectric Project is 15 metres high.
2. Intake: where water enters the plant. The intake will be equipped with a trash rack to help keep out debris.
3. Penstock: a pipe that conveys water under pressure from the intake to the turbine.
4. Turbine: a waterwheel turned by the pressure and flow of the water. The Project will use two 8 megawatt ("MW") turbines.
5. Generator: the shaft of the turbine turns the generator, which generates the electricity. The Project will have two generators, one for each turbine.
6. Draft tube: conveys water from the turbine back to the river.
7. Tailrace: where water exits the plant. The tailrace for the Project will be located adjacent to the southwest bank of the Mattagami River.
8. Transmission lines: carry the electricity generated at the plant to the provincial grid. The Project will require a 115 kV transmission line from Yellow Falls to the existing 115 kV transmission line located north of Highway 11.

Stantec

Yellow Falls Power LP

PREPARED FOR:
YELLOW FALLS POWER LP
ENVIRONMENTAL ASSESSMENT REPORT

FIGURE NO.
2.1

TITLE
TYPICAL COMPONENTS OF A HYDROELECTRIC GENERATING STATION

Initiated: June, 2007
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2.2 PROJECT CONCEPT

2.2.1 Mode of Operation

Hydroelectric facilities generally operate under one of two modes of operation: power-on-demand or power-on-availability.

Power-on-demand facilities, commonly known as 'peaking' plants, store water during times of low electricity demand and release it during times of high electricity demand. These facilities are effective at responding to daily electricity demand fluctuations, and can take advantage of the corresponding changes in electricity prices (i.e. produce electricity when it is in greatest demand and has the highest price). However, the storage-then-release operation of these facilities result in significant modification of downstream flows and large changes in reservoir levels with the potential for associated environmental impacts.

Power-on-availability plants, commonly known as run-of-river plants, do not typically store water for release at a later time, although some plants have limited water storage capabilities (usually 48 hours or less). In run-of-river plants, inundation is limited to that which is required for the purpose of creating hydraulic head (difference in water levels between the intake headwater and powerhouse tailwater), which provides consistent power and flow to the turbines. In run-of-river plants, power is generated based on the available river flow at that time, since water is not stored for later release. The outflow from a run-of-river facility is equivalent to the natural flow of the river, and thus the headpond is maintained at a relatively constant level. The Yellow Falls Hydroelectric Project is a run-of-river hydroelectric facility, and is not designed to manipulate river flows or store water.

In November 2005, YFP was awarded a Renewable Energy Supply II ("RES II") Contract under the Ministry of Energy's Renewables II Request for Proposals ("RFP II") process. The RFP II process was open to renewable energy projects with a nameplate capacity greater than or equal to 20MW.

As a result of the modification to the dam and powerhouse location, and the consequent reduction in Project nameplate capacity to 16 MW, the Project no longer meets the original requirements of RFP II. YFP will therefore make alternative contract arrangements for the sale of the electricity generated from the Project.

Although not required prior to commencement of operations, YFP is confident that an alternative contract arrangement at a fixed price per kWh will be obtained prior to commissioning of the Project. No financial incentives are available to YFP to supply greater quantities of electricity during peak hours and the Project is not designed to operate in this manner. Since peaking facilities store and release water opportunistically, and depend on higher electricity prices during peak usage, less total electricity is actually produced. There is a financial disincentive to supply greater quantities of electricity during peak times and store water during off-peak hours.

Based on the environmental, operational and contractual aspects described above, operational modes other than power-on-availability (i.e. run-of-river) are not beneficial to the Project.

2.2.2 Headpond Level

The total head, as determined by the headpond and tailwater levels, is one of the key determinants of the total capacity of a hydroelectric facility. Headpond elevation has been minimized to the extent possible. Previous facility designs included a greater headpond elevation (**Section 2.2.3**). Through design optimization, the headpond height has been reduced to 244.0 m, reducing the extent of the Project headpond. Further reduction of headpond elevation below 244 would result in a reduction in plant capacity and would not make most efficient use of the resource available.

2.2.3 Design Evolution

The Yellow Falls Hydroelectric Project has been under development since 1987 (**Section 1.7**). Between 1987 and 2008, the project concept has undergone several refinements.

