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May 12, 2011

VIA RESS AND COURIER

Ms. Kirsten Walli
Board Secretary
Ontario Energy Board
P.O. Box 2319
2300 Yonge Street, 27th Floor
Toronto, ON
M4P 1E4

Dear Ms. Walli,

**Re: EB-2011-0056 - Ontario Power Generation - Section 92 Application for
Leave to Construct Transmission Line - Smoky Falls Generating Station**

Attached please find an Application by Ontario Power Generation Inc. ("OPG") for approval of Leave to Construct for a new double circuit 230 kV transmission line from OPG's Smoky Falls generating station on the Lower Mattagami River to the Hydro One transmission system.

I am providing two (2) hardcopies of OPG's Application and one electronic copy filed through the Board's Regulatory Electronic Submission System (RESS).

This material will be available on OPG's website on May 13, 2011 at
<http://www.opg.com/about/reg/filings>.

Yours truly,

[Original Signed By]

Andrew Barrett

cc: Fred Cass, Aird & Berlis LLP
Carlton Mathias, OPG
Regulatory Affairs Records, OPG

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ONTARIO ENERGY BOARD

IN THE MATTER OF the *Ontario Energy Board Act, 1998*, S.O.
1998, c. 15, Schedule B;

AND IN THE MATTER OF an Application by Ontario Power
Generation Inc. for an order or orders granting leave to
construct a new double circuit 230 kV transmission line
approximately 3 km in length, in the Lower Mattagami region of
Ontario.

APPLICATION

1. The applicant, Ontario Power Generation Inc. ("OPG"), is incorporated under the *Business Corporations Act (Ontario)*, with its head office in the City of Toronto. The principal business of OPG is the generation and sale of electricity in Ontario. OPG is applying on behalf of its wholly-owned and controlled entities LM Extension Inc. and Lower Mattagami Limited Partnership ("LMLP"). In this application, all three entities will collectively be referred to as OPG.
2. LMLP is a limited partnership of which OPG is the general partner with a 99.9999 per cent interest and LM Extension Inc. is a limited partner with a 0.0001 per cent interest. Legal title to the proposed transmission line will be held by LMLP. The Lower Mattagami River Hydroelectric Complex (see Ex. A-T4-S1) is owned by the Lower Mattagami Energy Limited Partnership ("LMELP") of which OPG is the general partner with a 99.99999 per cent interest and LM Energy Inc. is a limited partner with a 0.00001 per cent interest. LM Energy Inc. is wholly-owned by OPG.
3. In this Application, OPG applies to the Ontario Energy Board ("OEB") pursuant to section 92 of the *Ontario Energy Board Act, 1998*, S.O. 1998, c. 15, Schedule B (the "OEB Act") for an order or orders granting leave to construct a new double circuit 230 kV

transmission line, approximately 3 km in length, in the Lower Mattagami region of Ontario. See the map provided as Ex. B-T2-S3 Attachment 1.

4. This new transmission line is required to accommodate increased electrical power output from OPG's Smoky Falls Generating Station ("Smoky Falls GS") following completion of the proposed redevelopment of the site. The project to construct the new transmission line is referred to hereinafter as the "Proposed Line". The Proposed Line is to be located adjacent to an existing 115 kV transmission corridor from Smoky Falls GS to an existing double circuit 230 kV transmission line owned by Hydro One Networks Inc. ("Hydro One").

5. The Proposed Line is part of a larger project to increase the capacity of four generating stations owned by OPG located along the Lower Mattagami River. The project to increase the capacity of these stations is referred to as the Lower Mattagami River Project ("LMR Project"). The Proposed Line is part of the LMR Project in respect of all consultations and approvals referenced below. Additional detail regarding the need for the Proposed Line is provided in Ex. B-T2-S2.

6. On May 23, 2006, the Minister of Energy directed OPG to proceed with the definition phase of the LMR Project, which OPG did.

7. On November 23, 2010, the Ontario Government released its Long Term Energy Plan ("LTEP"). The LMR Project is included in the LTEP as a project to meet Ontario's goal of 9,000 MW of hydroelectric capacity by 2018.

8. Construction of the Proposed Line is scheduled to begin in spring 2012, assuming the leave sought in this Application is granted. To accommodate any unforeseen events, OPG requests that the conditions of the approval include authorization for leave to construct to terminate no earlier than December 31, 2012. The planned in-service date for the Proposed Line is February 1, 2013. A detailed construction schedule is filed as Ex. B-T5-S2.

1
2 9. Hydro One has previously been granted leave to construct electricity facilities in the
3 Lower Mattagami area. The Hydro One approval related to a second 230 kV transmission
4 circuit along an existing transmission corridor from Harmon Junction to Kipling GS (EB-
5 2009-0078). This Application is an independent project. OPG is applying on its own
6 behalf to construct the Proposed Line as the line will be located on OPG property and is
7 required to address OPG's operational needs at the Lower Mattagami River Hydroelectric
8 Complex.

9
10 10. The Proposed Line is in the public interest because it will enable OPG to make more
11 efficient use of the available water flows along the Lower Mattagami River, a renewable
12 resource. The Proposed Line will not have a material impact on the price of electricity,
13 and OPG will pay for all costs of the Proposed Line as part of the overall cost of the LMR
14 Project.

15
16 11. The Independent Electricity System Operator ("IESO") completed a System Impact
17 Assessment ("SIA") of the Proposed Line in accordance with the Grid Connection
18 Requirements of the Market Rules. The SIA, filed as Ex. B-T6-S2, confirms that the LMR
19 Project, including the Proposed Line, will not adversely impact the reliability of the IESO-
20 controlled grid.

21
22 12. Hydro One completed a Customer Impact Assessment ("CIA") in accordance with its
23 Customer Connection Procedures, and the results confirm that the LMR Project,
24 including Proposed Line, will not adversely impact customers in the study area. The CIA
25 is filed as Ex. B-T6-S3.

26
27 13. With respect to consultation, significant public, First Nations and government agency
28 consultation has been undertaken, including that conducted as part of the federal
29 environmental assessment. There is broad support for the LMR Project in the First
30 Nations communities and the community at large. The LMR Project also has the support

1 of the Ontario Government. Additional details regarding the consultation process are
2 provided in Ex. B-T6-S4.

3
4 14. The Proposed Line will be constructed, owned and operated by OPG. In accordance with
5 Ontario Regulation 161/99, OPG is exempted from the requirement to hold a licence to
6 own or operate a transmission system where the transmitter is a generator and transmits
7 electricity only for the purpose of conveying it to the IESO-controlled grid.

8
9 15. A Notice of Approval to Proceed, and an Order-in-Council providing approval to proceed
10 with the LMR Project, including conditions, was issued by the Ontario Minister of the
11 Environment in 1994. Approval of the federal environmental assessment was received in
12 March 2010. Further details regarding the provincial and federal environmental
13 assessment processes are filed in Ex. B-T6-S5.

14
15 16. A portion of the property rights required for the Proposed Line are on Crown land and the
16 permitting process for the transmission line right of way is underway. The remainder of
17 the line is on an existing Water Power Lease for Smoky Falls GS. Land matters are
18 discussed further in Ex. B-T6-S6.

19
20 17. The cost of the Proposed Line is estimated to be approximately \$6.6M. A detailed
21 estimate is provided in Ex. B-T4-S2. Details of the project economics are filed in Ex. B-
22 T4-S3.

23
24 18. For the reasons provided in support of this Application, OPG respectfully submits that the
25 Proposed Line is in the public interest and should be approved under section 92 of the
26 OEB Act. Accordingly, OPG requests an Order from the OEB pursuant to section 92 of
27 the OEB Act by January 2012, granting leave to construct the Proposed Line.

28
29 19. The Application is supported by written evidence. The written evidence filed by OPG may
30 be supplemented or amended from time to time by OPG prior to the OEB's final decision
31 on the Application.

20. OPG further applies to the OEB pursuant to the provisions of the OEB Act and the OEB Rules of Practice and Procedure for such orders and directions as may be necessary in relation to the Application and the proper conduct of this proceeding.

21. OPG requests a written hearing for this proceeding and submits that the evidence supports granting the requested Order.

22. OPG requests that copies of all documents filed with the OEB by each party to this Application, along with copies of all comments filed with the OEB in accordance with Rule 24 of the OEB Rules of Practice and Procedure, be served on the applicant and the applicant's counsel as follows:

(a) The applicant: Greg Towstego
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Telephone: 416-592-4964

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Facsimile: 416-592-1466

Electronic mail: carlton.mathias@opg.com

Dated at Toronto, Ontario, this 12th day of May 2011.

Ontario Power Generation Inc.

[Original Signed By]

Greg Towstego

OVERVIEW OF OPG

OPG is an electricity generation company whose principal business is the generation and sale of electricity in Ontario. OPG's focus is on the effective stewardship of generation assets owned by the people of Ontario. This is achieved by focusing on: (i) the safe, reliable operation of its facilities including the avoidance of harm to employees, contractors, and the public at large, (ii) the management of these facilities by maintaining a strong focus on delivering value for money, and (iii) adhering to the highest standards of corporate citizenship, including a commitment to environmental and social objectives.

OPG was incorporated on December 1, 1998 under the *Business Corporations Act, Ontario*. The generating assets of OPG's predecessor, Ontario Hydro, along with related liabilities, were subsequently transferred to OPG in April 1999. OPG's sole shareholder is Her Majesty the Queen in Right of the Province of Ontario, as represented by the Minister of Energy. OPG's head office is located in the City of Toronto.

OPG owns a diversified portfolio of regulated and unregulated electricity generating facilities. In 2009, OPG assets generated approximately 70 per cent of the electricity consumed in Ontario. As of December 31, 2010, OPG's generating portfolio had 19,931 MW of in-service capacity, comprised of the following:

- Three nuclear generating stations, with 6,606 MW capacity.
- 65 hydroelectric generating stations, with 6,996 MW capacity.
- Five thermal generating stations, with 6,327 MW capacity.
- Two wind power turbines, with a capacity of 2 MW.

In addition, OPG and TransCanada Energy Ltd. co-own the Portlands Energy Centre gas-fired generating station. OPG, ATCO Power Canada Ltd. and ATCO Resources Ltd. co-own the Brighton Beach gas-fired generating station. OPG also owns two nuclear generating stations, which are leased on a long-term basis to Bruce Power L.P. ("Bruce Power").

OVERVIEW OF LOWER MATTAGAMI HYDROELECTRIC FACILITIES

OPG's Lower Mattagami River Hydroelectric Complex ("LMR Hydroelectric Complex") is comprised of four hydroelectric generating stations, as follows:

- Smoky Falls GS (52 MW, in-service 1931)
- Little Long GS (138 MW, in-service 1963)
- Harmon GS (142 MW, in-service 1965)
- Kipling GS (154 MW, in-service 1966)

These stations are located about 70 km northeast of the Town of Kapuskasing, Ontario, along the Mattagami River and are owned and operated by OPG. The stations are located in the following downstream (northerly) sequence along an approximately 20 km long section of the river: Little Long GS; Smoky Falls GS; Harmon GS; and Kipling GS. A map showing the location of the LMR Hydroelectric Complex is provided in Ex. B-T2-S3, Attachment 1.

OPG operates the LMR Hydroelectric Complex generating stations to optimize power production into the hours of the day when demand is highest. Smoky Falls GS has significantly less generating capacity than the other three stations, and is effectively operated as a baseload facility 24 hours per day. The other three stations have larger capacities and are operated as peaking stations for various durations depending on available inflows.

The payments for the output of the LMR Hydroelectric Complex generating stations are not regulated by the OEB.

1 **PROCEDURAL ORDERS / CORRESPONDENCE/NOTICES**

2

3 Include in this tab any Procedural Orders, Correspondence and Notices when they are filed.

PROJECT LOCATION AND EXISTING TRANSMISSION SYSTEM

1.0 PROJECT LOCATION

The study area for the Proposed Line is located approximately 70 km northeast of the town of Kapuskasing. The existing Smoky Falls GS and the existing 115 kV transmission right-of-way adjacent to which the Proposed Line will be constructed are located within an area roughly 3 km long to the southwest of Smoky Falls GS. The new line will terminate at the Hydro One 230 kV transmission line about 3 km southwest of Smoky Falls GS. A map showing the geographic location of the Proposed Line is provided as Ex. B-T2-S3, Attachment 1. A geographic description of the overall LMR Hydroelectric Complex is provided in Ex. A-T4-S1.

2.0 EXISTING TRANSMISSION SYSTEM

As shown in Ex. B-T1-S2, Attachments 1 and 2, Smoky Falls GS is currently connected to the Hydro One transmission system via two Hydro One 115 kV transmission lines designated as S3S and S4S. The S3S and S4S lines continue on to Kapuskasing, about 70 km to the south. These lines physically cross the existing Hydro One L20D and H22D 230 kV lines about 3 km southwest of Smoky Falls GS, but are not electrically connected to them.

Little Long GS, Harmon GS and Kipling GS are connected to the Hydro One transmission system via the L20D and H22D 230 kV lines. There are no load customers other than OPG in the Proposed Line's project area.

Schematic electrical diagrams of the existing transmission facilities and the Proposed Line are provided in Ex. B-T1-S3 and Ex. B-T2-S4, respectively.

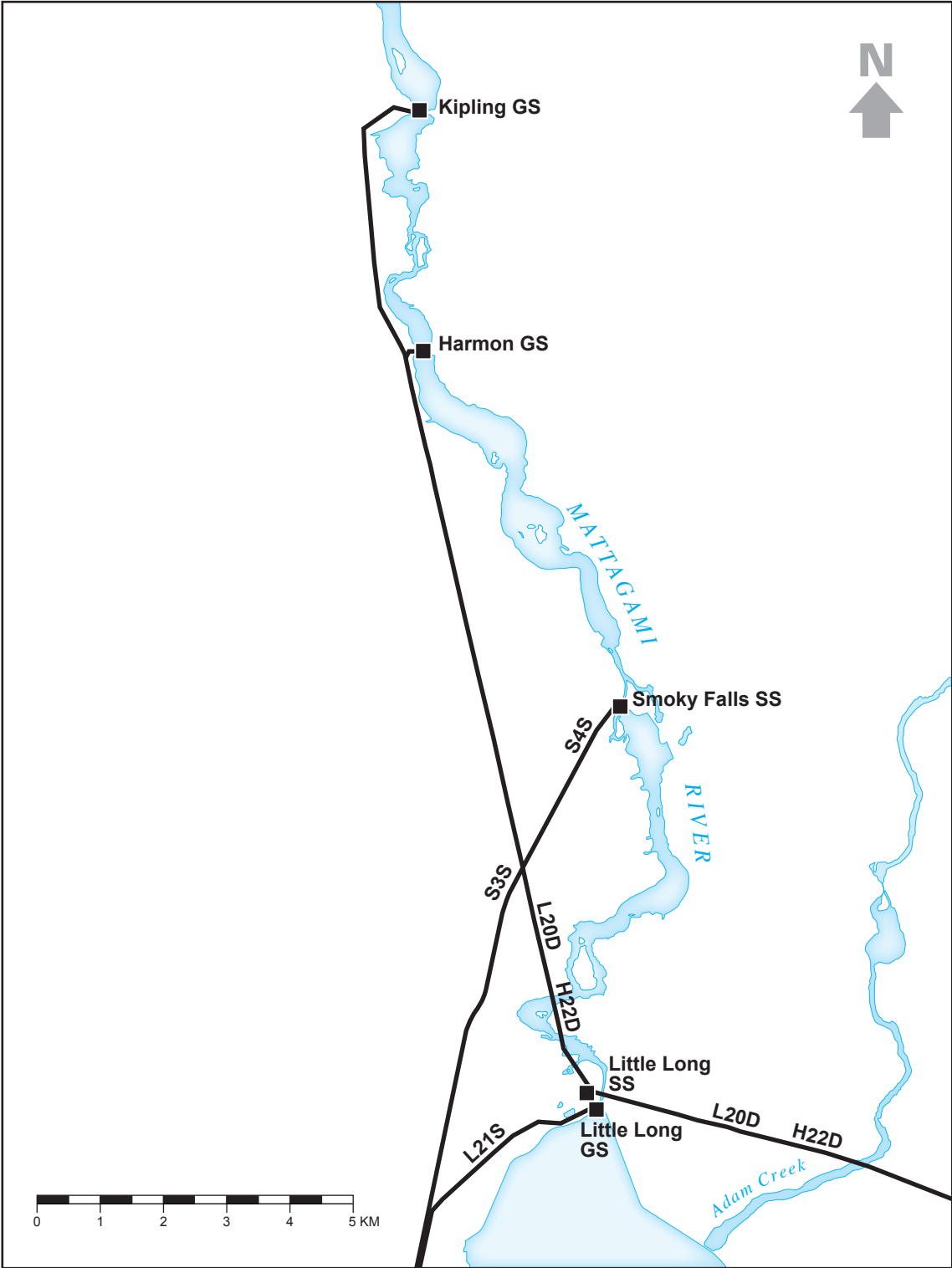
MAP OF EXISTING TRANSMISSION FACILITIES

Maps depicting the existing transmission facilities are provided as Attachments 1 and 2.

As shown in the attachments, Smoky Falls GS is currently connected to the Hydro One transmission system via the Hydro One S3S and S4S 115 kV transmission lines. As shown on Attachment 2, the S3S and S4S lines travel for about 1 km on the Smoky Falls GS property and then for approximately 2 km along a Hydro One corridor. They then continue on to Kapuskasing, about 70 km to the south. These lines physically cross the existing Hydro One L20D and H22D 230 kV lines about 3 km southwest of Smoky Falls GS, but are not electrically connected to them.

As shown in Attachment 1, Little Long GS, Harmon GS and Kipling GS are connected to the Hydro One transmission system via the L20D and H22D 230 kV lines.

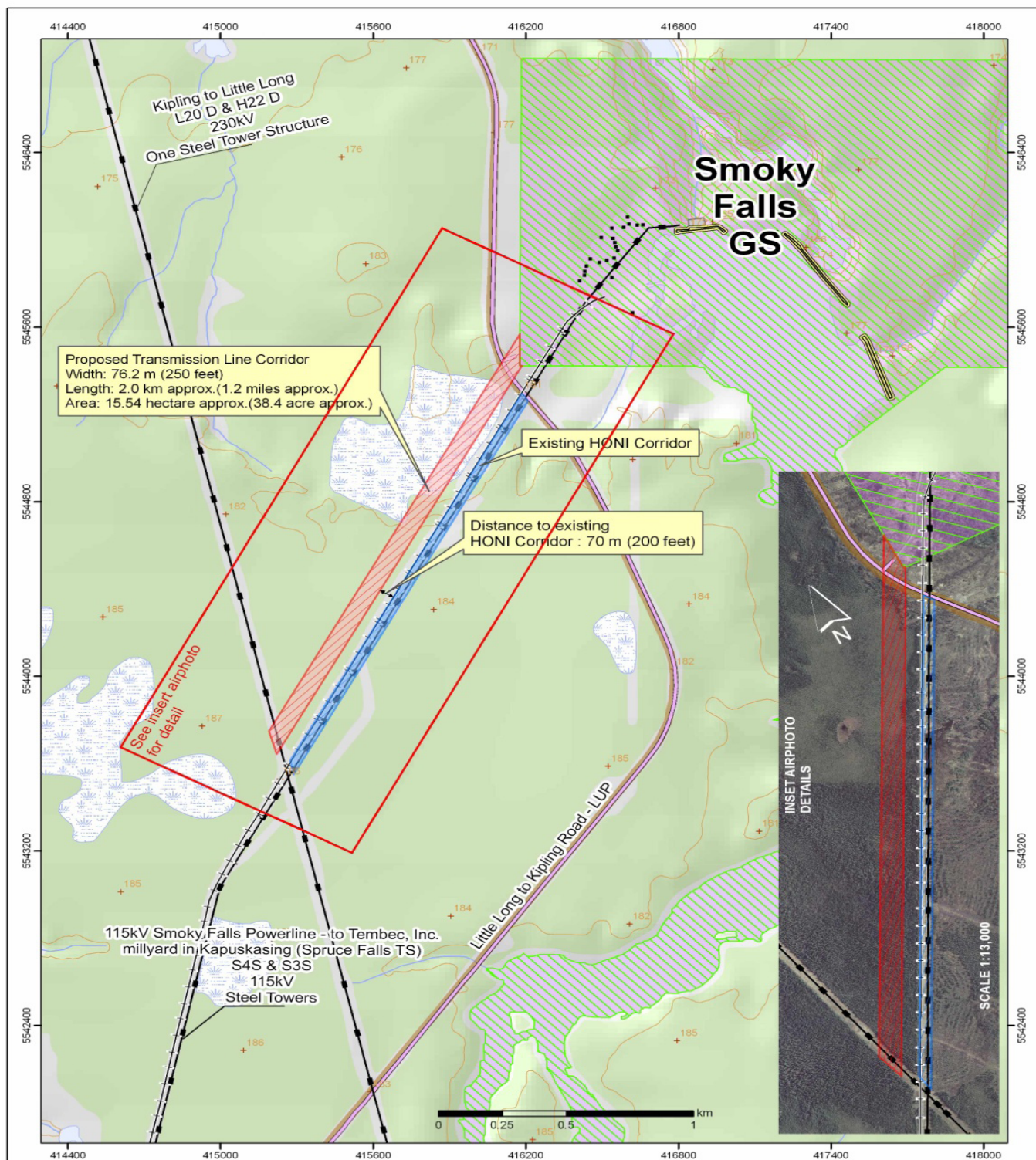
EXISTING LOWER MATTAGAMI AREA TRANSMISSION LINES





LOWER MATTAGAMI DEVELOPMENT

Lands required - Proposed Transmission Line Corridor



Legend

- | | | |
|------------------------|-----------------------|----------------------------------|
| Lands Required | Road | Waterbody |
| Existing HONI Corridor | Elevation Spot Height | LUP (MNR - Road) |
| Dam Structure | Elevation Contour | HONI Lease and Easement in Gross |
| Railway | Wooded Area | Water Power Lease |
| Hydro Line | Wetland | |