The initial project concept was an 11 MW run-of-river facility at Island Falls. The initial project concept included a 17 m high earth fill dam, spillway, and two 5.5 MW turbines. The proposed headpond was 16 km long, with an operating level of 245 m above sea level ("asl") from Island Falls to the White Caribou River and a surface area of 450 ha. Access was proposed along an upgraded Red Pine Road, and 14 km of 135 kV transmission line was contemplated. The original dam design included an earth-filled dam in a straight alignment along the existing bedrock island chain along Island Falls.

In 2002, installation of two 6.5 MW turbines was considered, along with an additional access road and two alternate 115 kV transmission line routes. On CREC's involvement in the Project in 2004, installation of two 7.5 MW turbines was considered, which would have resulted in 15 MW of nameplate capacity.

When CREC was acquired by CHD in 2005, a complete review of the project design was undertaken, resulting in a 20 MW plant capacity using two 10 MW turbines and generators. In addition, the headpond operating level was reduced from 245 to 244 m asl to decrease potential environmental effects and potential backwater effects on Lower Sturgeon GS at the 1 in 100 year flood level. A 9 km long headpond was proposed, with a total surface area of 234 ha – a considerable reduction in size from previous design iterations. A 21 km 115 kV transmission line was planned along Red Pine Road to connect the Project to the Ontario's electricity transmission system.

The change to the plant capacity reduced the average plant capacity factor from 77% to 50.7%, but increased average annual energy production from 76.9 GWh to 86.8 GWh. This change, which primarily affected the generating unit size and powerhouse, was undertaken to make the most efficient use of the resource.

At the same time, the alignment of the dam was refined. The north embankment dam was angled upstream from the island chain in order to minimize the embankment dam length. The alignment change reduced the length of the north embankment dam by 100 m resulting in a 40% reduction in dam length.

In order to confirm this layout a geotechnical investigation began in the fall of 2006 to confirm river bed foundation suitability, seepage cut-off requirements, and abutment conditions, particularly the presence or absence of bedrock. These additional investigations were required as a majority of the geotechnical information reviewed pertained to the straight island alignment along the island chain only.

Based on the geotechnical findings, the revised angled alignment was slightly reoriented toward Island Falls. This refined curved alignment was based on the bedrock conditions present. The geotechnical findings also revealed that locating the dam further upstream from Island Falls was not practical as the bedrock dropped off rapidly in the upstream direction and stabilization and seepage cut-off costs would be prohibitive.

Prior to the release of the Draft EA, the project was referred to as the *Island Falls Hydroelectric Project*. Following release of a draft environmental assessment report for review by first nations, agencies, and members of the public, numerous comments were received. As a direct result of agency and public consultation, YFP made a decision to relocate the dam and powerhouse 2 km upstream of Island Falls to Yellow Falls. Accordingly, the Project name has changed to the “Yellow Falls Hydroelectric Project” and the Project nameplate capacity has changed from 20 MW to 16 MW. Average annual energy production is estimated at 70.1 GWh.

2.3 PROJECT COMPONENTS

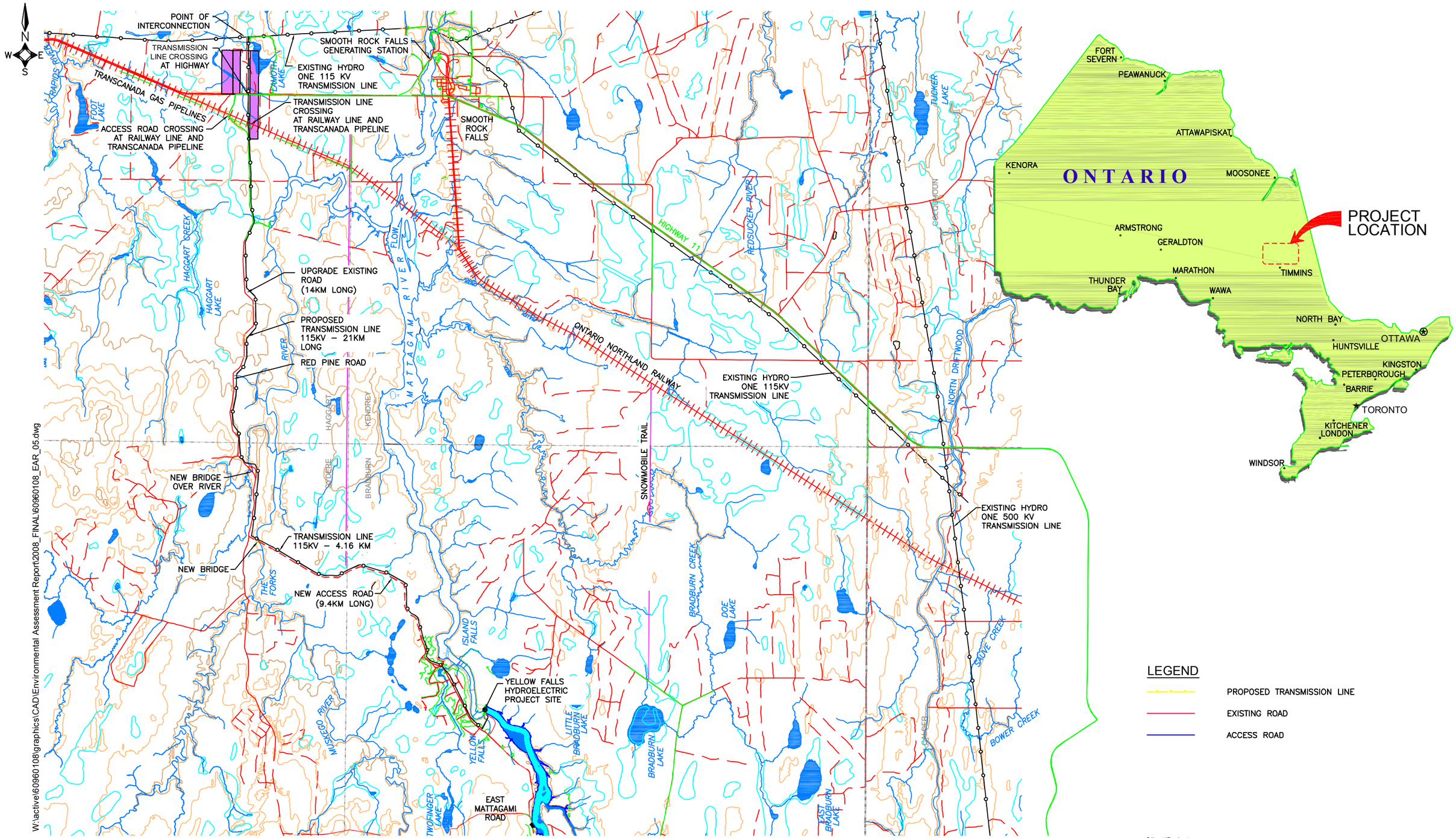
Major Project activities include construction, operation, and decommissioning of key components; including the following (**Figure 2.2**):

- Main access road (includes permanent upgrades to 14 km of existing Red Pine Road, 9.4 km of new road)
- Three new bridges
- Potential aggregate pit or quarry and associated access
- Concrete batch plant
- Intake and powerhouse (close-coupled)
- Gated spillway
- Retaining wall
- Service building (including septic and potable water supply using water filtered from the powerhouse)
- Generating equipment
- Controls and communication devices

- Headpond (extending approximately 6 km upstream)
- Electrical 115 kV transmission line (approximately 25 km in length)
- 13.8 to 115 kilovolt (kV) substation
- Interconnection with existing Hydro One 115 kV transmission line

The proposed Project consists of a powerhouse containing two 8 MW turbines (16 MW total) that are closely coupled to the intakes (i.e. short penstock contained within the powerhouse structure), spill facilities, a concrete retaining wall, and related infrastructure across the Mattagami River at Yellow Falls (**Figure 2.3)**.

As proposed, the Project will result in a headpond approximately 6 km in length from Yellow Falls upstream to Loon Rapids. The headpond will be maintained at a near-constant 244 m above sea level ("asl"). An approximately 12 m increase in water depth will occur immediately upstream of the facility. The total surface area of the headpond will be approximately 160 ha (**Figure 2.4**).



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KILOMETRES

LEGEND

- PROPOSED TRANSMISSION LINE
- EXISTING ROAD
- ACCESS ROAD

NOTES

1. DRAWING CREATED FROM ACRES DRAWING, FIGURE 1, SITE LOCATION PLAN, YELLOW FALLS HYDROELECTRIC DEVELOPMENT PROJECT DESCRIPTION AND TECHNICAL APPRAISAL, MAY 1990.
2. BASE MAPPING FROM GOVERNMENT OF CANADA NTS MAPPING, SHEETS 42 H/3, 42 H/4, 42 H/5 AND 42 H/6.