Ontario MNR - Ontario Base Mapping
 Copyright Queen's Printer of Ontario

UTM Zone 17N - NAD 1983
 Scale 1:15,000



DRAWING: 00034-01.027 v9
 DATE: FEB-13-2008
 SIZE: 11"x17"
 RESOLUTION: 300-DPI
 PRODUCED BY: YK



671 Danforth Ave., Suite 305, Toronto, ON, M4J 1L3
 (416) 410-7569

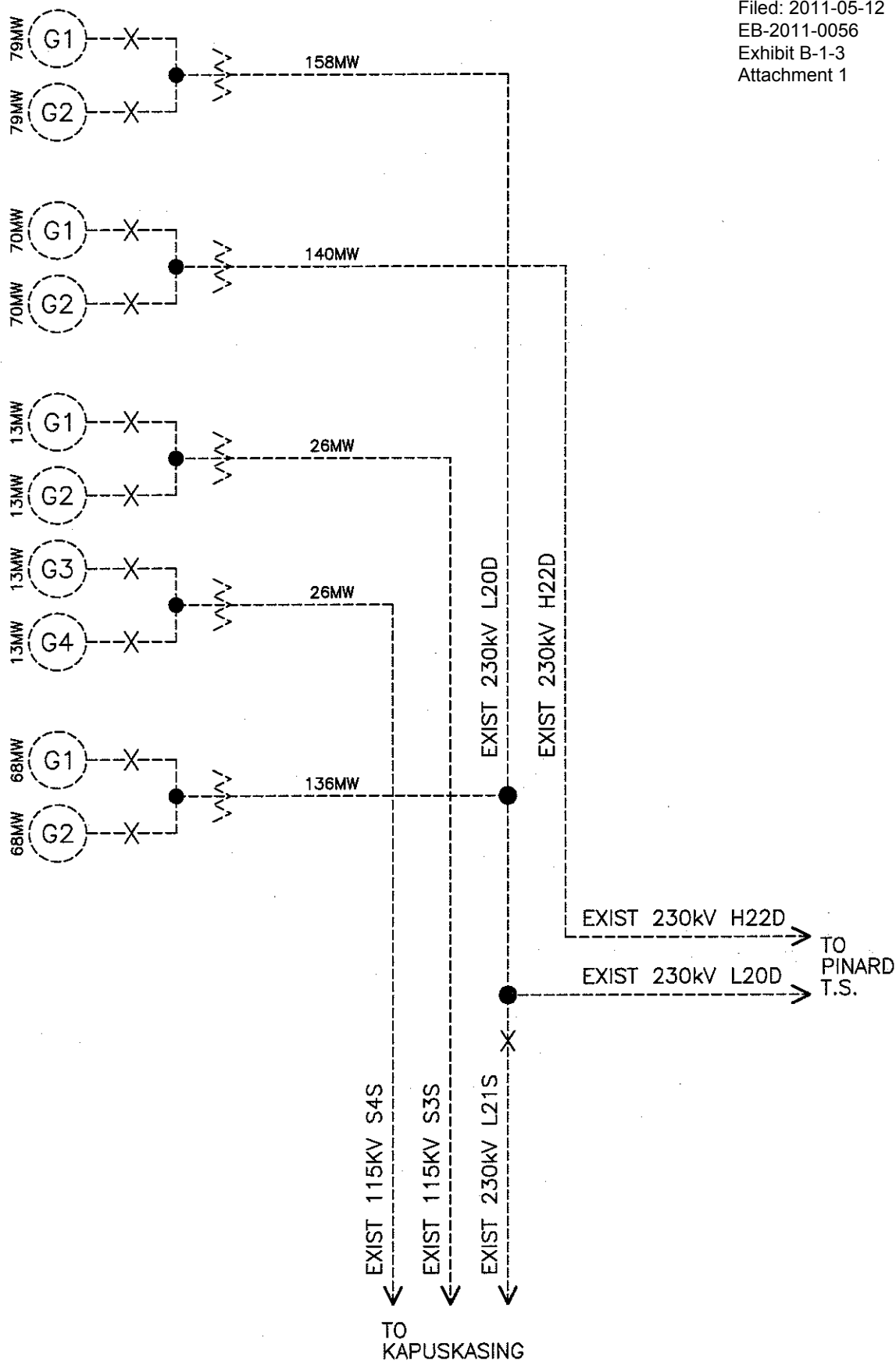
SCHEMATIC OF EXISTING TRANSMISSION FACILITIES

A schematic diagram depicting the existing transmission facilities is provided as Attachment 1.

As shown, Smoky Falls GS is currently connected to the Hydro One transmission system via the Hydro One 115 kV transmission lines designated as S3S and S4S. The S3S and S4S lines continue on to Kapuskasing, about 70 km to the south.

Little Long GS, Harmon GS and Kipling GS are connected to the Hydro One transmission system via the L20D and H22D 230 kV lines. The S3S and S4S lines are not electrically connected to the L20D and H22D lines.

LITTLE LONG
G.S.



Plot Scale
Aug 30, 2006, 1:53pm Login name: Witt109069
Drawing Name: R:\323076\Elec\SKETCH-1.dwg

Ontario Power Generation
Lower Mattagami Development Feasibility Study
Existing - 230kV and 115kV Transmission

SKETCH-1

HATCH AGRES

PROPOSED LINE

The Proposed Line will be constructed to provide the required transmission capability to deliver the electricity generated at the expanded Smoky Falls GS to the Hydro One transmission system.

The following is the specific work and facilities required to meet the new requirements:

- Construct a new approximately 3 km long double circuit 230 kV line adjacent to the existing S3S/S4S 115 kV transmission right-of-way. It will originate at the high voltage side of new 13.8/238 kV step-up transformers at Smoky Falls GS and terminate at the Hydro One L20D/H22D 230 kV lines.
- One circuit of the double circuit line will terminate at the Hydro One L20D line and the second circuit will terminate at the Hydro One H22D line.
- Install 12 new double-circuit heavy anchor towers alongside the existing 115 kV towers on the section of the S3S/S4S lines from Smoky Falls GS to the interconnection point with the L20D/H22D Hydro One lines.
- Upgrade access roads on the right-of-way (if required), clear trees and brush from the right-of-way, erect new structures, string new conductor, remove redundant structures and unused/waste construction materials from the site, and restore the area including de-commissioning of construction roads.

The redeveloped Smoky Falls GS will require three new 13.8/238 kV generator step-up transformers, one for each new unit, along with new protection and control equipment and other standard electrical systems such as grounding, excitation, voltage regulation, switchgear, monitoring equipment, and Supervisory Control and Data Acquisition ("SCADA") systems. These facilities are included in the redevelopment of Smoky Falls GS and are not included as part of the Proposed Line.

NEED FOR PROPOSED LINE

The Proposed Line is needed to accommodate increased electricity generation at Smoky Falls GS.

The existing LMR Hydroelectric Complex is severely constrained at Smoky Falls GS due to its limited generation capacity and lack of water storage, which require it to pass a significant portion of the available water without generating electricity. The redevelopment of Smoky Falls GS will result in the retirement of the existing 52 MW powerhouse at Smoky Falls GS and the construction of a new powerhouse with a capacity of 267 MW that can use all of the available water efficiently. OPG is also planning to add a third unit to each of Little Long GS, Harmon GS and Kipling GS, increasing their capacities to 205 MW, 220 MW and 232 MW, respectively. Expansion of all four plants will result in a total of about 438 MW of additional power from the LMR Hydroelectric Complex.

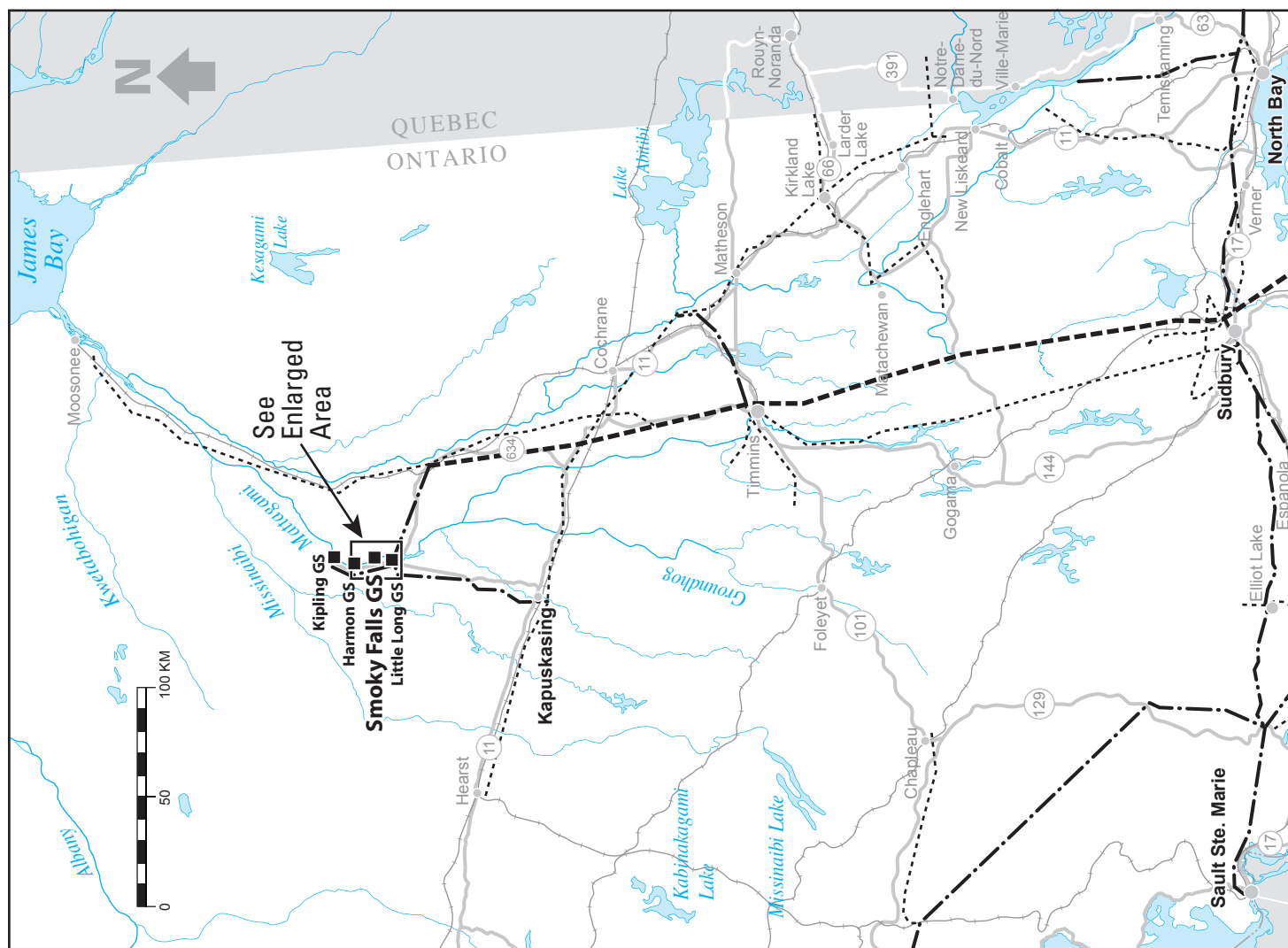
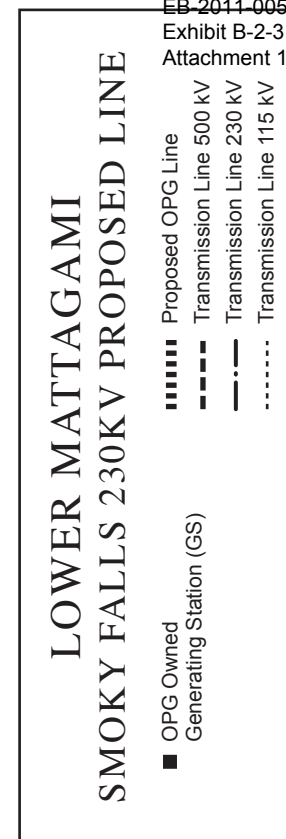
The need for the Proposed Line follows directly from the expansion of Smoky Falls GS. The Proposed Line is required to provide additional transmission capacity and reliability for the additional 215 MW of generation at Smoky Falls GS (from the current 52 MW to the proposed 267 MW). This represents a significant increase in the capacity of the station. The existing single circuit 115 kV S3S and S4S lines connecting Smoky Falls GS to the Hydro One transmission system cannot accommodate the additional generation. The maximum capacity that could be delivered from the expanded Smoky Falls GS using the existing lines would be approximately 104 MW, resulting in a bottling of the majority of the planned additional generation.

MAP OF PROPOSED LINE

A map showing the general geographic location of the Proposed Line is provided as Attachment 1. Additional detail is provided on the map included as Ex. B-T1-S2, Attachment 2.

Smoky Falls GS and the Proposed Line are located approximately 70 km northeast of the town of Kapuskasing. The right-of-way for the Proposed Line is located within an area roughly 3 km long to the southwest of Smoky Falls GS. The Proposed Line will terminate at the existing Hydro One L20D and H22D 230 kV transmission lines about 3 km southwest of Smoky Falls GS.

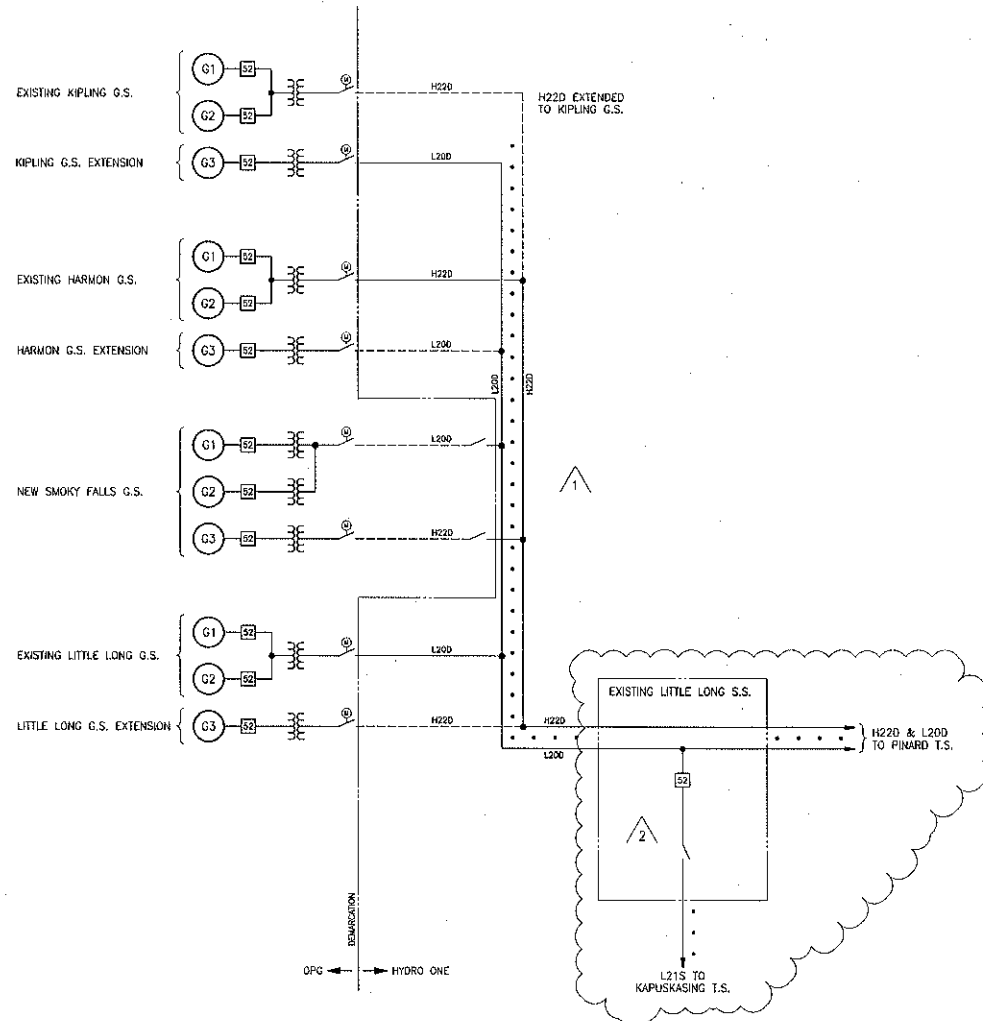
The Proposed Line will travel for about 1 km on the OPG Smoky Falls GS property adjacent to the existing Hydro One S3S/S4S 115 kV lines. Upon leaving the Smoky Falls GS property, it will continue for approximately 2 km on Crown Land adjacent to the Hydro One S3S/S4S lines. A detailed discussion of land matters is provided in Ex. B-T6-S6.



SCHEMATIC OF PROPOSED LINE

Schematic diagrams depicting the Proposed Line are provided as follows:

- Attachment 1 – Overall 230 kV, Grid Connections and Existing Little Long Switching Station
- Attachment 2 - 230 kV Tap for Smoky Falls GS



LEGEND:

- NEW 230KV LINES
- EXISTING 230KV LINES

REFERENCE DRAWINGS:

- F427-E1E-SKETCH-101 - KIPLING G.S. PLANT EXTENSION UNIT SINGLE LINE DIAGRAM
- F428-E1E-SKETCH-101 - HARMON G.S. PLANT EXTENSION UNIT SINGLE LINE DIAGRAM
- F429-E1E-SKETCH-101 - LITTLE LONG G.S. PLANT EXTENSION UNIT SINGLE LINE DIAGRAM
- F430-E1E-SKETCH-101 - SMOKY FALLS G.S. PLANT EXTENSION UNIT SINGLE LINE DIAGRAM
- F431-E1E-SKETCH-102 - SMOKY FALLS G.S. PLANT EXTENSION MAIN SINGLE LINE DIAGRAM

THIS DRAWING IS FOR ESTIMATING USE ONLY
 All ratings and class of equipment, materials, detail and construction, shown on this drawing are representative only and must not be considered as final design requirements.
DO NOT USE FOR CONSTRUCTION

THIS DRAWING ISSUED IN CAD ELECTRONIC FORMAT TO THE W2P PROPONENTS FOR THE SOLE PURPOSE OF PREPARING W2P PROPOSAL

02	01	01	GENERAL REVISION		
01	01	01	GENERAL REVISION		
01	01	01	ISSUED FOR W2P RFP		
01	01	01	01/01/01	01/01/01	01/01/01

LOWER MATTAGAMI DEVELOPMENT PROJECT
 OVERALL 230KV
 GRID CONNECTIONS AND EXISTING
 LITTLE LONG SWITCHING STATION

ONTARIO POWER GENERATION Electricity Production - Hydroelectric Technical Services

THE HATCH energy The Energy Company

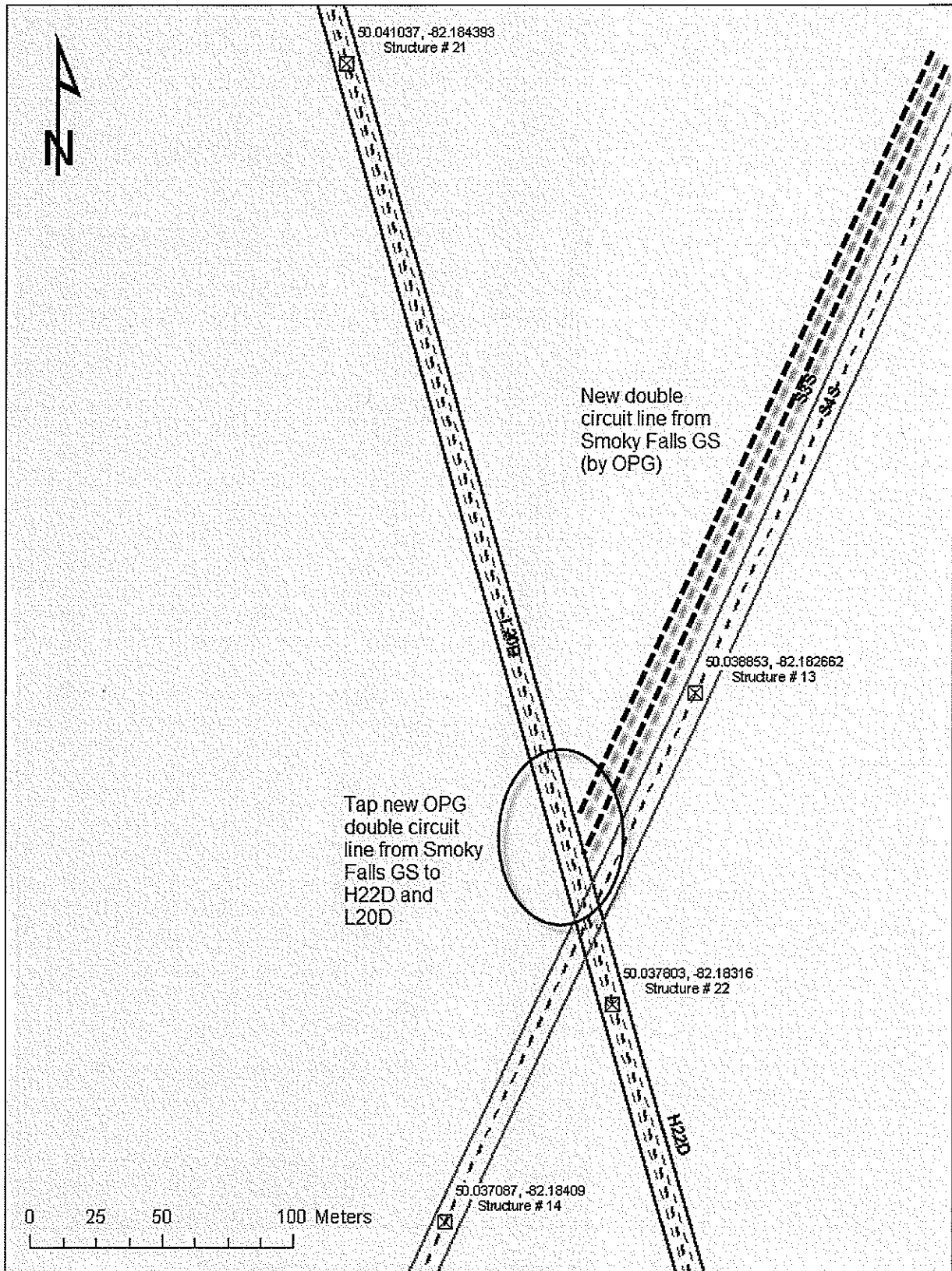
designed by	R. A. Plotrobon	01
checked by	G. D. Holden	01
date	06/NOV/30	01
scale	NONE	01
author		01

HATCH ACRES PROJECT NUMBER	323076	192-E1E-SKETCH-101	02
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A1 (594 x 841)

standard drawing number

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260 270 280 290 300 millimetres



230kV Tap for Smoky Falls GS

CROSS SECTION OF TOWER TYPES

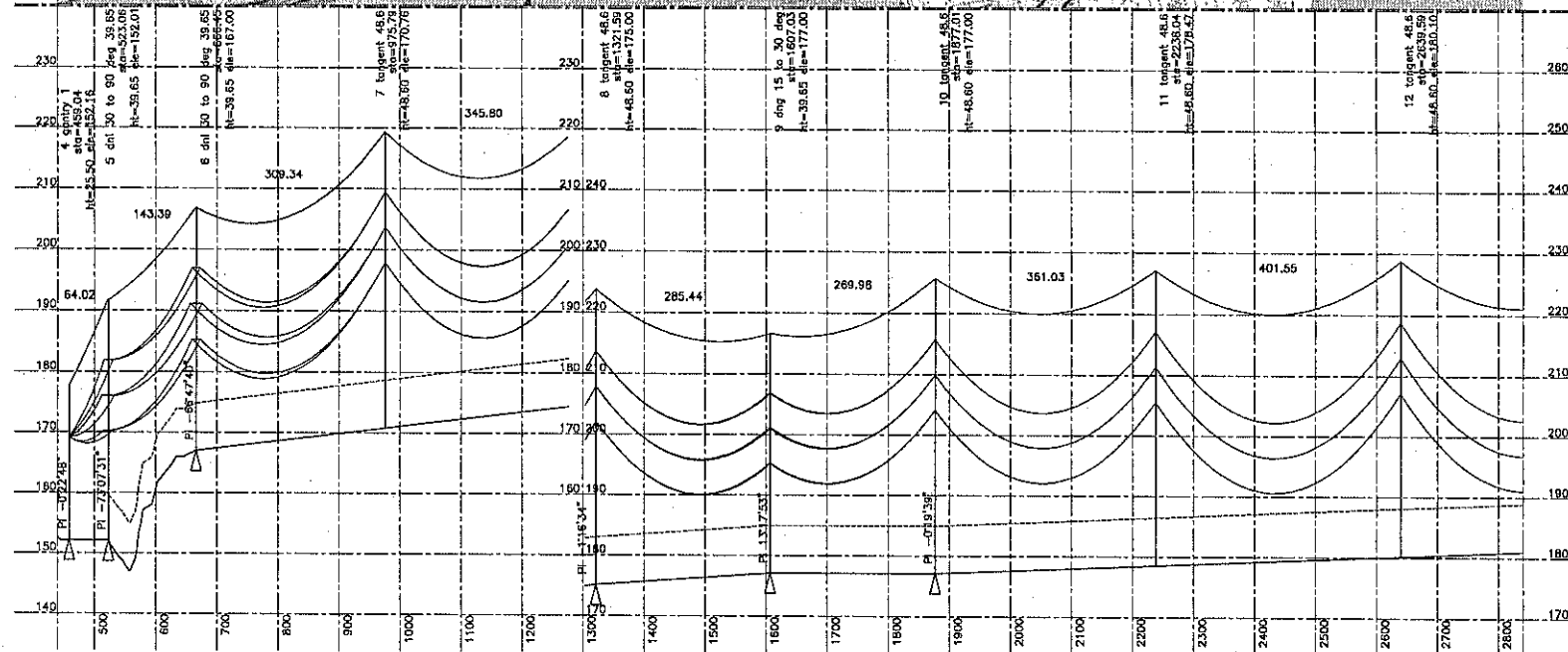
Schematic diagrams depicting cross sections of tower types to be used for the Proposed Line are provided as follows:

- Attachment 1 – 230 kV TL Switchyard to Existing 230 kV TL Plan and Profile, Drawing 1 of 2
- Attachment 2 - 230 kV TL Switchyard to Existing 230 kV TL Plan and Profile, Drawing 2 of 2
- Attachment 3 – HONI/OPG Interconn. Point, 230 kV Terminal Structure & Line Isolation Switchyard
- Attachment 4 - 230 kV TL Switchyard to Existing 230 kV TL Terminal Structure
- Attachment 5 - 230 kV TL Switchyard to Existing 230 kV TL Tangent Suspension Structure
- Attachment 6 - 230 kV TL Switchyard to Existing 230 kV TL Dead End Angle Structure

REFERENCE DRAWINGS:
 4010-4700-0302 - PLAN AND PROFILE
 DRAWING 2 OF 2



Existing H₂O



100.0 m Horiz. Scale
 10.0 m Vert. Scale

2 PA 06/11 ISSUED FOR BID			
1 PA 06/11 ISSUED FOR REVIEW			
mt	rev	date	particulars
number	no.		
SMOKY FALLS 2 GS		0	
230 kV TL SWITCHYARD TO EXISTING 230 kV TL PLAN AND PROFILE DRAWING 1 OF 2			
ONTARIOPOWER GENERATION		Electricity Production - Hydroelectric Technical Services	
des	L. AGOSTINELLI	designed by	
std	D. NUDD	M. MEZIANE	
date	06/11/2009	design approved	
	2009-05-25	M.D. BELANGER	
scale	AS SHOWN	checked	
		J. BROWN	
dwg no		DWG	
Drawing Number 020448-4010-47DD-0301-PA		SH 00	

PROFESSIONAL STAMP

CLIENT: **KAP KIEWIT-ALARIE, A PARTNERSHIP**

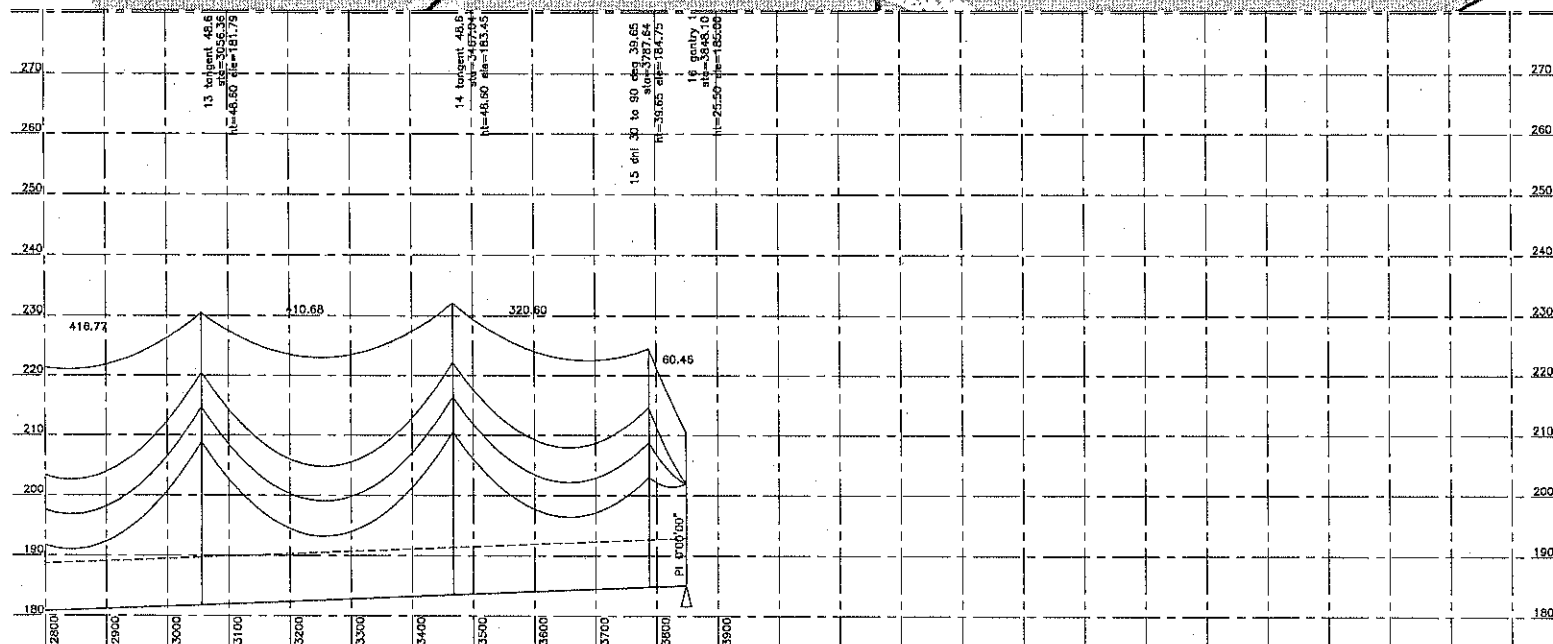
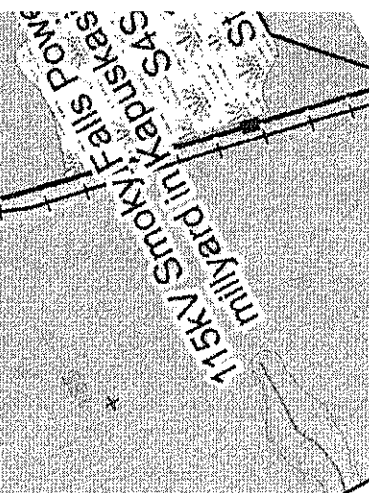
CONSULTANT: **SNC-LAVALIN HYDRO AND POWER SYSTEMS**

LAST UPDATED: 2009/07/10 - 15:30m
 FILE: W:\11000\4010-47DD-0301-PA.dwg

A1 (594 x B41)

PLATE TL101

REFERENCE DRAWINGS:
4010-47DD-0301 - PLAN AND PROFILE
DRAWING 1 OF 2



100.0 m Horiz. Scale
10.0 m Vert. Scale

2	PA 0001	ISSUED FOR BID		
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PLAN AND PROFILE				
DRAWING 2 OF 2				
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des	L. AGOSTINELLI	designed by	M. MEZIANE	3
chd	D. NUDD	design approved	M.D. BELANGER	3
date	2008-06-25	submittal	J. BROWN	DWG
scale	AS SHOWN	rev	SH	00

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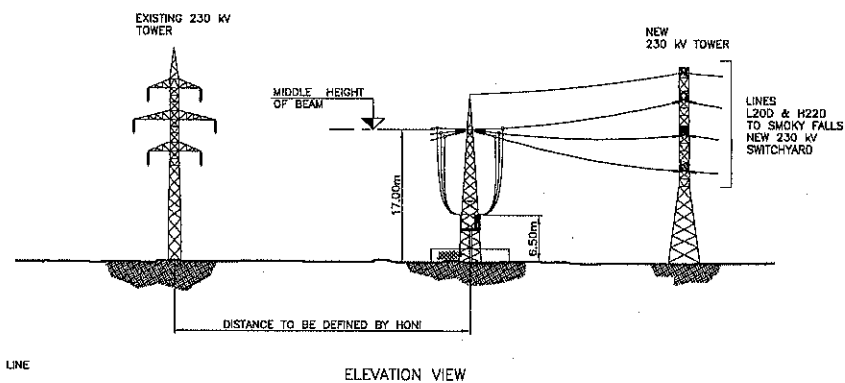
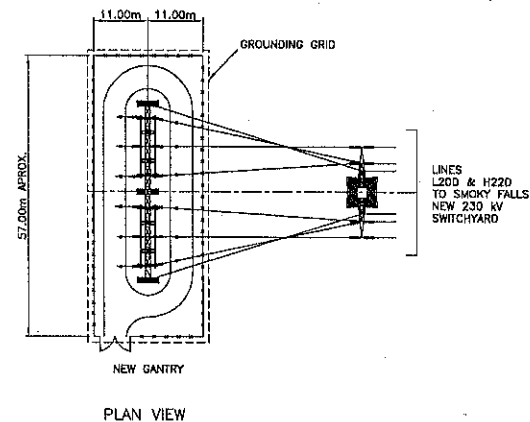
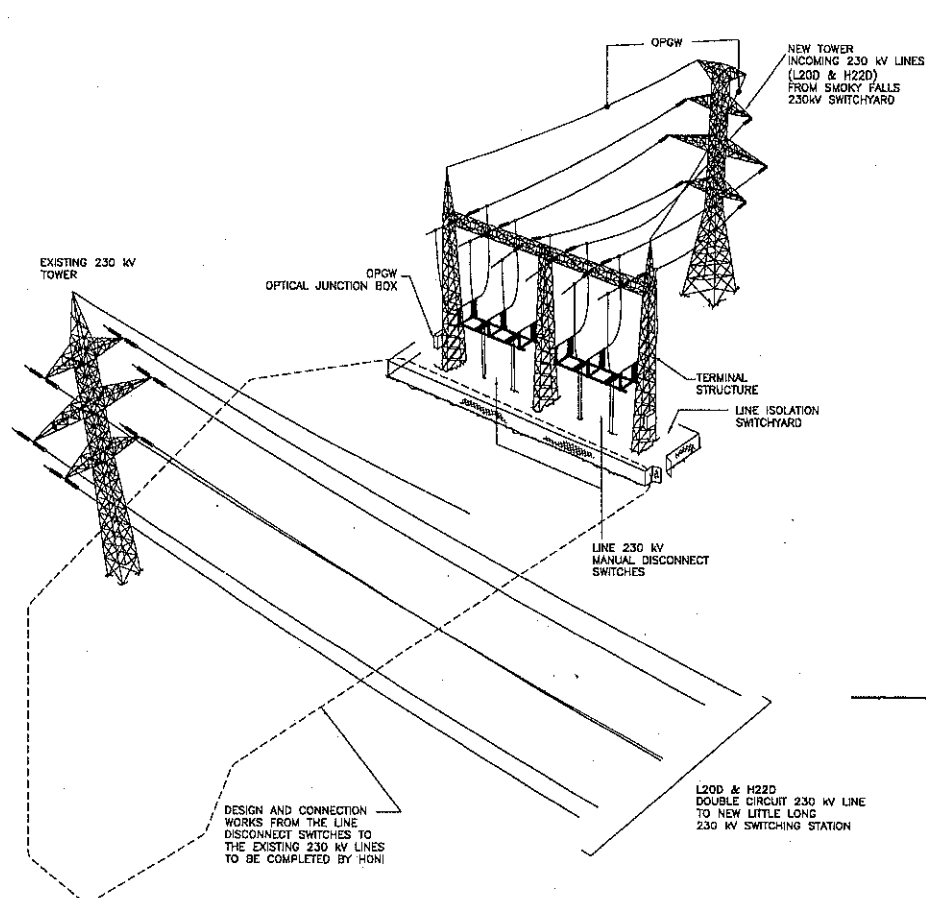
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CONSULTANT: **SNC-LAVALIN HYDRO AND POWER SYSTEMS**

Drawing Number: **020448-4010-47DD-0302-PA**

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- 4010-47DD-0302 PLAN AND PROFILE - DRAWING 2 OF 2
- 4020-47DD-0100 230KV SWITCHYARD LAYOUT-PLAN
- 4020-47DD-0109 230KV LINE ISOLATION SWITCHYARD PLAN, SECTIONS AND GROUNDING



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SMOKY FALLS 2 GS 0

HONI/OPG INTERCONN. POINT
230 kV TERMINAL STRUCTURE
& LINE ISOLATION SWITCHYARD

ONTARIOPOWER GENERATION Electricity Production - Hydroelectric Technical Services

des	C. LAFIERRE	designed by	
draw	D. HUDO	D. MANSOUR	
date	2009-08-10	design approved	
scale	1:75	J. BROWN	DWG

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CLIENT: **KAP** KIEWIT-ALARIE, A PARTNERSHIP

CONSULTANT: **SNC-LAVALIN** HYDRO AND POWER SYSTEMS

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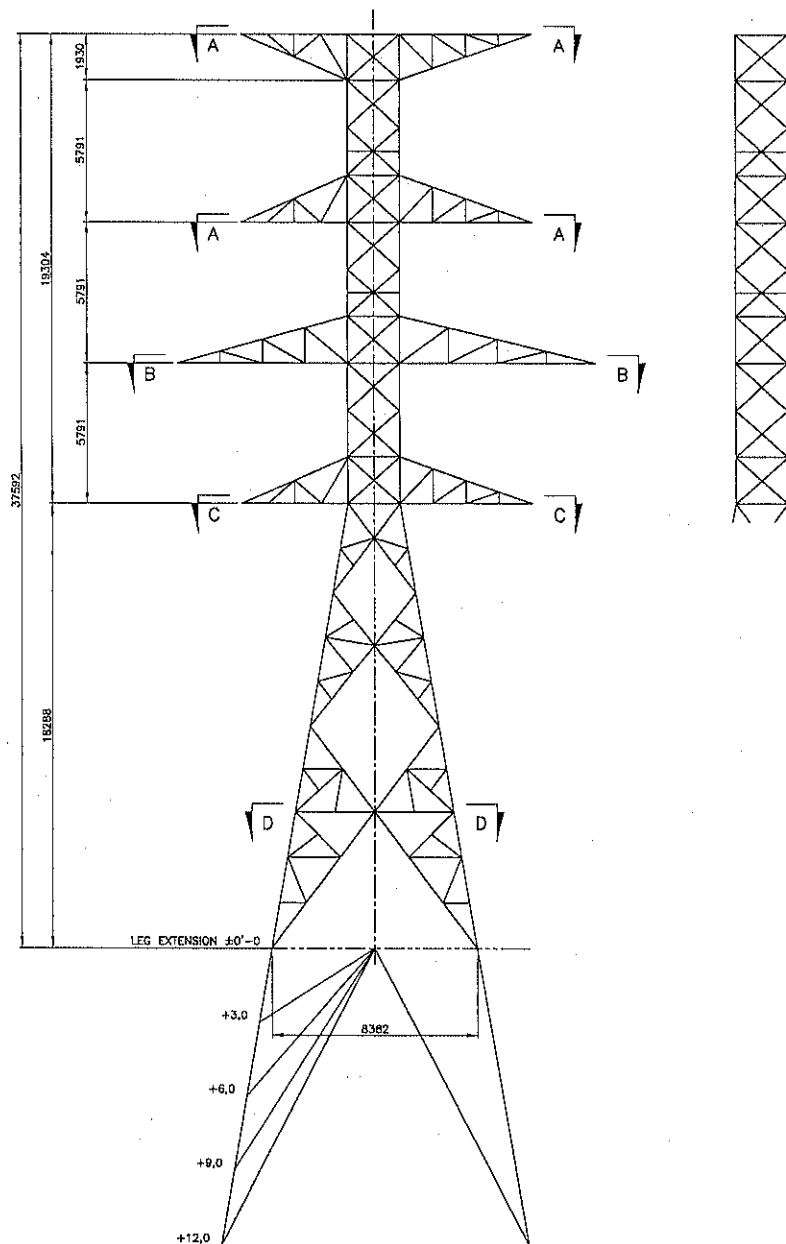


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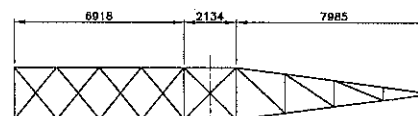
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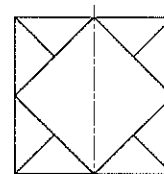
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SECTION A-A
 SECTION C-C



SECTION B-B



SECTION D-D



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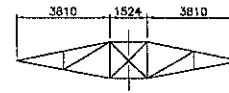
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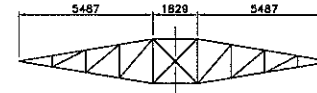
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date 2009-06-10	design approved M.D. BELANGER	authorized J. BROWN	DWG type DWG	SH 00

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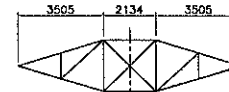
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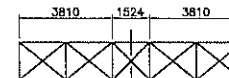
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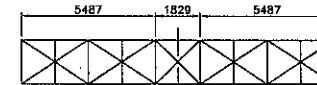
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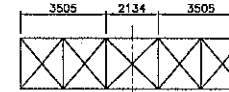
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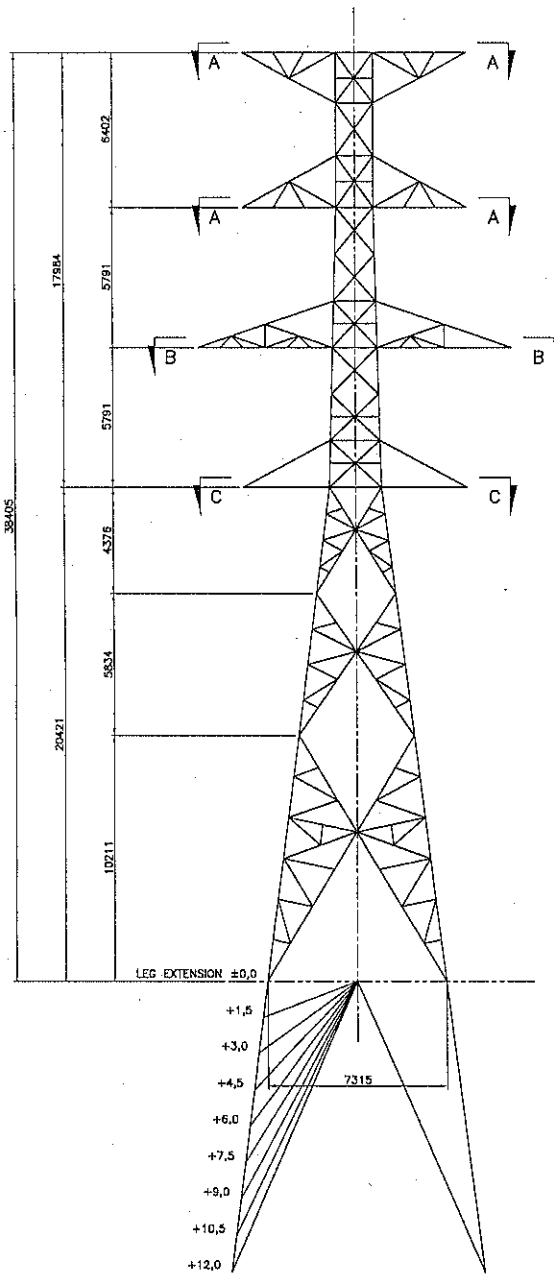
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SECTION B-B