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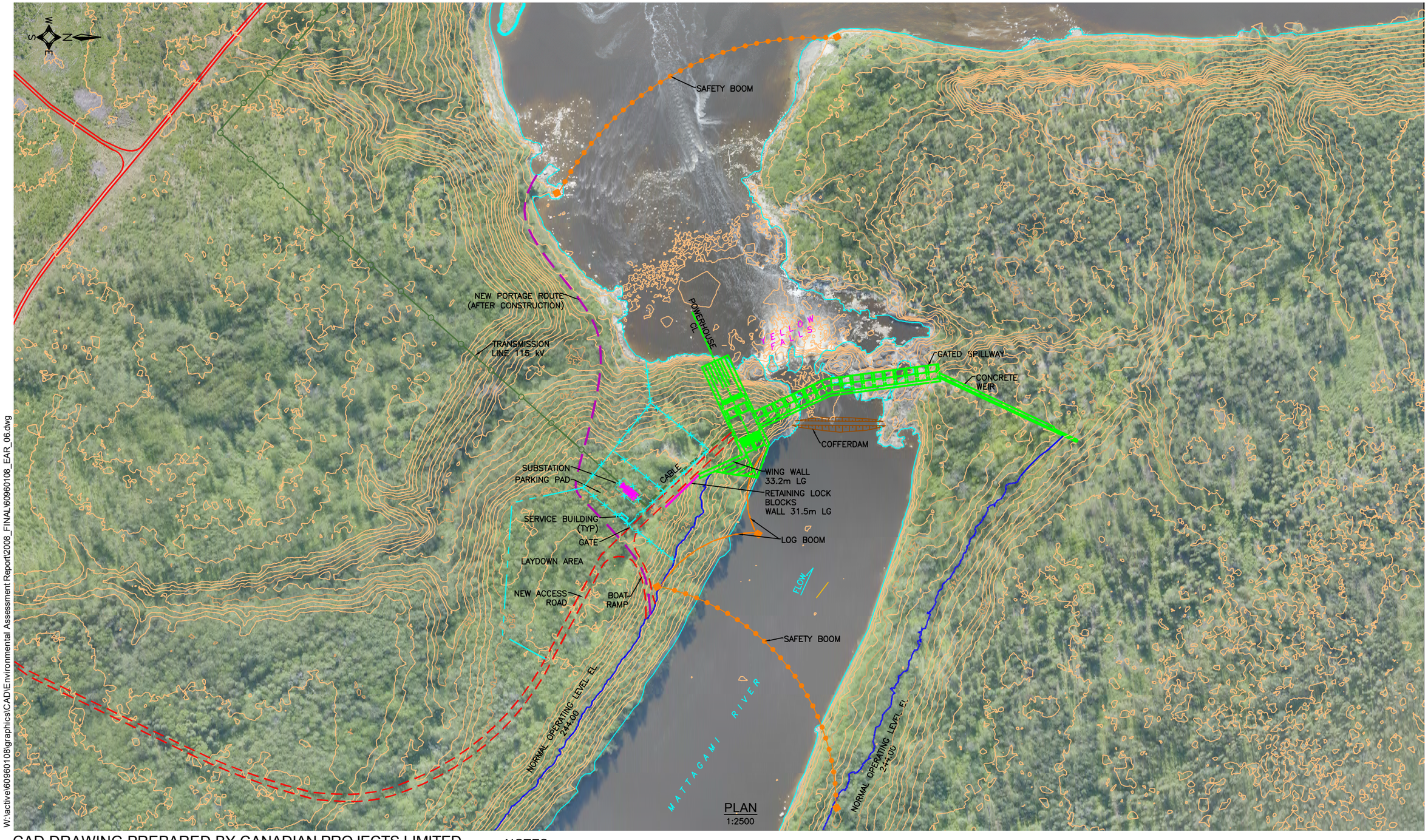
Figure No.
2.2

Title
GENERAL ARRANGEMENT
PRELIMINARY PROJECT LAYOUT PLAN



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NOTES

1. ALL DIMENSIONS AND ELEVATIONS ARE IN METRES, UNLESS NOTED OTHERWISE.
2. BASE CONTOURS FROM LiDAR SURVEY FLOWN JUNE 2006 BY TERRAPOINT CANADA INC.

LEGEND

- NEW ACCESS ROAD
- ELECTRIC CABLE
- TRANSMISSION LINE 115 kV
- PORTAGE ROUTE
- FENCE

SCALE 1:2500

0 25 50 75 100 125

METRES

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Figure No.

2.3

Title

GENERAL ARRANGEMENT PLAN