SECTION C-C



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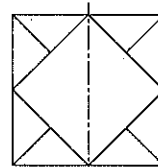
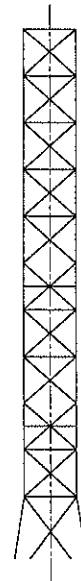
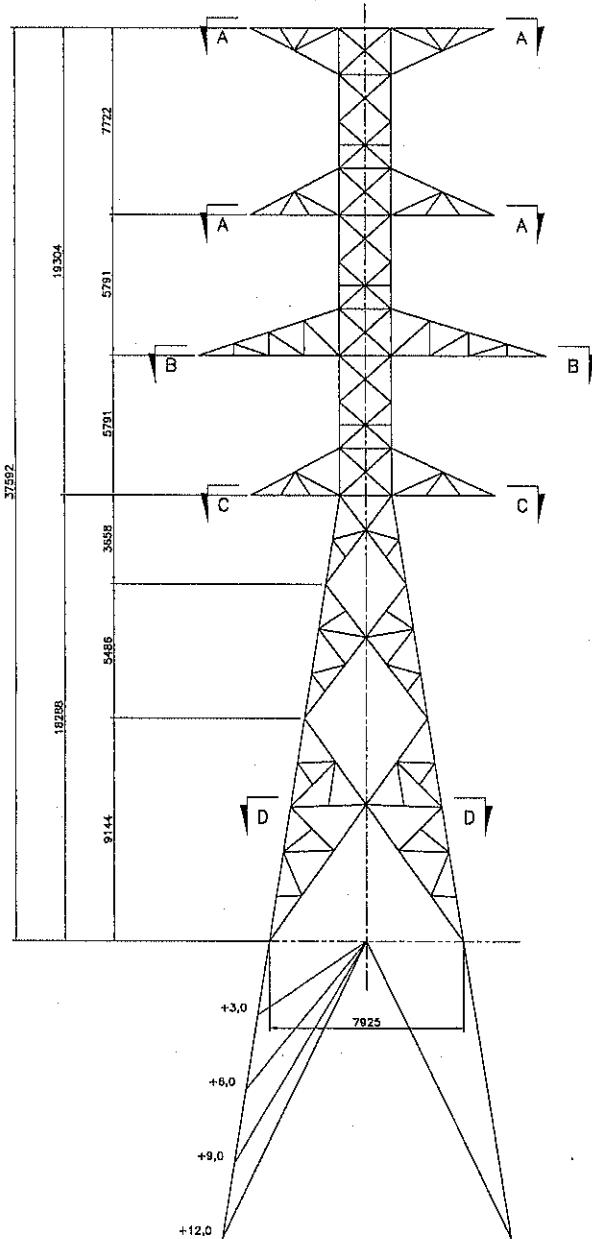
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ONTARIO POWER GENERATION			Electricity Production - Hydroelectric Technical Services	
des. C. LAPIERRE	designed by M. MEZIANE			
chek. D. NUDD	design approved M.D. BELANGER			
date 2008-08-10				
scale 1:100	J. BROWN			
dwg no.				

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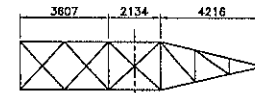
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CONSULTANT: **SNC-LAVALIN HYDRO AND POWER SYSTEMS**

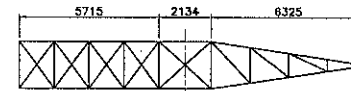
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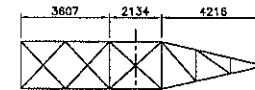
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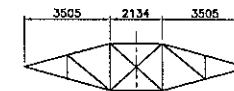
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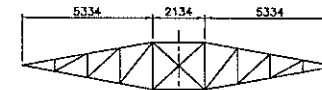
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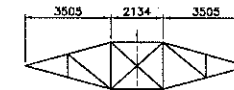
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TYPE "D" FIN DE COURSE, ANGLES 15° A 60°



SECTION A-A & C-C



SECTION B-B
TYPE "B" ANGLES 0° A 15°



SECTION A-A, B-B & C-C
TYPE "C" FIN DE COURSE, ANGLES 0° A 15°

REFERENCE DRAWINGS:

- 4010-47DD-0301 - 230 kV TL SWITCHYARD TO EXISTING 230 kV TL PLAN AND PROFILE DRAWING 1 OF 2
- 4010-47DD-0302 - 230 kV TL SWITCHYARD TO EXISTING 230 kV TL PLAN AND PROFILE DRAWING 2 OF 2
- 4010-47DD-0313 - 230 kV TL SWITCHYARD TO EXISTING 230 kV TL FOUNDATIONS FOR TL109, TL110 & TL111

2	PA 0001	ISSUED FOR BID																							
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SMOKY FALLS 2 GS																									
230 kV TL SWITCHYARD TO EXISTING 230 kV TL DEAD END ANGLE STRUCTURE																									
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KAP KIEWIT-ALARIE, A PARTNERSHIP	SNC-LAVALIN HYDRO AND POWER SYSTEMS
Drawing Number 020448-4010-47DD-0311-PA	



TRANSMISSION ALTERNATIVES

Alternatives considered to transmit the additional Smoky Falls GS generation to the Hydro One transmission system are as follows. Two of the five alternatives, alternatives 2 and 3, are discussed in the IESO System Impact Assessment ("SIA") provided in Ex. B-T6-S2.

Alternative 1 - Do Nothing

The Do Nothing alternative is not viable as the existing single circuit 115 kV lines (S3S and S4S) connecting Smoky Falls GS to the Hydro One transmission system cannot deliver the additional power from the redeveloped Smoky Falls GS.

Alternative 2 – Proposed Line (Double circuit 230 kV Line to existing L20D/H22D Hydro One Lines) (Recommended Alternative)

This alternative is the new 3 km double circuit 230 kV Proposed Line as described in this Application, and as proposed by OPG in the SIA (subject to a change in length from 4 km to approximately 3 km, as discussed in the following paragraph). It connects the new Smoky Falls GS directly to L20D and H22D, the nearest Hydro One 230 kV lines, with the new line being adjacent to an existing transmission corridor. An additional benefit of this alternative is that each station would be serviced by both the L20D and H22D lines. This is the recommended alternative.

OPG's initial proposal of a 4 km long line (see SIA, page 1) was based on preliminary information, and has since been revised to approximately 3 km.

Alternative 3 – Double circuit 230 kV Line to existing L20D/H22D Hydro One Lines and an expanded Little Long Substation

This alternative calls for a new 3 km double circuit 230 kV line to the existing L20D/H22D line with a significantly expanded Little Long substation ("Little Long SS"). Little Long SS is located near Little Long GS, about 7 km south of Smoky Falls GS, and connects to the Hydro One 230 kV system. This connection arrangement was discussed and reviewed by the IESO, OPG and Hydro One but the expanded Little Long SS could not be economically justified (see SIA pages 5 and 6). This alternative is therefore not recommended.

1 **Alternative 4 – Single circuit 230 kV Line to an expanded Little Long Substation**

2 The provincial environmental assessment contains a proposal for connecting Smoky Falls
3 GS using a 7 km 230 kV single-circuit line along a new transmission corridor to a significantly
4 expanded Little Long SS. This would be significantly more costly than Alternative 2 above
5 and is therefore not the recommended alternative.
6

7 **Alternative 5 – Expand Existing Hydro One S3S and S4S 115 kV Lines**

8 Expansion of the existing Hydro One single circuit S3S and S4S 115 kV lines from Smoky
9 Falls GS is not viable for a number of reasons. As shown in Ex. B-T1-S3, Attachment 1,
10 these lines are part of the Hydro One 115 kV system and travel to Kapuskasing
11 (approximately 70 km from Smoky Falls GS). They do not connect to the Hydro One H22D
12 and L20D 230 kV lines. In addition, the towers are designed to accommodate the 115 kV
13 single circuits, which are insufficient to carry the new Smoky Falls GS output. This alternative
14 is therefore not recommended.

**PROJECT COSTS, ECONOMICS AND OTHER PUBLIC INTEREST
CONSIDERATIONS**

1.0 PROJECT COSTS

The total cost of the Proposed Line is estimated to be approximately \$6.6M. The Proposed Line will be funded by OPG as part of the overall cost of the LMR project. A detailed cost estimate is provided in Ex. B-T4-S2.

2.0 PROJECT ECONOMICS

The economic feasibility of the Proposed Line was evaluated as part of the economic evaluation for the overall LMR Project, and not on a stand-alone basis. OPG is not a rate-regulated transmitter and is not seeking recovery of project costs in transmission rates. Details of the project economics are filed in Ex. B-T4-S3.

3.0 OTHER PUBLIC INTEREST CONSIDERATIONS

The Proposed Line is in the public interest as it will enable the accommodation of increased electrical power output from Smoky Falls GS following completion of the proposed replacement of the powerhouse. Public interest considerations are discussed further in Ex. B-T4-S4.

PROJECT COSTS

The total estimated cost for the Proposed Line is summarized in Table 1 below.

Table 1
Total Estimated Project Cost for Proposed Line

Item	Estimated Cost (\$K)
Transmission Line:	
Transmission Line Design & Surveys	536
Materials	2,378
Transmission Line Installation	212
Transmission corridor preparation	485
Total Transmission Line	3,611
Connection to Hydro One L20D/H22D Lines:	3,000 (Preliminary estimate. Detailed estimate not yet received from Hydro One)
Total Cost	6,611

PROJECT ECONOMICS

1.0 ECONOMIC FEASIBILITY

The economic feasibility of the Proposed Line was evaluated as part of the economic evaluation for the overall LMR Project, and not on a stand-alone basis. Based on the requirement to deliver an increased amount of electricity from Smoky Falls GS following the planned construction of the new powerhouse, and the evaluation of alternatives as discussed in Ex. B-T3-S1, the Proposed Line is recommended as the preferred alternative.

See Ex. A-T2-S1 for a discussion of the Minister of Energy directives for the LMR Project.

2.0 COST RESPONSIBILITY

The Proposed Line will be fully funded by OPG as part of the LMR Project. Funding to construct the Proposed Line is included in the budget for the LMR Project. This includes the funding of the Proposed Line and all required ancillary equipment required to operate it, including the connection to the Hydro One L20D/H22D transmission line.

3.0 RATE IMPACT ASSESSMENT

The payments for the output of the Mattagami River plants are not regulated by the OEB. OPG is not a rate-regulated transmitter and is not seeking recovery of project costs for the Proposed Line in transmission rates. The project to construct the Proposed Line has no impact on transmission rates.

The costs recovered for the LMR Project, including the Proposed Line, will impact consumers through the Global Adjustment. The cost of the Proposed Line and its impact on consumers is not material in the context of the overall cost for the LMR Project.

OTHER PUBLIC INTEREST CONSIDERATIONS

There are no customers other than OPG in the area that will be affected by the construction of the Proposed Line.

The Proposed Line is in the public interest as it will enable the accommodation of increased electrical power output from Smoky Falls GS following completion of the proposed replacement of the powerhouse. As discussed in Ex. B-T2-S2, the existing single circuit 115 kV lines connecting Smoky Falls GS to the Hydro One transmission system cannot accommodate the additional generation. The Proposed Line will enable OPG to make more efficient use of the available water flows along the Mattagami River, thus making more efficient use of an available renewable resource.

The cost of the Proposed Line will not have a material impact on the price of electricity, as discussed in Ex. B-T4-S3.

CONSTRUCTION AND PROJECT ADMINISTRATION

To complete the Proposed Line, OPG will undertake the following tasks:

- Install 12 new double-circuit heavy anchor towers alongside the existing 115 kV towers on the Hydro One S3S/S4S line from Smoky Falls GS to the interconnection point with the Hydro One L20D/H22D lines, approximately 3 km southwest of Smoky Falls GS. Detailed drawings relating to the tower structures are provided in Ex. B-T2-S5.
- Upgrade access roads on the right-of-way (if required), clear trees and brush from the right-of-way, erect new structures, string new conductor, remove redundant structures and unused/waste construction materials from the site, and restore the area including de-commissioning of construction roads (if required).
- Coordination of any Hydro One transmission line outages required to accommodate the construction of the Proposed Line, which will require close coordination with OPG generation production schedules and other construction work in the area.

A project schedule showing the tasks required to complete the Proposed Line by the scheduled in-service date is provided in Ex. B-T5-S2. As discussed in Ex. A-T2-S1, OPG has scheduled a February 2013 in-service date for the Proposed Line.

The new line will be constructed by Kiewit Alarie Partnership ("KAP"). KAP is a partnership between two of the largest construction firms operating in Canada: Peter Kiewit & Sons Co. ("Kiewit"), a North American company with offices in Milton, Ontario, and Leo Alarie and Sons Construction Ltd. of Timmins, a subsidiary of the Aecon Infrastructure Group ("Aecon"). Through a competitive Request for Expressions of Interest process earlier in the LMR Project process, OPG entered into a contract with KAP to undertake the construction of the LMR Project.

The Proposed Line is designed in accordance with good utility practice and will meet the requirements of the Transmission System Code for licensed transmitters in Ontario.

CONSTRUCTION AND IN-SERVICE SCHEDULE

1.0 SCHEDULE

The construction and in-service schedule for the Proposed Line is provided in Table 1 below. This schedule integrates with the construction schedule for the redevelopment of the Smoky Falls GS.

Table 1
Construction Schedule for New 3 km Double Circuit 230 kV Transmission Line

Task	Start	Finish
Line Construction:		
Detailed Engineering	January 2010	December 2011
Tender & Award Structural Steel	January 2011	June 2011
Receive Structural Steel	October 2011	July 2012
Construction	April 2012	October 2012
In-Service	n/a	February 2013
Road Removal, Site Restoration	February 2015	June 2015

2.0 SCHEDULE RISK MITIGATION

OPG's project management plan for the LMR Project includes a plan for mitigation, monitoring, and remediation activities to address schedule risk. The plan includes specific steps to be taken to identify and manage risks relating to delay in the start of construction due to a failure to obtain timely approvals, changes in construction windows due to environmental constraints, prolonged adverse weather conditions, and the availability of qualified contractors and/or skilled tradespersons. These measures include monitoring workshops regarding compliance with regulatory and government agency requirements, maintaining open communications with regulators and applicable government agencies through the Environmental Working Group and the Mattagami Extensions Coordinating Committee ("MECC") (the MECC is discussed further in Ex. B-T6-S5), use of contingency funds if needed, creation and monitoring of an organizational chart, in association with Kiewit

- 1 Alarie Partnership, to identify key positions, ongoing monitoring of project staffing, and use of
- 2 contractual rights as required to manage staff mobility.

OTHER MATTERS / AGREEMENTS / APPROVALS

1.0 SYSTEM IMPACT ASSESSMENT

Under the IESO Market Rules, any party planning to construct a new or modified connection to the IESO-controlled grid must have an IESO assessment of the proposed connection and related facilities. At OPG's request and expense, the IESO has completed a System Impact Assessment ("SIA") of the proposed facilities included in the LMR Project under the IESO Connections Assessment and Approval process.

The SIA addresses the impact of the LMR Project on system operating voltage, system operating flexibility, and on the ability of other connections to deliver or withdraw power from the IESO-controlled grid. The SIA, filed at Ex. B-T6-S2, confirms that the proposed transmission work to address the expansion of the Lower Mattagami River plants (including the Proposed Line that is the subject of this Application) will not adversely impact the reliability of the IESO-controlled grid.

2.0 CUSTOMER IMPACT ASSESSMENT

Hydro One has carried out a Customer Impact Assessment ("CIA") in accordance with its customer connection procedures to determine the impact of the LMR Project on load customers and generators in the local vicinity. The CIA, provided in Ex. B-T6-S3, confirms that the LMR Project (including the Proposed Line) will not adversely impact customers or the performance of the power system in the study area.

3.0 STAKEHOLDER AND COMMUNITY CONSULTATION

OPG has and continues to carry out an extensive consultation process with stakeholders and local First Nations and Métis communities that may have an interest in the LMR Project, including the Proposed Line. OPG has and will continue to ensure that stakeholders' issues are appropriately addressed. OPG will continue to inform area elected officials, and relevant provincial government ministries and agencies of the status of the LMR Project, including the Proposed Line. Prior to and during the construction and commissioning stages of the Proposed Line, OPG will consult with the local community and other interested stakeholders to ensure potential concerns are appropriately addressed. See Ex. B-T6-S4 for details of the consultation process.

4.0 ENVIRONMENTAL ASSESSMENT APPROVAL

Based on an environmental assessment submitted by OPG to the Ontario Ministry of the Environment ("MOE") in 1990, a Notice of Approval to Proceed and Order-in-Council providing approval to proceed with the LMR Project was issued by the MOE in 1994. The LMR Project was granted a Declaration Order termination date of December 15, 2010, with which OPG has complied. OPG is in the process of satisfying the terms and conditions of this provincial environmental assessment.

OPG submitted a draft federal environmental assessment ("Federal EA") report for the LMR Project to the federal government in June 2008. Subsequent activities in the process included public and First Nations consultations, revisions to the draft Federal EA report and further consultation with the required agencies, review of the revised Comprehensive Study report, and the Federal EA decision. A decision by the Minister of the Environment (Canada) that the LMR Project would not cause significant environmental effect was received on March 29, 2010. The environmental assessment process is discussed in detail in Ex. B-T6-S5.

5.0 COMPLIANCE WITH INDUSTRY STANDARDS AND CODES

A connection agreement with Hydro One, to enable OPG to transfer electricity to the IESO-controlled grid via the Proposed Line, will be negotiated prior to the in-service of the redeveloped Smoky Falls GS.

The design and maintenance of the Proposed Line will be in accordance with good utility practice, as established in the Transmission System Code, and in accordance with Northeast Power Coordinating Council ("NPCC") and North American Electric Reliability Council ("NERC") planning and operating standards.

6.0 SUMMARY OF REQUIRED PERMITS AND APPROVALS

Table 1 below provides a summary of the status of the key permits and approvals required by OPG to construct the Proposed Line.

1

Table 1

2

Summary of Required Permits and Approvals

Permit or Approval	Status
Permits and Approvals for LMR Project (required for but not specific to Proposed Line)	
Provincial Environmental Assessment	Notice of Approval to Proceed and Order-in-Council providing approval to proceed with the project issued on December 15, 1994. (see Ex. B-T6-S5)
Federal Environmental Assessment	Approved on March 29, 2010. (see Ex. B-T6-S5)
IESO System Impact Assessment Report	Final Report issued March 31, 2010. (see Ex. B-T6-S2)
Hydro One Customer Impact Assessment	Final Report issued December 20, 2010. (see Ex. B-T6-S3)
Permits and Approvals Specific to Proposed Line	
Property easement from the Crown along the corridor from the boundary of OPG Water Power Lease No. 121 to the connection point with the Hydro One L20D/H22D 230 kV line.	OPG will apply to the Ontario Ministry of Natural Resources for this easement. An Easement Agreement will be developed as part of the application process. (see Ex. B-T6-S6)
MNR Work Permit	OPG's contractor, KAP, will complete the MNR Application for Work Permit prior to commencing any work in the area of the transmission line corridor. (see Ex. B-T6-S6)
Temporary access rights and tree cutting approval may be required for construction access.	Requirements for temporary access rights and tree cutting approval will be identified in the construction planning stage, and will be included in the MNR Work Permit as required. (see Ex. B-T6-S6)
Land Use Permit	OPG will apply for a Land Use Permit when the construction of the Proposed Line is nearing completion. (see Ex. B-T6-S6)

3

IESO SYSTEM IMPACT ASSESSMENT

1

2

3 The IESO System Impact Assessment Report CAA ID 2006-239, issued March 31, 2010, is
4 provided as Attachment 1.



Power to Ontario.
On Demand.

REPORT

System Impact Assessment Report

**Lower Mattagami
Generation Development**

CONNECTION ASSESSMENT & APPROVAL PROCESS

CAA ID 2006-239

Applicant: Ontario Power Generation Inc.

Market Facilitation Department

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System Impact Assessment Report

Lower Mattagami Generation Development Project

Disclaimers

IESO

This report has been prepared solely for the purpose of assessing whether the connection applicant's proposed connection with the IESO-controlled grid would have an adverse impact on the reliability of the integrated power system and whether the IESO should issue a notice of approval or disapproval of the proposed connection under Chapter 4, section 6 of the *Market Rules*.

Approval of the proposed connection is based on information provided to the IESO by the connection applicant and the transmitter(s) at the time the assessment was carried out. The IESO assumes no responsibility for the accuracy or completeness of such information, including the results of studies carried out by the transmitter(s) at the request of the IESO. Furthermore, the connection approval is subject to further consideration due to changes to this information, or to additional information that may become available after the approval has been granted. Approval of the proposed connection means that there are no significant reliability issues or concerns that would prevent connection of the proposed facility to the IESO-controlled grid. However, connection approval does not ensure that a project will meet all connection requirements. In addition, further issues or concerns may be identified by the transmitter(s) during the detailed design phase that may require changes to equipment characteristics and/or configuration to ensure compliance with physical or equipment limitations, or with the Transmission System Code, before connection can be made.

This report has not been prepared for any other purpose and should not be used or relied upon by any person for another purpose. This report has been prepared solely for use by the connection applicant and the IESO in accordance with Chapter 4, section 6 of the *Market Rules*. The IESO assumes no responsibility to any third party for any use, which it makes of this report. Any liability which the IESO may have to the connection applicant in respect of this report is governed by Chapter 1, section 13 of the *Market Rules*. In the event that the IESO provides a draft of this report to the connection applicant, you must be aware that the IESO may revise drafts of this report at any time in its sole discretion without notice to you. Although the IESO will use its best efforts to advise you of any such changes, it is the responsibility of the connection applicant to ensure that it is using the most recent version of this report.

HYDRO ONE

Special Notes and Limitations of Study Results

The results reported in this study are based on the information available to Hydro One, at the time of the study, suitable for a preliminary assessment of a new generation or load connection proposal.

The short circuit and thermal loading levels have been computed based on the information available at the time of the study. These levels may be higher or lower if the connection information changes as a result of, but not limited to, subsequent design modifications or when more accurate test measurement data is available.

This study does not assess the short circuit or thermal loading impact of the proposed connection on facilities owned by other load and generation (including OPG) customers.

In this study, short circuit adequacy is assessed only for Hydro One breakers and does not include other Hydro One facilities. The short circuit results are only for the purpose of assessing the capabilities of existing Hydro One breakers and identifying upgrades required to incorporate the proposed connection. These results should not be used in the design and engineering of new facilities for the proposed connection. The necessary data will be provided by Hydro One and discussed with the connection proponent upon request.

The ampacity ratings of Hydro One facilities are established based on assumptions used in Hydro One for power system planning studies. The actual ampacity ratings during operations may be determined in real-time and are based on actual system conditions, including ambient temperature, wind speed and facility loading, and may be higher or lower than those stated in this study.

The additional facilities or upgrades which are required to incorporate the proposed connection have been identified to the extent permitted by a preliminary assessment under the current IESO Connection Assessment and Approval process. Additional facility studies may be necessary to confirm constructability and the time required for construction. Further studies at more advanced stages of the project development may identify additional facilities that need to be provided or that require upgrading.

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LOWER MATTAGAMI GENERATION DEVELOPMENT IESO SYSTEM IMPACT ASSESSMENT

SIA Findings

Summary

The Ontario Power Generation (OPG) is proposing to do the following generation expansion at Lower Mattagami:

Existing Generating Facilities				
Little Long GS		Two units: 68 MW	Σ 136 MW	Σ 486 MW
Harmon GS		Two units: 70 MW	Σ 140 MW	
Kipling GS		Two units: 79 MW	Σ 158 MW	
Smoky Falls GS		Four units: 13 MW	Σ 52 MW	
Generating Facilities after expansion				
Little Long GS	(I/S date 2012)	Three units: 70 MW	Σ 210 MW	Σ 945 MW
Harmon GS	(I/S date 2012)	Three units: 78 MW	Σ 234 MW	
Kipling GS	(I/S date 2013)	Three units: 79 MW	Σ 237 MW	
Smoky Falls GS	(I/S date 2013)	Three units: 88 MW	Σ 264 MW	
Increase from present level				459 MW

In order to carry out the above expansion,

(a) OPG intends to do the following modifications.

- Upgrade turbine runners in existing generators at Little Long and Harmon GS
- Install second 13.8/230 kV transformer at Little Long, Harmon and Kipling GS
- Install three new 13.8/230 kV transformers at Smoky Falls GS
- Decommission existing four generators at Smoky Falls GS
- Remove Smoky Falls GS connection to Spruce Falls
- Construct a new 4 km long, double circuit, 230 kV transmission line between Smoky Falls GS and to a designated tap-in point of the existing L20D and H22D to incorporate Smoky Falls GS

(b) Hydro One intends to do the following modifications.

- Install series capacitors at Nobel SS to provide 50 % compensation to X503E and X504E
- Install a +300/-100 Mvar SVC at the Porcupine 230 kV bus
- Install a +200/-100 Mvar SVC at the Kirkland Lake 115 kV bus
- Extend H22D from Harmon GS to Kipling GS to incorporate two Kipling units.

Additional reactive support to accommodate the large reactive losses will be provided in part by shunt capacitor banks installed at various stations across Northern Ontario. Details regarding these shunt capacitor installations are provided below:

	Station	Size	In-service Date
1	Dryden TS	2 x 50 MVar@ 250 kV	December 2010
3	Kapuskasing TS	1 x 21.6 MVar @ 28.8 kV	September 2010
4	Essa TS	1 x 245 MVar @ 250 kV	September 2010
6	Pinard TS	2 x 32.4 MVar @ 27.6 kV	December 2010
7	Hanmer TS	1 x 149 MVar@ 220 kV	December 2010
8	Porcupine TS	2 x 100 MVar @ 250 kV	September 2011

Note: An SIA for these shunt capacitor installations has already been completed by the IESO and can be found at http://www.ieso.ca/imoweb/pubs/caa/caa_SIAReport_2008_352.pdf

Conclusions

The IESO carried out the System Impact Assessment in order to identify the effect of this redevelopment plan on the IESO controlled grid. Based on the analysis, the following conclusions were made.

- (1) The proposed project will not cause a material adverse impact on the reliability of the IESO-controlled grid provided the connection requirements given in this document are met.
- (2) When all elements are in service and with the system assumptions made in this report, the transfer capability of the Flow-South interface can be increased up to 2050 MW with no generation rejection armed for contingencies to the X503E or X504E 500 kV circuits.
- (3) System limitations exist to the amount of power that can flow into Hanmer on the P502X circuit and into Porcupine on the D501P circuit. If the power flows into Hanmer on P502X and into Porcupine on D501P are increased beyond the levels studied in this report or pre-contingency voltage levels are lowered, transient instability of the Lower Mattagami units and unacceptable transient voltage performance can result for a contingency to the X503E or X504E 500 kV circuits with no generation rejection armed. Expansion of the Mississagi East transfer capability provides for the opportunity to reduce the amount of flow into Hanmer on P502X, while still achieving a Flow South transfer of 2050 MW.
- (4) If existing relay settings of D3K@K remain unchanged, D3K will trip for the loss of P502X.
- (5) The proposed excitation systems and governors for the new generators meet IESO standards.
- (6) The steady-state loadings for circuits H22D and L20D are only marginally below their thermal capability. Slight thermal overloading of the H22D and L20D circuits is possible. All other steady-state loadings for the equipments mentioned are below their continuous ratings.
- (7) Post-contingency overvoltage concerns exist around the Hanmer, Porcupine, Pinard and Kapuskasing area. To mitigate overvoltage concerns, Hydro One must install switching schemes to automatically trip newly installed capacitors at Hanmer, Porcupine, Pinard and Kapuskasing.

Notification of Conditional Approval

It is recommended that a Notification of Conditional Approval be issued for Lower Mattagami generation redevelopment project subject to the IESO's Requirements for Connection listed below, all general requirements as mentioned in this report and any further requirements that may be identified by Hydro One in the Customer Impact Assessment.

IESO's Requirements for Connection

These specific requirements are in addition to the general requirements listed in section 2 of this report.

For Ontario Power Generation:

1. The generator under-frequency settings should be set such that the generators do not trip for frequency variations that are above the curve given in Figure 3.
2. The real-time monitoring of following quantities from new generators must be provided to the IESO.
 - Active power generation
 - Reactive power generation
 - Terminal breaker status
 - Terminal voltage
 - AVR and PSS status
3. The performance of installed equipment must meet or exceed the predicted performance observed in this SIA. Finalized dynamic models for the Lower Mattagami generators and their control systems must meet or exceed the equipment capability studied in this report.
4. The commissioning reports must be submitted to the IESO within 30 days of the conclusion of commissioning. The field test results should agree with simulations done using the PSS/E software.
5. OPG must install the extensions of L20D and H22D to incorporate Smoky Falls GS.

For Hydro One:

1. The following must be installed.
 - Series capacitors at Nobel SS to provide 50 % compensation to X503E and X504E
 - +300/-100 Mvar SVC at Porcupine 230 kV bus
 - +200/-100 Mvar SVC at Kirkland Lake 115 kV bus
 - Extension of H22D from Harmon GS to Kipling GS to incorporate two Kipling units.
 - Drop downs from L20D and H22D to incorporate Smoky Falls GS
2. Northeast Generation Rejection Schemes must be modified.
 - All six new generators must be included in the scheme such that they can be rejected as response to contingencies, similar to existing Lower Mattagami units.
 - The Facility Description Document FDD-1025 must be revised.

3. The relay settings of D3K must be modified.
4. The short-circuit currents should not exceed new and existing equipment ratings. Short circuit levels are shown in Table 3 of this report.
5. New or modified syncho-check and auto-reclosure settings must be provided to the IESO.
6. The performance of installed equipment must meet or exceed the predicted performance observed in the SIA.
7. To mitigate overvoltage concerns, Hydro One must install switching schemes to automatically trip newly installed capacitors at Hanmer, Porcupine, Pinard and Kapuskasing.

These switching schemes can be implemented using automatic over-voltage based switching on the condition that voltage thresholds and time delays are suitably chosen, such that overvoltage concerns are mitigated and operating times of the switching schemes do not encroach on the ULTC operation timeframe. The newly implemented schemes must also ensure that they are properly coordinated with the existing reactor switching scheme at Pinard and with other existing SPS facilities in the area. This will likely mean that the time delays and voltage thresholds of the existing Pinard reactor switching scheme will need to be modified.

If Hydro One is unable to meet these conditions, switching out of the capacitors at Hanmer, Porcupine, Pinard and Kapuskasing will need to be added as responses to various contingencies to the existing Moose River G/R and Northeast 115 kV L/R & G/R schemes.

For Both OPG and Hydro One:

The following requirement applies to the OPG as connection applicant and Hydro One as the transmitter.

The connection applicant is required to initiate an assessment of the existing protection systems with the transmitter who shall identify any modifications to protection equipment or settings required to incorporate the new facility. The IESO will evaluate the impact of any protection modifications and associated changes to functionality, timing, or reach on system reliability. The IESO will not assess aspects of protection systems which are solely the accountability of the connection applicant (e.g. coordination of relay protections).

To allow sufficient time to assess the impact on power system reliability, the connection applicant must submit any proposed protection changes to the IESO at least six (6) months before any actual changes are to be implemented on the existing protection systems.

Please send documentation for protection changes triggered by new or modified primary equipment (i.e. new or replacement relays) to connection.assessments@ieso.ca.

For protection changes that are not associated with new or modified equipment (i.e. protection settings changes) please send documentation to protection.settings@ieso.ca.

The IESO would deem the modifications acceptable if they do not cause any new and/or reduced operating security limits under normal operating conditions. Should the modifications be unacceptable, the IESO would require the connection applicant to investigate other mitigating measures.

IESO Recommendations

The modified connection arrangement shown below with a switching station located at Little Long SS is highly recommended by the IESO.

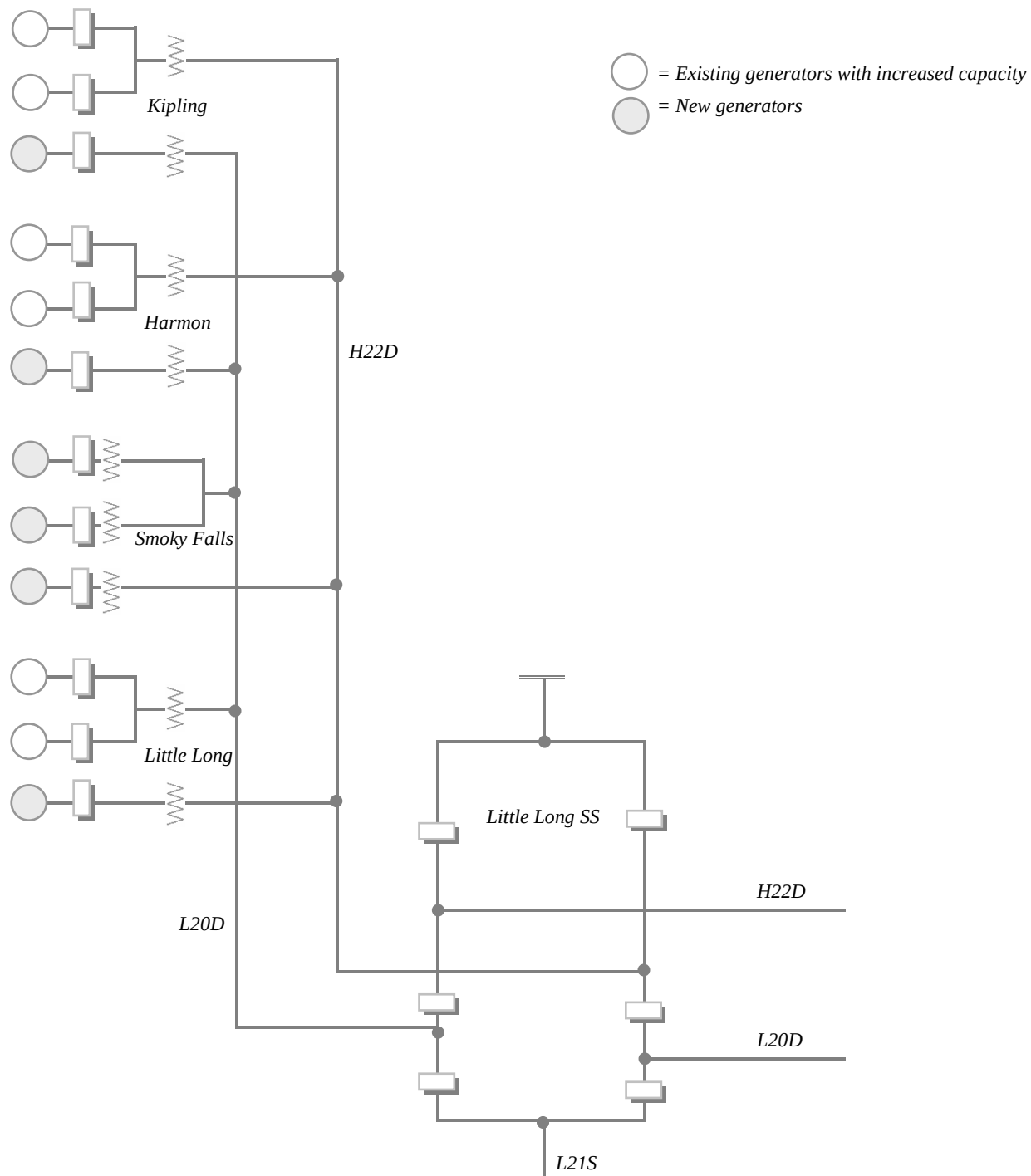


FIGURE 1 : RECOMMENDED LITTLE LONG SS CONNECTION ARRANGEMENT

This recommended arrangement provides the following reliability benefits over the proposed connection arrangement studied in this report:

- Allows limited generation capacity to continue to operate in support of the 230 kV circuit L21S in the event of a double-circuit contingency/outage involving the 230 kV circuits between Little Long SS and Pinard TS.
- Maintains a connection from Pinard TS to support the load supplied from circuit L21S in the event of a double-circuit contingency/outage involving the 230 kV circuits between Little Long SS and the generating plants.
- Allows the connection of a 100 MVar capacitor bank to compensate local area system losses which allows for increased power flows into Porcupine and Hanmer through circuits D501P and P502X.

This recommended connection arrangement was discussed and reviewed by the IESO, OPG and Hydro One but could not be economically justified at this time.

- End of Section -

1. Project Description

The north-eastern Ontario power system covers the area north of Sudbury and east of Wawa stretching all the way to the Quebec border. The north-eastern transmission system incorporates many generation resources that are used to supply local demand and demand in southern Ontario.

Amongst many hydroelectric power plants located in northeastern Ontario, there are four generating plants that are located along the Lower Mattagami River. They are Little Long, Kipling, Harmon and Smoky Falls. Due to study revelations that each of these power generating stations has enough water flow to support additional power production, the Ontario Power Generation Inc is proposing to expand those stations to the following levels:

<i>Capacity of the Generating Facilities following expansion</i>				
Little Long GS	Three units:	70 MW	Σ	210 MW
Harmon GS	Three units:	78 MW	Σ	234 MW
Kipling GS	Three units:	79 MW	Σ	237 MW
Smoky Falls GS	Three units:	88 MW	Σ	264 MW
<i>Increase from present level</i>				<i>459 MW</i>

The existing generators will produce more power at Little Long, Harmon and Kipling stations and each of those stations will also be equipped with a new third generator. While the runners at the existing Kipling turbines can handle the increased power production, the runners at existing turbines at Little Long and Harmon units require upgrading. The electrical equipment including generators requires no upgrades to produce the added power. The new unit at each station will be connected to L20D or H22D using a new 13.8/230 kV transformer. The existing units at Smoky Falls will be fully retired, and three new larger units will be installed and will be connected to H22D or L20D via two 4 km 230 kV transmission lines.

(a) Generation Connection Arrangement

The proposed connection arrangement is shown in Figure 2. This has been discussed with OPG and Hydro One. The resulting distribution of the generating facilities are shown below and will ensure approximately even flows on H22D and L20D circuits that will respect their continuous ratings.

Circuit	Kipling	Harmon	Smoky Falls	Little Long	Total Capacity connected
L20D	1 × 79 MW	1 × 78 MW	2 × 88 MW	2 × 70 MW	473 MW
H22D	2 × 79 MW	2 × 78 MW	1 × 88 MW	1 × 70 MW	472 MW

This arrangement will require the extension of the 230 kV circuit H22D from Harmon GS to Kipling GS to connect two Kipling units to H22D and two new 230 kV circuits from Smoky Falls GS to a designated tap-in point of the existing L20D and H22D circuits.

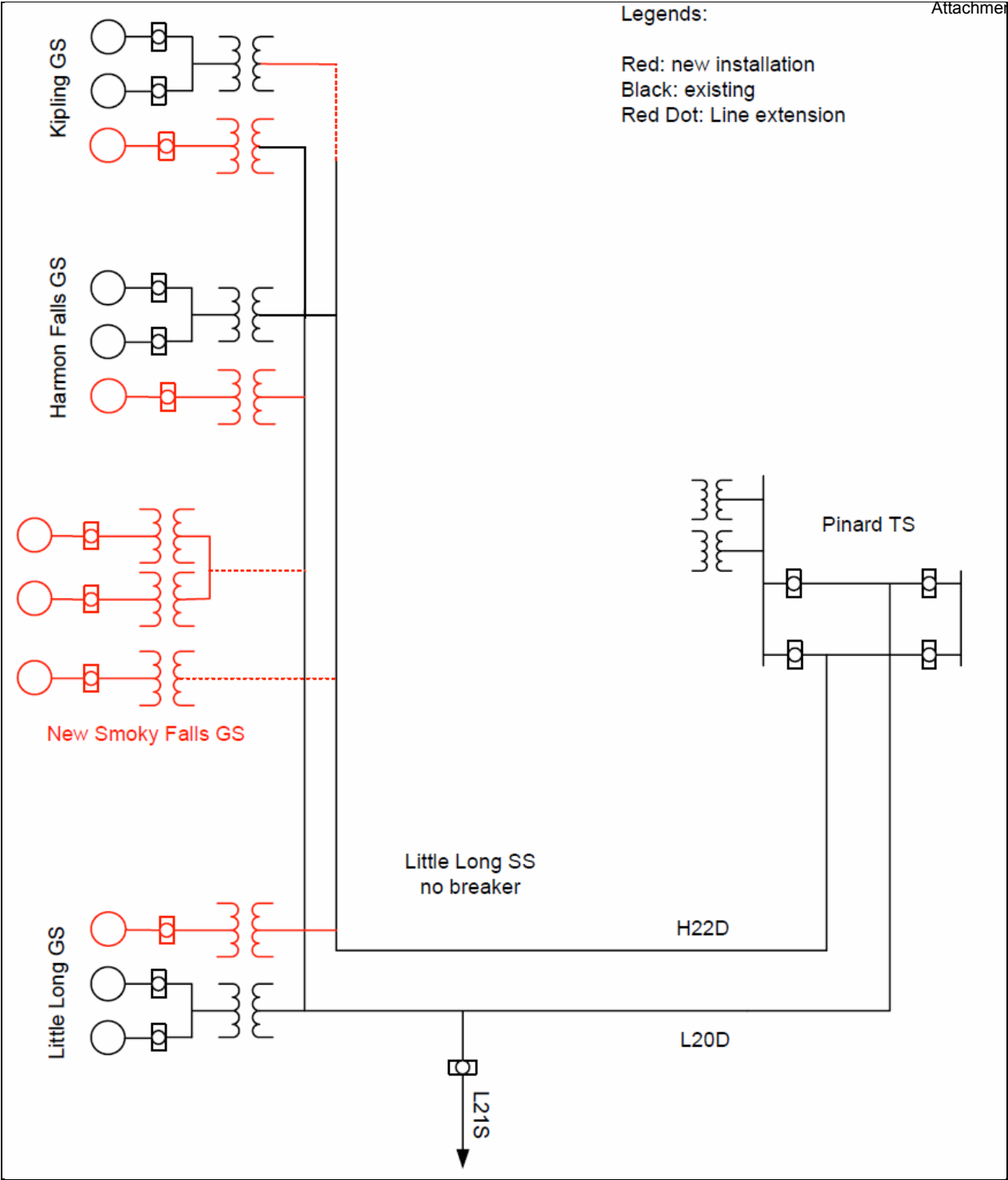


FIGURE 2 : PROPOSED LOWER MATTAGAMI CONNECTION ARRANGEMENT

– End of Section –

2. General Requirements

Generators

1. Each generator must satisfy the Generator Facility requirements in Appendix 4.2 of Market Rules.

The Market Rules (appendix 4.2, reference 1) require that the generation facility connecting to the IESO-controlled grid must have the minimum capability to supply reactive power continuously in the range of 90% lagging to 95% leading power factor based on rated active power output at its generator terminals for at least one constant 230 kV system voltage. The connection applicant shall submit the generator's capability curve to the IESO as evidence that the generator is capable of meeting the reactive power requirements.

If necessary, shunt capacitors must be installed to offset the reactive power losses within the facility in excess of the maximum allowable losses. If generators do not have dynamic reactive power capabilities as described above, dynamic reactive compensation devices must be installed to make up the deficient reactive power.

2. The generators must be able to ride through recognized contingencies on the IESO-controlled grid that do not disconnect the facility by configuration.

3. The connection and disconnection of the generators must minimize any adverse effects on the IESO-controlled grid.

Connection Equipment (Breakers, Disconnects, Transformers, Buses)

1. Appendix 4.1, reference 2 of the Market Rules states that under normal conditions voltages are maintained within the range of 220 kV to 250 kV. Thus, the IESO requires that the 230 kV equipment in Ontario must have a maximum continuous voltage rating of at least 250 kV.

Fault interrupting devices must be able to interrupt fault current at the maximum continuous voltage of 250 kV.

If revenue metering equipment is being installed as part of this project, please be aware that revenue metering installations must comply with Chapter 6 of the IESO Market Rules for the Ontario electricity market. For more details the applicant is encouraged to seek advice from their Metering Service Provider (MSP) or from the IESO metering group.

2. The Transmission System Code (TSC), Appendix 2 establishes maximum fault levels for the transmission system. For the 230 kV system, the maximum 3 phase symmetrical fault level is 63 kA and the single line to ground (SLG) symmetrical fault level is 80 kA (usually limited to 63 kA).

The TSC requires that new equipment be designed to sustain the fault levels in the area where the equipment is installed. If any future system enhancement results in an increased fault level higher than the equipment's capability, the connection applicant is required to replace the equipment at their own expense with higher rated equipment capable of sustaining the increased fault level, up to the TSC's maximum fault level of 63 kA for the 230 kV system.

3. The connection equipment must be designed so that the adverse effects of failure on the IESO-controlled grid are mitigated.

4. The connection equipment must be designed so that it will be fully operational in all reasonably foreseeable ambient temperature conditions. This includes ensuring that SF6 breakers are equipped with heaters to prevent freezing.

IESO Monitoring and Telemetry Data

In accordance with the telemetry requirements for a generation facility (see Appendices 4.15 and 4.19 of the Market Rules) the connection applicant must install equipment at this project with specific performance standards to provide telemetry data to the IESO. The data is to consist of certain equipment status and operating quantities which will be identified during the IESO Market Entry Process.

As part of the IESO Facility Registration/Market Entry process, the connection applicant must also complete end to end testing of all necessary telemetry points with the IESO to ensure that standards are met and that sign conventions are understood. All found anomalies must be corrected before IESO final approval to connect any phase of the project is granted.

Protection Systems

1. Protection systems must be designed to satisfy all the requirements of the Transmission System Code as specified in Schedules E, F and G of Appendix 1 and any additional requirements identified by the transmitter. New protection systems must be coordinated with existing protection systems.

2. All new facilities must be protected by two redundant protection systems according to section 8.2.1a of the TSC. These redundant protections systems must satisfy all requirements of the TSC but in particular they may not use common components, common battery banks or common secondary CT or PT windings.

3. Protective relaying must be set to ensure that transmission equipment remains in-service for voltages between 94% of the minimum continuous and 105% of the maximum continuous values in the Market Rules, Appendix 4.1.

4. The Applicant is required to have adequate provision in the design of protections and controls at the facility to allow for future installation of Special Protection Scheme (SPS) equipment.

5. Any modifications made to protection relays by the transmitter after this SIA is finalized must be submitted to the IESO as soon as possible or at least six (6) months before any modifications are to be implemented on the existing protection systems. If those modifications result in adverse impacts, the connection applicant and the transmitter must develop mitigation solutions. Send documentation for protection modifications triggered by new or modified primary equipment (i.e. new or replacement relays) to connection.assessments@ieso.ca. For protection modifications that are not associated with new or modified equipment (i.e. protection setting modifications) please send documentation to protection.settings@ieso.ca.

6. Protection systems within the generation facilities must only trip the appropriate equipment required to isolate the fault. After the facility begins commercial operation, if an improper trip of

the 230 kV circuits L20D/H22D occurs due to events within the facility, the facility may be required to be disconnected from the IESO-controlled grid until the problem is resolved.

Frequency Requirements

The facility must be capable of operating continuously for grid frequencies in the range between 59.4 Hz and 60.6 Hz as specified in Appendix 4.2, Reference 3 of the Market Rules.

The facility must be capable of operating at full active power for a limited period of time for grid frequencies as low as 58.8 Hz. Generators must not trip for under-frequency system conditions that are below 60 Hz but above 57.0 Hz and above the curve shown in Figure 1.

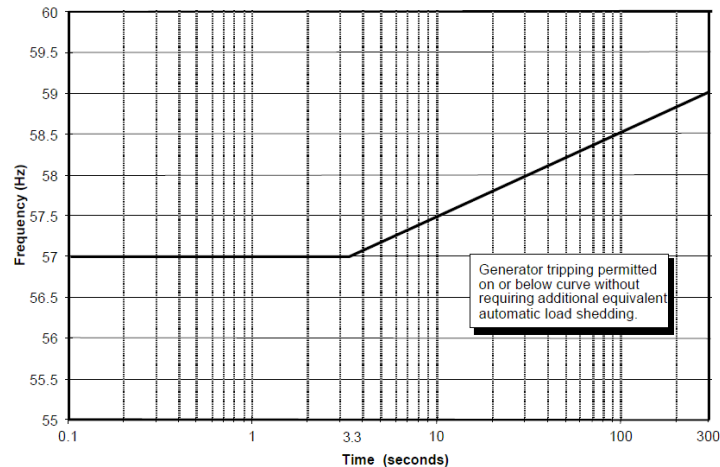


Figure 3: Setting for Grid Under-frequency Trip Protection

Miscellaneous

1. The generators must operate in the voltage control mode. Operation of the facility in power factor control or reactive power control is not acceptable.

Facility Registration/Market Entry Requirements

The connection applicant must complete the IESO Facility Registration/Market Entry process in a timely manner before IESO final approval for connection is granted. Models and data, including any controls that would be operational, must be provided to the IESO. This information should be submitted at least seven months before energization to the IESO-controlled grid, to allow the IESO to incorporate this project into IESO work systems and to perform any additional reliability studies.

As part of the IESO Facility Registration/Market Entry process, the connection applicant must provide evidence to the IESO confirming that the equipment installed meets the Market Rules requirements and matches or exceeds the performance predicted in this assessment. This evidence shall be either type tests done in a controlled environment or commissioning tests done on-site. In either case, the testing must be done not only in accordance with widely recognized standards, but also to the satisfaction of the IESO. Until this evidence is provided and found acceptable to the IESO, the Facility Registration/Market Entry process will not be considered complete and the connection applicant must accept any restrictions the IESO may impose upon this project's participation in the IESO administered market or connection to the IESO-controlled grid.

The evidence must be supplied to the IESO within 30 days after completion of commissioning tests. Failure to provide evidence may result in disconnection from the IESO-controlled grid.

If the submitted models and data differ materially from the ones used in this assessment, then further analysis of the project will need to be done by the IESO.

Reliability Standards

Prior to connecting to the IESO controlled grid, the proposed facility must be compliant with the applicable reliability standards set by the North American Electric Reliability Corporation (NERC) and the North East Power Coordinating Council (NPCC). A list of applicable standards, based on the proponent's/connection applicant's market role/OEB licence can be found here:

<http://www.ieso.ca/imoweb/ircp/reliabilityStandards.asp>

In support of the NERC standard EOP-005, the proponent/ connection applicant may meet the restoration participant criteria. Please refer to section 3 of Market Manual 7.8 (Ontario Power System Restoration Plan) to determine its applicability to the proposed facility

The IESO monitors and assesses market participant compliance with these standards as part of the IESO Reliability Compliance Program. To find out more about this program, visit the webpage referenced above or write to ircp@ieso.ca.

Also, to obtain a better understanding of the applicable reliability obligations and find out how to engage in the standards development process, we recommend that the proponent/ connection applicant join the IESO's Reliability Standards Standing Committee (RSSC) or at least subscribe to their mailing list at rssc@ieso.ca. The RSSC webpage is located at: http://www.ieso.ca/imoweb/consult/consult_rssc.asp.

– End of Section –

3. Data Verification

The data for existing generators, excitation systems, power system stabilizers and governors remain unchanged. The data for these facilities used in the assessment are the data available in the IESO database which were provided by OPG at the time of their registration. The following are the dynamic models and data for the new generators as submitted by OPG.

(a) Generators

Following are the data for the **GENSAL** models used in the analysis.

Kipling G3

$T'_{do} = 5.0$	$T''_{do} = 0.045$	$T''_{qo} = 0.04$	$H = 3.16$	$D = 0.0$	$X_d = 0.86$
$X_q = 0.66$	$X'_d = 0.29$	$X''_d = 0.25$	$X_l = 0.12$	$S(1.0) = 0.15$	$S(1.2) = 0.5$

Little Long G3

$T'_{do} = 5.0$	$T''_{do} = 0.09$	$T''_{qo} = 0.04$	$H = 3.1$	$D = 0.0$	$X_d = 0.86$
$X_q = 0.6$	$X'_d = 0.29$	$X''_d = 0.25$	$X_l = 0.12$	$S(1.0) = 0.15$	$S(1.2) = 0.5$

Harmon G3

$T'_{do} = 5.0$	$T''_{do} = 0.09$	$T''_{qo} = 0.04$	$H = 3.1$	$D = 0.0$	$X_d = 0.86$
$X_q = 0.6$	$X'_d = 0.29$	$X''_d = 0.25$	$X_l = 0.12$	$S(1.0) = 0.15$	$S(1.2) = 0.5$

Smoky Falls G1, G2, G3

$T'_{do} = 5.0$	$T''_{do} = 0.10$	$T''_{qo} = 0.07$	$H = 3.1$	$D = 0.0$	$X_d = 0.95$
$X_q = 0.66$	$X'_d = 0.3$	$X''_d = 0.26$	$X_l = 0.13$	$S(1.0) = 0.15$	$S(1.2) = 0.5$

(b) Automatic Excitation Systems

The following are the data for the **ESST1A** models used in the analysis.

Kipling G3, Harmon G3, Little Long G3, Smoky Falls G1, G2, G3

$T_R = 0.01$	$T_C = 0.0$	$T_B = 0.0$	$T_{C1} = 0.0$	$T_{B1} = 0.0$	$K_A = 160.0$
$T_A = 0.0$	$K_C = 0.1$	$VI_{MAX} = 999.0$	$VI_{MIN} = -999.0$	$VR_{MAX} = 5.5$	$VR_{MIN} = -4.51$
$K_F = 0.0$	$T_F = 1.0$	$K_{LR} = 0.0$	$I_{LR} = 0.0$	$VA_{MAX} = 999.0$	$VA_{MIN} = -999.0$
$UEL = 1$	$VOS = 1$				

(c) Power System Stabilizers

The following are the data for the **PSS2A** models used in the analysis.

Kipling G3

$T_{W1} = 10.0$	$T_{W2} = 10.0$	$T_6 = 0.0$	$T_{W3} = 10.0$	$T_{W4} = 0.0$	$T_7 = 10.0$
$K_{S2} = 1.58$	$K_{S3} = 1.0$	$T_8 = 0.5$	$T_9 = 0.1$	$K_{S1} = 15.0$	$T_1 = 0.08$
$T_2 = 0.02$	$T_3 = 0.08$	$T_4 = 0.02$	$VST_{MAX} = 0.1$	$VST_{MIN} = -0.05$	$N = 1$
$IC1 = 1$	$IC2 = 3$	$M = 5$			

Harmon G3

$T_{W1} = 5.0$	$T_{W2} = 5.0$	$T_6 = 0.0$	$T_{W3} = 5.0$	$T_{W4} = 0.0$	$T_7 = 5.0$
$K_{S2} = 0.81$	$K_{S3} = 1.0$	$T_8 = 0.5$	$T_9 = 0.1$	$K_{S1} = 15.0$	$T_1 = 0.08$
$T_2 = 0.02$	$T_3 = 0.08$	$T_4 = 0.02$	$VST_{MAX} = 0.1$	$VST_{MIN} = -0.05$	$N = 1$
$IC1 = 1$	$IC2 = 3$	$M = 5$			

Little Long G3

$T_{W1} = 7.5$	$T_{W2} = 7.5$	$T_6 = 0.0$	$T_{W3} = 7.5$	$T_{W4} = 0.0$	$T_7 = 7.5$
$K_{S2} = 1.21$	$K_{S3} = 1.0$	$T_8 = 0.5$	$T_9 = 0.1$	$K_{S1} = 15.0$	$T_1 = 0.08$
$T_2 = 0.02$	$T_3 = 0.08$	$T_4 = 0.02$	$VST_{MAX} = 0.1$	$VST_{MIN} = -0.05$	$N = 1$
$IC1 = 1$	$IC2 = 3$	$M = 5$			

Smoky Falls G1, G2, G3

$T_{W1} = 10.0$	$T_{W2} = 10.0$	$T_6 = 0.0$	$T_{W3} = 10.0$	$T_{W4} = 0.0$	$T_7 = 10.0$
$K_{S2} = 1.61$	$K_{S3} = 1.0$	$T_8 = 0.5$	$T_9 = 0.1$	$K_{S1} = 15.0$	$T_1 = 0.08$
$T_2 = 0.02$	$T_3 = 0.08$	$T_4 = 0.02$	$VST_{MAX} = 0.1$	$VST_{MIN} = -0.05$	$N = 1$
$IC1 = 1$	$IC2 = 3$	$M = 5$			

(d) Governor

The following are the data for the **WEHGOV** models used in the analysis.

Kipling G3, Harmon G3, Smoky Falls G1,G2,G3

$R_{GATE} = 0.04$	$R_{PE} = 0.0$	$T_{PE} = 1.0$	$K_P = 2.0$	$K_I = 1.0$	$K_D = 0.2$
$T_D = 0.05$	$T_P = 0.2$	$T_{DV} = 0.2$	$T_G = 0.25$	$GT_{MXOP} = 0.05$	$GT_{MXCL} = -0.05$
$G_{MAX} = 1.0$	$G_{MIN} = 0.0$	$D_{TURB} = 0.0$	$T_W = 1.0$	$D_{BAND} = 0.0$	$D_{PV} = 0.0$
$D_{ICM} = 0.04$	$G_1 = 0.0$	$G_2 = 0.25$	$G_3 = 0.5$	$G_4 = 0.75$	$G_5 = 1.0$
$FG_1 = 0.00$	$FG_2 = 0.25$	$FG_3 = 0.5$	$FG_4 = 0.75$	$FG_5 = 1.0$	$FP_1 = 0.0$
$FP_2 = 0.2$	$FP_3 = 0.3$	$FP_4 = 0.4$	$FP_5 = 0.5$	$FP_6 = 0.6$	$FP_7 = 0.7$
$FP_8 = 0.8$	$FP_9 = 0.9$	$FP_{10} = 1.0$	$P_1 = 0.0$	$P_2 = 0.0$	$P_3 = 0.25$
$P_4 = 0.50$	$P_5 = 0.75$	$P_6 = 0.83$	$P_7 = 0.86$	$P_8 = 0.88$	$P_9 = 0.9$
$P_{10} = 0.91$					

Little Long G3

$R_{GATE} = 0.04$	$R_{PE} = 0.0$	$T_{PE} = 1.0$	$K_P = 2.0$	$K_I = 1.0$	$K_D = 0.2$
$T_D = 0.05$	$T_P = 0.2$	$T_{DV} = 0.2$	$T_G = 0.25$	$GT_{MXOP} = 0.05$	$GT_{MXCL} = -0.05$
$G_{MAX} = 1.0$	$G_{MIN} = 0.0$	$D_{TURB} = 0.0$	$T_W = 1.5$	$D_{BAND} = 0.0$	$D_{PV} = 0.0$
$D_{ICM} = 0.04$	$G_1 = 0.0$	$G_2 = 0.25$	$G_3 = 0.5$	$G_4 = 0.75$	$G_5 = 1.0$
$FG_1 = 0.00$	$FG_2 = 0.25$	$FG_3 = 0.5$	$FG_4 = 0.75$	$FG_5 = 1.0$	$FP_1 = 0.0$
$FP_2 = 0.2$	$FP_3 = 0.3$	$FP_4 = 0.4$	$FP_5 = 0.5$	$FP_6 = 0.6$	$FP_7 = 0.7$
$FP_8 = 0.8$	$FP_9 = 0.9$	$FP_{10} = 1.0$	$P_1 = 0.0$	$P_2 = 0.0$	$P_3 = 0.25$
$P_4 = 0.50$	$P_5 = 0.75$	$P_6 = 0.83$	$P_7 = 0.86$	$P_8 = 0.88$	$P_9 = 0.9$
$P_{10} = 0.91$					

(e) Thermal Capacity

The following ratings were obtained from official Hydro One network web site. The lower of the sag temperature or 93 °C has been used to calculate the continuous rating.

Circuit	Wind km/hr	Max Operating Temp	Ambient Temp.	Conductor size (kcmil), Strands, CPB	Continuous Rating
L20D	4	<u>93 °C</u> , 127 °C	30 °C	1277.5, 42/7, 1	1140 A
H22D	4	<u>93 °C</u> , 120 °C	30 °C	1277.5, 42/7, 1	1140 A
X503E	4	93 °C, <u>79 °C</u>	30 °C	495.0, 22/7, 4	2270 A
X504E	4	93 °C, <u>73 °C</u>	30 °C	495.0, 22/7, 4	2080 A
D5H	4	<u>93 °C</u> , 100 °C	30 °C	795.0, 26/7, 1	850 A
Pinard T1 (ONAN,ODAF,ODAF)					450,600,750 MVA
Pinard T2 (ONAN,OFAF,OFAF)					450,600,750 MVA

- CPB is conductors per bundle.
- For L20D and H22D, 15-min-LTR is 1260 A and 5-min-LTR is 1680 A with 75% pre-flow.
- For X503E and X504E, the lowest section rating is given.

(g) Line Impedance

The impedances per unit length for the new extensions to be built from Harmon GS to Kipling GS, and from L20D/H22D to Smoky Falls GS are assumed the same as for the existing conductors L20D/H22D.

(f) Generator step-up transformers

The following data for the new step-up transformers was provided by OPG:

Station	Transformer Data			
	Voltage	Rating	Impedance	In-Service Tap
Harmon GS	255/13.8 kV	60/80/100 MVA	0.13 pu on 100 MVA	240 kV
Kipling GS				
Smoky Falls GS				
Little Long GS				

- End of Section -

4. System Impact Studies

4.1 Assumptions

The following are the default assumptions unless specified.

- (1) All transmission elements are in service.
- (2) The 2008 summer base case is used. Then, Lower Mattagami development is incorporated to result in the following conditions. A Flow South of 2255 MW translates into an operating limit of $2255/1.1 = 2050$ MW.

Ontario Primary Demand	Northeast Load	Northeast Generation
28,325 MW	1150 MW	3393 MW

Flow South	East-West Flow East	Mississagi Flow East	Flow into Hanmer on P502X	Flow into Porcupine on D501P
2255 MW	318 MW	760 MW	1374 MW	1209 MW

To test the Flow South interface at 2255 MW, the existing Mississagi East transfer limit of 550 MW had to be exceeded. This is due to the lack of sufficient generation East of Sudbury to achieve a Flow South of 2255 MW. With Aubrey and Wells units in-service and with the reactive compensation devices as outlined in (4), the existing limit of 550 MW for Mississagi East is expected to be revised to a higher value. As such, the studies performed in this SIA used a Mississagi East transfer of 760 MW. This value was selected as it represents a good estimate of what the Mississagi East limit will become once the reactive devices outlined in (4) come into service. All studies used a generator Vsched of 1.01 pu for Lower Mattagami units, while the SVCs at Kirkland Lake and Porcupine had a Vsched of 1.105 pu.

- (3) All newly installed generators have the capability to operate from 0.9 lag to 0.95 lead power factor. The reactive power capability used in the analysis for each new generator in the Lower Mattagami re-development is given below which are calculated based on the above power factors.

Generator ID	Max. Cont Rating	MVA Rating	Max. reactive power generation	Max. reactive power absorption
Kipling G3	79 MW	87 MVA	37.9 Mvar	25.7 Mvar
Little Long G3	70 MW	87 MVA	33.9 Mvar	23 Mvar
Harmon G3	78 MW	87 MVA	37.8 Mvar	25.7 Mvar
Smoky Falls G1,G2,G3	88 MW	98 MVA	42.6 Mvar	29 Mvar

Table 1: Lower Mattagami Generator Reactive Power Requirements

Newly installed generators at Lower Mattagami must have the reactive capabilities as shown above.

- (4) The following are in service and included in the system model:
- (a) Series capacitors at Nobel SS to provide 50 % compensation to X503E and X504E
 - (b) SVC at Porcupine 230 kV bus (+300/-100 Mvar)
 - (c) SVC at Kirkland Lake 115 kV bus (+200/-100 Mvar)
 - (d) Shunt Capacitor Banks at Pinard 27.6 kV bus (2 x 32.4 MVar @ 27.6 kV)
 - (e) Second Shunt Capacitor Bank at Hanmer 230 kV bus (149 MVar @ 220 kV)
 - (f) Second Shunt Capacitor Bank at Essa 230 kV bus (245 MVar @ 250 kV)
 - (g) Shunt Capacitor Banks at Porcupine 230 kV bus (2 x 100 MVar @ 250 kV)
 - (h) Shunt Capacitor Bank at Kapuskasing 24.9 kV bus (21.6 MVar @ 28.8 kV)
- (5) The following reactors have been removed from service to help maximize power transfers:
- (a) Pinard Reactors R1 and R2
 - (b) Hanmer Reactors R1, R2, R6, R7, R8 and R9
 - (c) Essa Reactors R3 and R4

4.2 Compensation for Reactive Power Losses

With the addition/expansion of Lower Mattagami generation, the flow of current would increase. As a result, the reactive power losses would increase, and this must be compensated. This reactive compensation will be provided in part by several new shunt capacitor banks to be installed by Hydro One at various stations across Northern Ontario. Details regarding these shunt capacitor installations are provided below. The SIA to study the impact of these shunt capacitors on system reliability has been completed in another SIA report and can be found using the following link: http://www.ieso.ca/imoweb/pubs/caa/caa_SIAReport_2008_352.pdf

	Station	Size
1	Kapuskasing TS	1 x 21.6 MVar @ 28.8 kV
2	Essa TS	1 x 245 MVar @ 250 kV
3	Pinard TS	2 x 32.4 MVar @ 27.6 kV
4	Hanmer TS	1 x 149 MVar @ 220 kV
5	Porcupine TS	2 x 100 MVar @ 250 kV

4.3 Thermal Loading

The following is the summary of pre-contingency loading of equipment.

Circuit	Loadability
H22D (section from Little Long to Pinard)	1131/1140 = 0.99
L20D (section from Little Long to L21S)	1134/1140 = 0.99
Pinard T1, T2	618/750 = 0.82
X503E	1079/2270 = 0.48
X504E	1081/2080 = 0.52
D5H	749/850 = 0.88

Loadability = Current Flow/Cont. Amp Rating for circuits or MVA/maximum MVA rating for transformers.

The steady-state loadings for circuits H22D and L20D are only marginally below their thermal capability. Changes to the assumptions made in this report may cause slight thermal overloading of the H22D and L20D circuits. All other steady-state loadings for the equipments mentioned are below their continuous ratings.

4.4 Post-Contingency Voltage

Voltage studies were conducted to analyze the post contingency pre-ULTC and post-ULTC voltages and changes at various buses for selected contingencies.

The following maximum voltage levels are observed:

	230 kV	500 kV
Post-contingency	250 kV	550 kV

To ensure that voltages did not exceed the maximum levels, the following capacitors/reactors were tripped/switched in along with appropriate generation rejection, load rejection and circuit cross tripping:

Loss of D501P (VC1): Trip 2 x 149 MVar Cap at Hanmer

Loss of P502X (VC2): Trip 1 x 149 MVar Cap at Hanmer

Loss of H22D (VC4): Trip 2 x 149 MVar Cap at Hanmer + Trip 2x 32.4 MVar Cap at Pinard +

Trip 2 x 100 MVar Cap at Porcupine +

Switch in 2 x 50 MVar Reactor at Pinard

Loss of L20D (VC5): Trip 2 x 149 MVar Cap at Hanmer + Trip 2x 32.4 MVar Cap at Pinard +

Trip 2 x 100 MVar Cap at Porcupine + Trip 1x 21.6 MVar Cap at Kapuskasing

+ Switch in 2 x 50 MVar Reactor at Pinard

Loss of L21S (VC6): Trip 1x 21.6 MVar Cap at Kapuskasing

Loss of R21D (VC7): Trip 1x 149 MVar Cap at Hanmer

Study results are provided below:

Note: Positive voltage changes represent voltage rises and negative voltage changes represent voltage declines. Loads have been converted into voltage dependent models for pre-ULTC simulations and left at constant MVA models for post-ULTC simulations.

Bus	Pre-Cont	VC1-D501P ¹				VC2-P502X ²				VC3-X503E			
	kV	Pre ultc		Post ultc		Pre ultc		Post ultc		Pre ultc		Post ultc	
		kV	%	kV	%	kV	%	kV	%	kV	%	kV	%
500 kV Bus													
Pinard	535.7	-	-	-	-	-	-	-	-	528.8	-1.3	527.1	-1.6
Porcupine	531.3	546.4	2.8	549.5	3.4	532.6	0.2	534.0	0.5	520.6	-2.0	518.1	-2.5
Hanmer	543.8	546.3	0.5	547.1	0.6	545.2	0.3	542.8	-0.2	519.8	-4.4	514.3	-5.4
Essa	533.1	538.0	0.9	538.5	1.0	538.0	0.9	536.2	0.6	515.8	-3.2	511.0	-4.1
230 kV Bus													
Pinard	234.9	-	-	-	-	-	-	-	-	232.9	-0.8	232.4	-1.1
Porcupine	243.1	243.1	0.0	244.3	0.5	243.1	0.0	243.1	0.0	243.1	0.0	243.1	0.0
Hanmer	246.4	241.3	-2.1	241.5	-2.0	242.8	-1.5	241.5	-2.0	237.2	-3.7	234.5	-4.8
Essa	247.4	249.0	0.7	249.3	0.8	248.9	0.6	248.1	0.3	240.8	-2.7	238.1	-3.8
Kapuskasing	246.2	-	-	-	-	-	-	-	-	245.5	-0.3	245.4	-0.3
Spruce Falls	246.2	-	-	-	-	-	-	-	-	245.6	-0.2	245.5	-0.3

Notes:

(1) Total G/R = 1350 MW

Cross tripping of L21S and K38S.

Post-Flow on H9K = 58.3 MW into Hunta.

(2) Total G/R = 1550 MW

Cross tripping of circuits L21S, K38S, D501P.

Post-Flow on H9K = 59.8 MW into Hunta. Post-Flow on A9K+A8K = 7.0 MW into Ansonville

Bus	Pre-Cont kV	VC4-H22D				VC5-L20D ³				VC6-L21S ⁴			
		Pre ultc		Post ultc		Pre ultc		Post ultc		Pre ultc		Post ultc	
		kV	%	kV	%	kV	%	kV	%	kV	%	kV	%
500 kV Bus													
Pinard	535.7	545.0	1.7	548.8	2.4	543.0	1.4	546.9	2.1	533.0	-0.5	533.0	-0.5
Porcupine	531.3	542.2	2.1	548.1	3.2	541.4	1.9	547.4	3.0	529.9	-0.3	529.9	-0.3
Hanmer	543.8	540.0	-0.7	541.2	-0.5	539.8	-0.7	540.9	-0.5	543.1	-0.1	543.1	-0.1
Essa	533.1	533.1	0.0	533.1	0.0	533.1	0.0	533.0	0.0	532.7	-0.1	532.6	-0.1
230 kV Bus													
Pinard	234.9	236.4	0.6	237.5	1.1	235.3	0.1	236.5	0.7	233.7	-0.5	233.7	-0.5
Porcupine	243.1	243.1	0.0	243.1	0.0	243.1	0.0	243.1	0.0	243.1	0.0	243.1	0.0
Hanmer	246.4	239.5	-2.8	239.9	-2.7	239.4	-2.8	239.7	-2.7	246.2	-0.1	246.1	-0.1
Essa	247.4	247.5	0.0	247.1	-0.1	247.3	0.0	247.0	-0.2	247.3	0.0	247.2	0.0
Kapuskasing	246.2	246.2	0.0	246.3	0.0	252.4	2.5	251.7	2.2	246.2	0.0	245.9	-0.1
Spruce Falls	246.2	246.3	0.0	246.3	0.0	252.4	2.5	251.7	2.2	246.3	0.0	246.0	-0.1

Notes:

(3) Post-Flow on H9K = 39.2 MW into Hunta & on Spruce Falls T7= 22.1 MW north (115 kV to 230 kV)

Cross Tripping of circuit L21S

(4) Post-Flow on H9K = 38.7 MW into Hunta & on Spruce Falls T7= 22.1 MW north (115 kV to 230 kV)

Bus	Pre-Cont kV	VC7-R21D			
		Pre ultc		Post ultc	
		kV	%	kV	%
500 kV Bus					
Pinard	535.7	544.2	1.6	545.3	1.8
Porcupine	531.3	541.9	2.0	543.4	2.3
Hanmer	543.8	545.7	0.3	545.9	0.4
Essa	533.1	535.2	0.4	535.0	0.4
230 kV Bus					
Pinard	234.9	236.6	0.7	236.9	0.9
Porcupine	243.1	243.1	0.0	243.1	0.0
Hanmer	246.4	244.4	-0.8	244.4	-0.8
Essa	247.4	248.1	0.3	247.9	0.2
Kapuskasing	246.2	246.4	0.1	246.3	0.0
Spruce Falls	246.2	246.5	0.1	246.4	0.0

In general, most studied steady state contingencies show voltage rises. This is due to the large amount of generation rejection or generation being lost by configuration, which results in lower power flows and thus lower system losses. In order to maintain voltages below 250 kV and 550 kV for 230 kV and 500 kV buses respectively, different capacitors were tripped and for some contingencies, the existing reactors at Pinard were switched in to help lower voltages.

The slight overvoltages seen at Kapuskasing and Spruce Falls can be mitigated by tripping the L21S/K38S circuit for the loss of the L20D circuit.

The switching of all newly installed capacitors at Hanmer, Porcupine, Pinard and Kapuskasing can be implemented using an automatic voltage based switching scheme.

All capacitor switching schemes must be coordinated with each other and with the existing reactor switching scheme at Pinard. All switching schemes must be designed with appropriate time delays and voltage thresholds which ensure that all capacitor and reactor switching is completed prior to post-contingency transformer ULTC operation.

The existing reactor switching scheme at Pinard will likely require modification to its voltage thresholds and time delay settings.

If proper coordination between all switching schemes is not possible or time delays encroach on the ULTC operation timeframes, Hydro One will need to add the tripping of the capacitors at Hanmer, Porcupine, Pinard and Kapuskasing for various contingencies as additional selections to the existing Moose River and Northeast 115 kV SPS.

4.5 Transient Stability

Transient stability simulations were performed for following contingencies.

ID	Contingency (3ph fault)	Fault clearance		G/R		Circuit Cross Tripping	
		Local	Remote	Moose	NUG	L21S/K38S	D501P
TC1	X503E@X	66 ms	91 ms	-	-	-	-
TC2	D501P@P	66 ms	108 ms	180 ms	230 ms	180 ms	-
TC3	P502X@X	66 ms	91 ms	180 ms	230 ms	180 ms	@P = 91 ms, @D = 120 ms

Tripping of the appropriate capacitor banks as outlined in sections 4.4 were done 1 second after the application of the fault. Automatic tripping of capacitors are required additions to the existing Moose River and NE L/R & G/R schemes as discussed in section 4.7 of this report.

(a) X503E contingency

No generation rejection is required. The transient performance is shown in Figures 4A & 4B.

The voltage at the 500 kV bus at Porcupine remains below 80% of the nominal threshold for 370 ms. This would be in excess of the 250 ms permitted under the IESO criteria. Since there is no load connected to the Porcupine 500 kV bus, this does not represent a significant concern. The marginal violation in the time that the voltage remains below the 80% threshold capability could be addressed through the provision of a short-term overload capability for the Porcupine SVC or through a very small reduction (<10MW) in the Flow-South transfer.

While the Flow-South interface was capable of transferring 2255 MW without generation rejection for this contingency, changes to any of the assumptions made in this study can result in generator instability at Lower Mattagami and/or unacceptable voltage performance at Porcupine. In particular, extensive

simulations conducted with higher power flows into Hanmer on the P502X circuit and into Porcupine on the D501P circuit or with lower pre-contingency voltages than the values used in this study would require more pre-contingency MVar support to maintain transient stability and acceptable voltage performance with no generation rejection.

(b) D501P contingency

With the 500 kV circuit D501P lost, the net generation from Moose River plants and units supplying circuits H9K/F1E/L21S/K38S flows into Hunta SS via H9K. This would result in transient instability as well as overloading of H9K and Spruce Falls T7. Thus, approximately 1400 MW of generation is rejected followed by the cross tripping of L21S and K38S circuits (and loads connected to those circuits) to control the voltage. The following is the list of elements rejected.

<i>Generation</i>	Harmon G1,G2, G3, Kipling G1,G2,G3, Smoky G1,G2, G3, Little Long G1,G2,G3 Kapuskaing G1,G2, Canyon G1,G4,G5, Otter Rapid G1,G2,G3,G4	Total = 1400 MW
<i>Circuits</i>	L21S, K38S	
<i>Load</i>	Kapuskaing, Spruce Falls	Total = 70 MW
<i>Capacitors</i>	2 x Hanmer	

The post-flow on H9K is 46 MW into Hunta. The transient performance is shown in Figures 5A & 5B.

(c) P502X contingency

The power system section north of Porcupine/Ansonville is connected to the rest by one 500 kV circuit P502X and two 115 kV circuits A9K and A8K. The loss of the P502X circuit results in large power flows in A8K+A9K circuits and in D3K, where the latter might possibly trip. Thus, as a response to the loss of P502X, generation is rejected to result-in post-flow on A9K+A8K below ± 40 MW along with the cross tripping of L21S, K38S (and loads connected to those circuits) and D501P circuits to control the voltage. The following is the list of elements rejected.

<i>Generation</i>	Harmon G1,G2, G3, Kipling G1,G2,G3, Smoky G1,G2,G3, Little Long G1,G2,G3 Kapuskaing G1,G2, Otter Rapid G1,G2,G3,G4, Northland Power Iroquois Falls G1,G2,G3 Canyon G1,G4,G5, Tunis NUG	Total = 1580 MW
<i>Circuits</i>	L21S, K38S, D501P	
<i>Load</i>	Kapuskaing, Spruce Falls	Total = 70 MW
<i>Capacitors</i>	1 x Hanmer	

The post-flow on A9K+A8K is 7 MW into Ansonville. The transient performance is shown in Figure 6A & 6B.

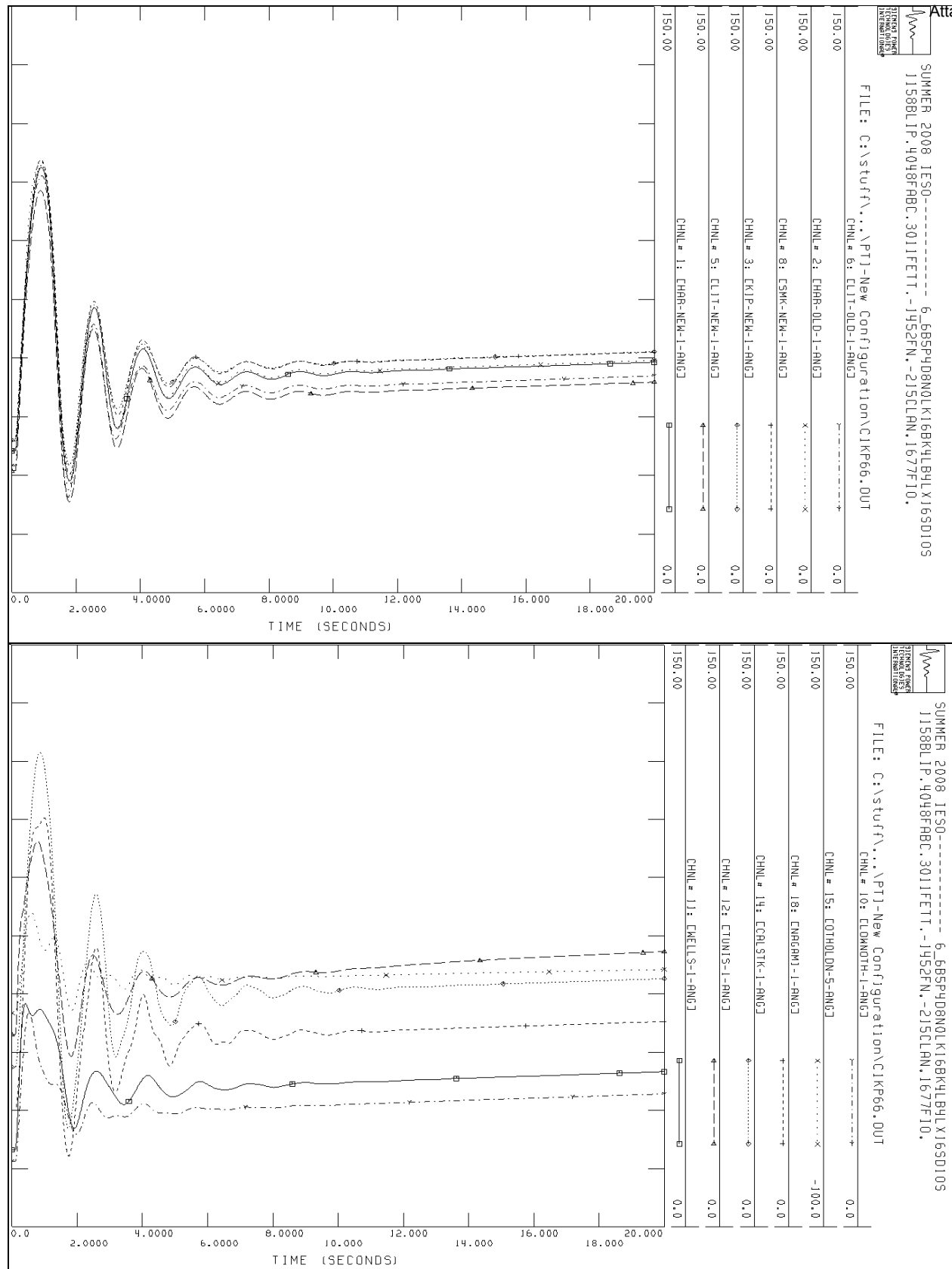


FIGURE 4A: RESPONSE TO LOSS OF X503E

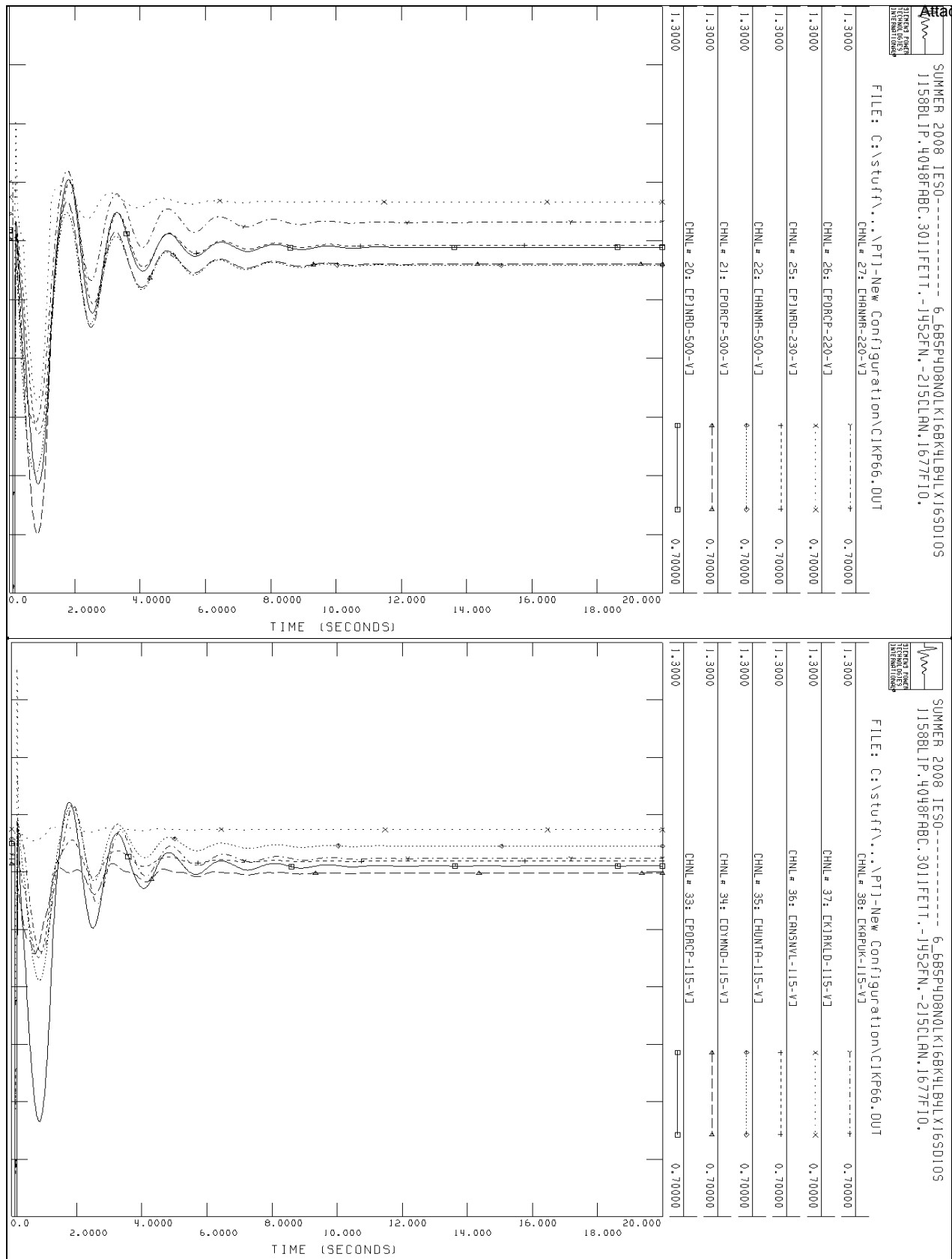


FIGURE 4B: RESPONSE TO LOSS OF X503E

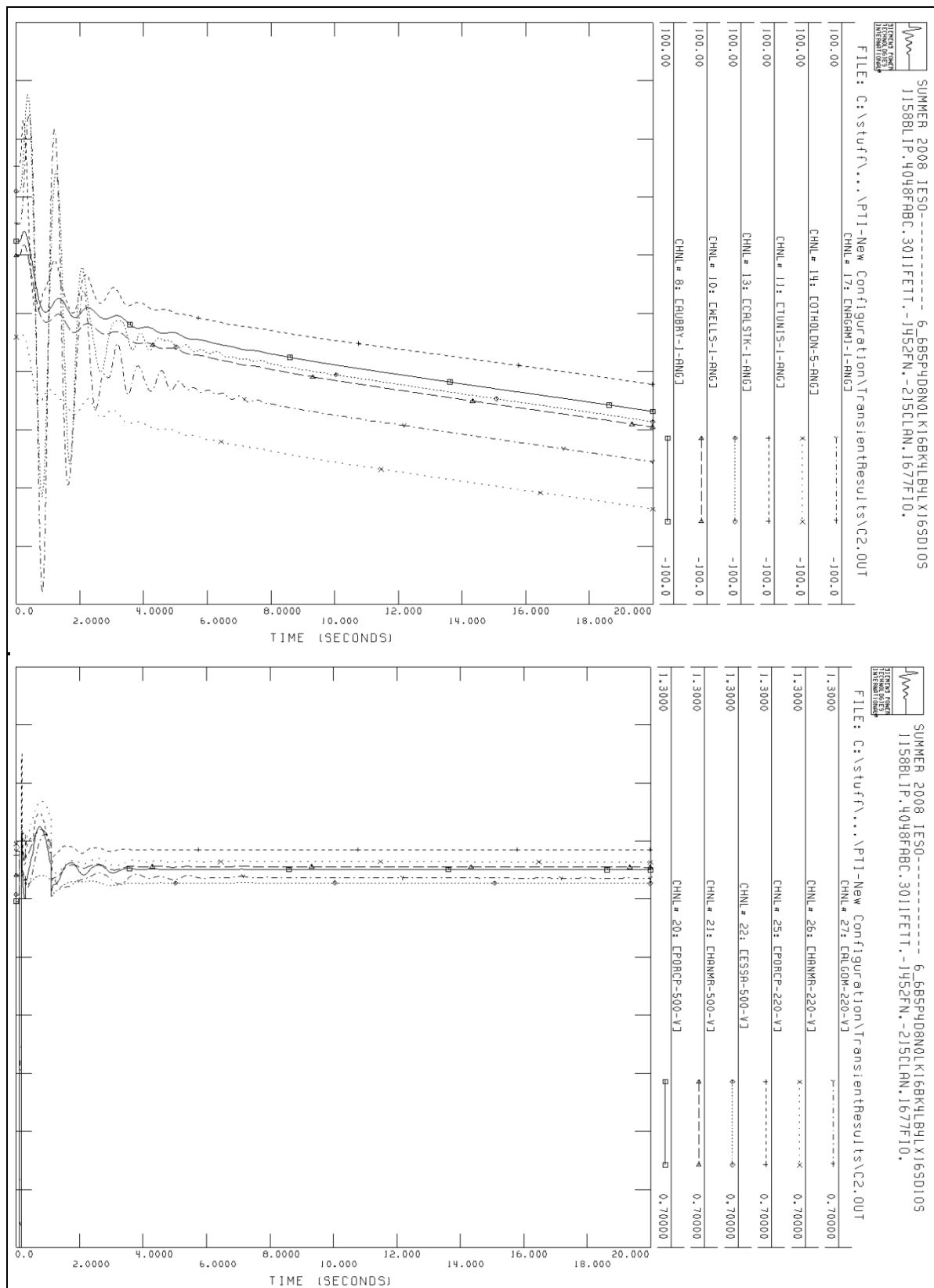


FIGURE 5A: RESPONSE TO LOSS OF D501P

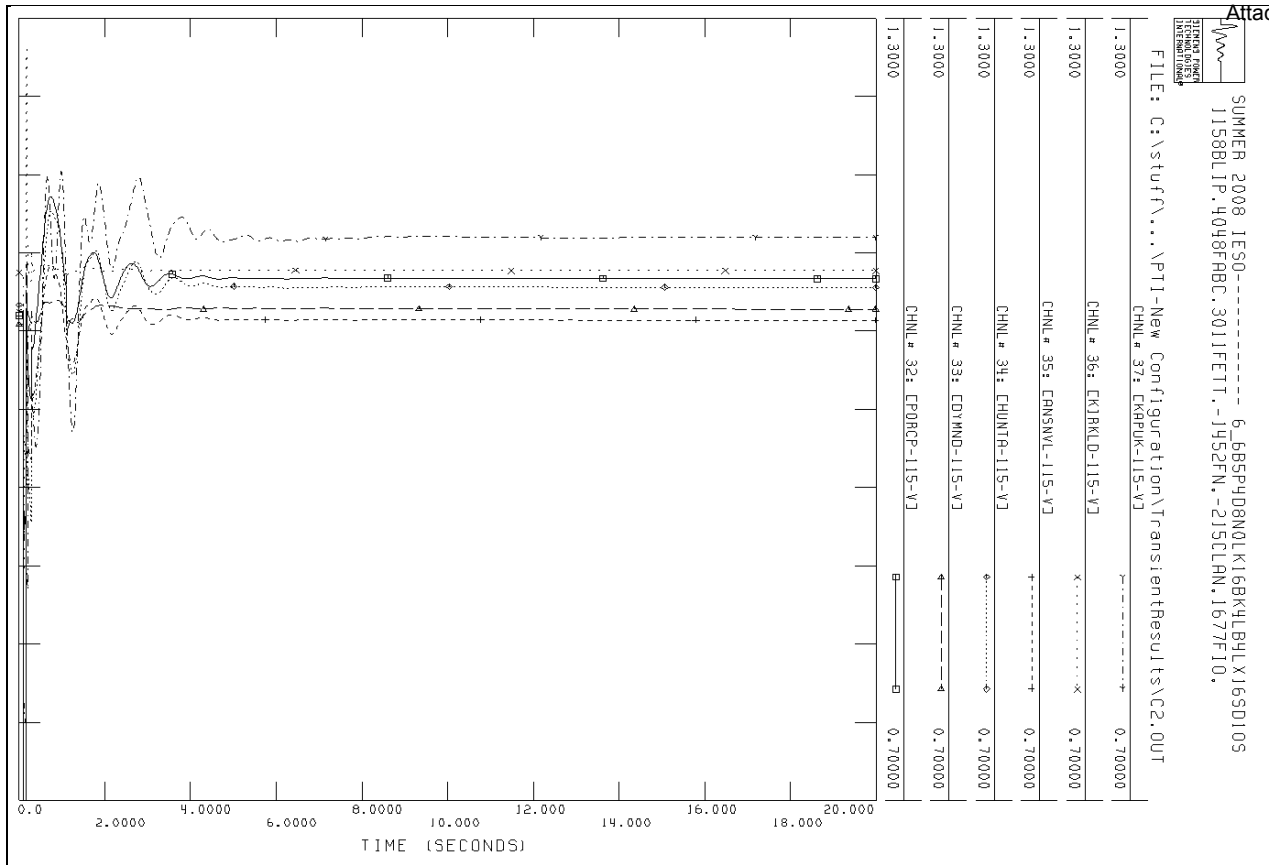


FIGURE 5B: RESPONSE TO LOSS OF D501P

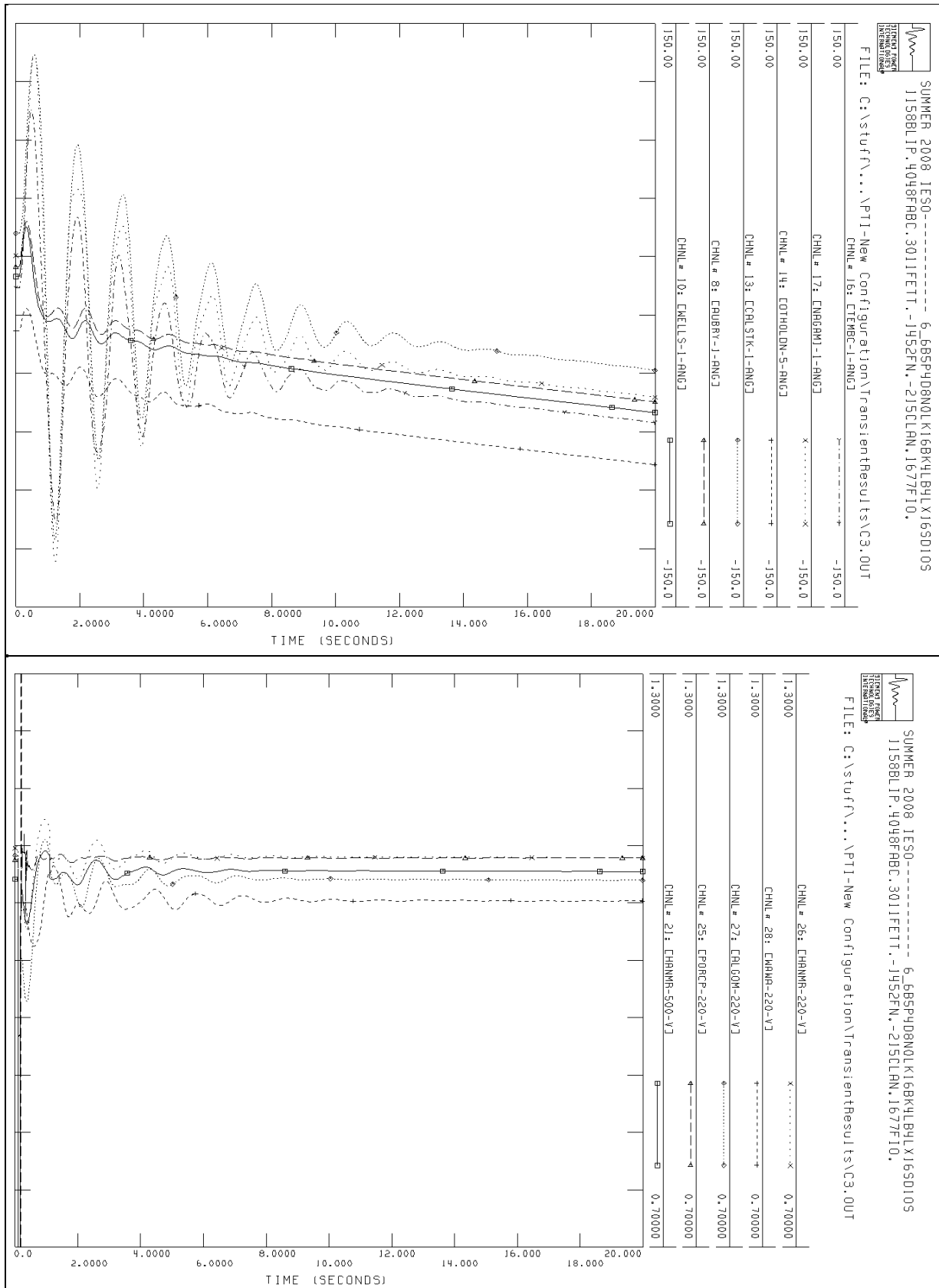


FIGURE 6A: RESPONSE TO LOSS OF P502X

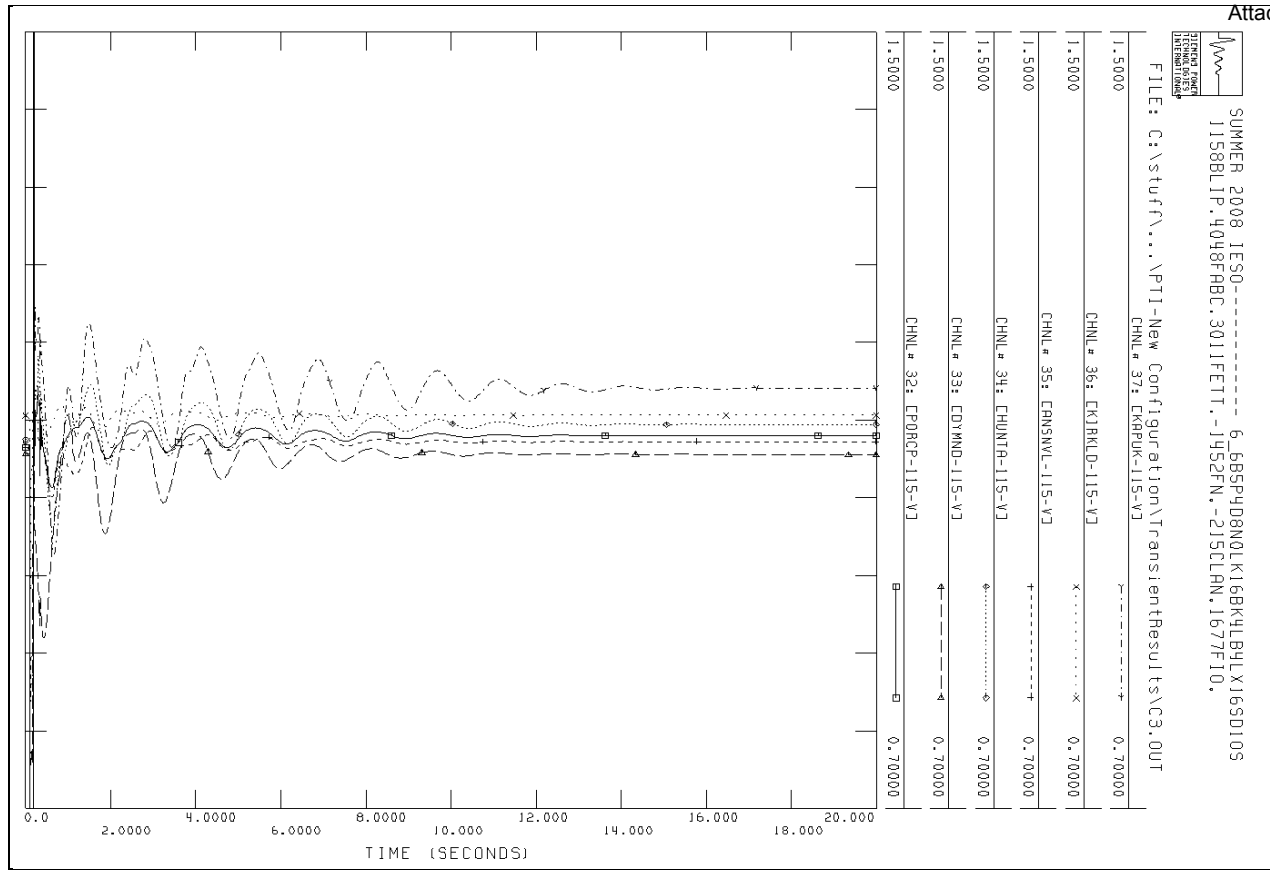


FIGURE 6B: RESPONSE TO LOSS OF P502X

4.6 Flow-South Interface

The north-eastern Ontario power system extends up to north of Sudbury and east of Wawa stretching all the way to the Quebec border. One of the key interfaces governing the operation of this section of the IESO-controlled grid is the North-South interface. The transfer across the North-South Interface is represented by the combined flow on the 230kV circuit D5H, measured at Otto Holden GS, and on the 500kV circuits X503E and X504E, measured at Essa TS. The maximum transfer capability of the Flow-South interface depends on the maintenance of transient stability of units north of North-South interface. Presently, this capability is 1300 MW with no generation rejection and 1400 MW with 100 MW of post-contingency generation rejection.

In order to accommodate all of the existing and committed generating facilities in the northeast, together with the expanded capacity at the Lower Mattagami River plants, it is required that the maximum transfer capability of the Flow-South interface be increased. The analysis done by Hydro One and the IESO has demonstrated that with the installation of the following facilities, the transfer capability of the Flow-South interface could be increased up to approximately 2050 MW pre-contingency.

- Series capacitors at Nobel SS to provide 50 % compensation to X503E and X504E
- SVC at Porcupine TS (+300/-100 Mvar)
- SVC at Kirkland Lake TS (+200/-100 Mvar)
- Northern Ontario Shunt Capacitors

The series compensation at Nobel SS, which is approximately the mid-point of X503E/X504E circuits, improves the transient stability under high Flow-South conditions by adding the effect of doubling the parallel transmission lines between Hanmer TS and Essa TS. The SVC at Porcupine and Kirkland Lake TS is mainly for the maintenance of post-contingency voltages such as for the loss of P502X. The various Northern Ontario shunt capacitors compensate system losses and provide pre-contingency voltage support.

With the increase of the Flow-South transfer up to 2050 MW, generation rejection to maintain the transient stability for various contingencies including the loss of X503E or X504E circuits will not be required with all elements in-service and under the studied system conditions, if sufficient reactive power supply is available. However, it is required to expand the northeast generation rejection scheme to include the new generators at Lower Mattagami to deal with various outage situations.

While the Flow South interface is capable of transferring 2050 MW with no generation rejection for the loss of X503E and X504E, limitations to the amount of power that can be transferred into Hanmer and Porcupine on 500 kV circuits P502X and D501P do exist. Should future generation expansion north east of Hanmer occur or load levels in this area drop, power flow through this new limit could become constrained. The expansion of the Mississagi East transfer capability provides for the opportunity to reduce the amount of flow into Hanmer and Porcupine, while still achieving a Flow South transfer of 2050 MW.

4.7 Modifications to Moose River G/R Scheme

The Moose River G/R scheme must be expanded to include all new generators at Lower Mattagami.

Moose River Basin Generation Rejection Scheme						
OUTPUT: CONTROL ACTIONS	INPUT: CONTINGENCY SIGNALS					
	P502X	D501P	X503E	X504E	X503E+X504E	E501V+E511V
	Kipling G3 - new	X	X	X	X	X
	Harmon G3 - new	X	X	X	X	X
	Little Long G3 - new	X	X	X	X	X
	Smoky Falls G1 – new	X	X	X	X	X
	Smoky Falls G2 – new	X	X	X	X	X
	Smoky Falls G3 – new	X	X	X	X	X

Figure 7: Moose River G/R Scheme Expansion

4.8 Relay Margin

It is necessary that sufficient margin is maintained between apparent impedance trajectory of relays at each terminal of un-faulted circuits and the relay characteristics during transients in order to ensure those circuits are not tripped. The IESO requires that the relay margin for 115 kV circuits to be minimum 15 percent on all instantaneous relays and zero percent on all timed relays having a time delays less than or equal to 0.4 sec.

The Figure 8 shows the relay characteristics and the apparent impedance trajectory of the 115 kV circuit D3K for the loss of P502X. The trajectory for Kirkland Lake terminal of D3K enters the zone 2 characteristics. Thus, the existing relay settings will not be acceptable. If the settings are not revised, D3K will have delayed trip which makes the portion of the power system north of Kirkland Lake and Porcupine an electrical island.

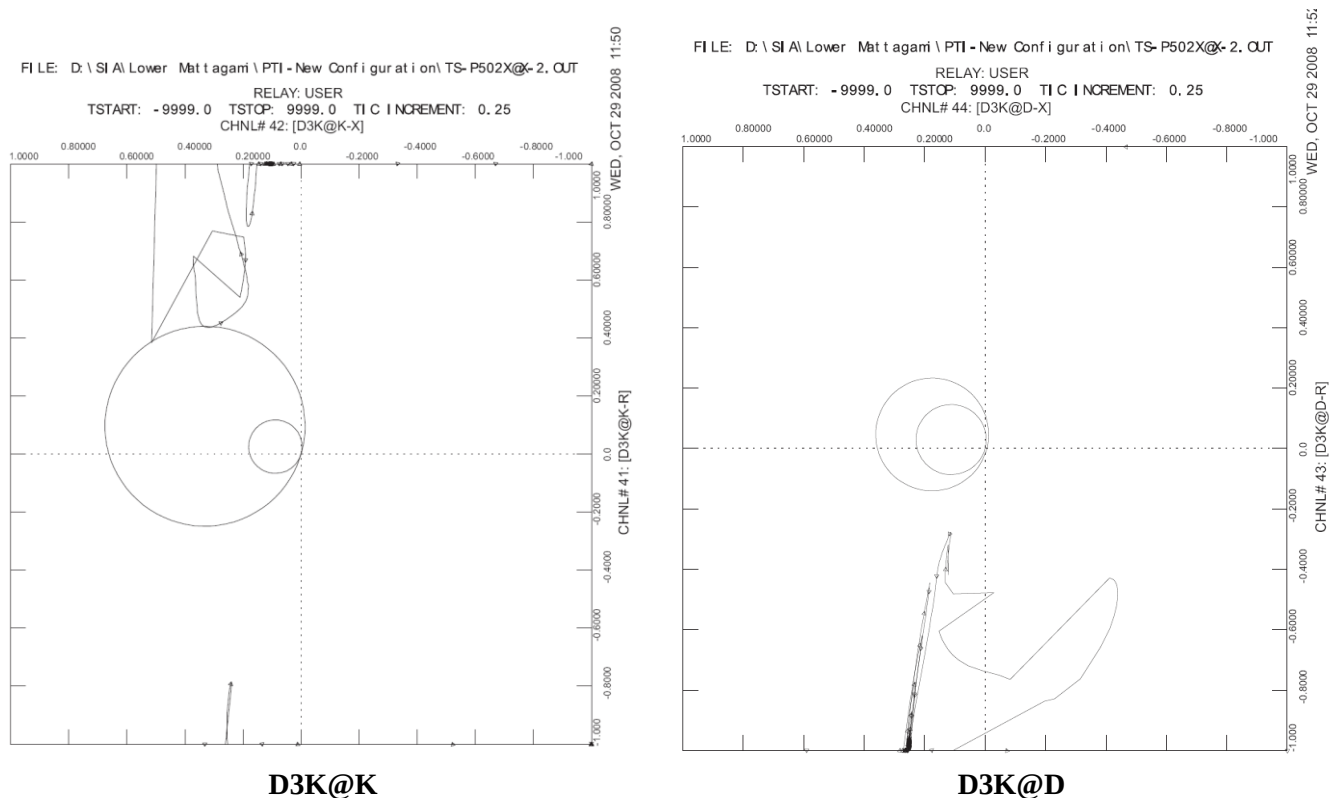


FIGURE 8 : D3K RELAY RESPONSE TO LOSS OF P502X

4.9 Excitation and Governor System Performance

The dynamic performance of the generator excitation system was simulated to check the compliance of the automatic excitation system behavior in terms of the ceiling and the speed of response to IESO standards.

- *Response Ratio Test*

The excitation system response ratio test was performed to determine the rated field voltage, $E_{fd, \text{rated}}$, and the required positive and negative ceiling targets. During this particular test, the generator produces rated MW and MVAR according to the rated power factor. The rated power factor for Kipling, Little Long, Harmon and Smoky Falls generators are 0.90. The disturbance simulated is a large change of exciter reference.

The IESO *Market Rule* requirement is to have a *positive excitation ceiling* twice the rated Efd and a *negative excitation ceiling* of -1.4 times the rated Efd. The following is the summary of results.

Generator	Power Factor	Terminal Voltage	(a) Efd Rated	Positive Ceiling	Negative Ceiling
Kipling G3	0.90	1.0 pu	1.994 pu	5.3006/(a) = 2.67	-4.51/(a) = -2.26
Little Long G3	0.90	1.0 pu	2.007 pu	5.2993/(a) = 2.64	-4.51/(a) = -2.25
Harmon G3	0.90	1.0 pu	2.006 pu	5.2994/(a) = 2.64	-4.51/(a) = -2.25
Smoky Falls G1/G2/G3	0.90	1.0 pu	2.084 pu	5.2916/(a) = 2.54	-4.51/(a) = -2.16

- *Positive Open Circuit Test*

During this particular test, the generator operates effectively in an island. The output of the generator is zero. The terminal voltage is 1.0 pu. The disturbance simulated is an increase of the exciter reference by +5 %.

The IESO *Market Rules* requirement is the *excitation response time*, i.e the time (in seconds) for the excitation voltage to attain 95% of difference between positive ceiling voltage (2 x Efd) and rated load-field voltage under the specified conditions, must be less than 50 ms. The following equation translates the above requirement to open circuit conditions starting from Efd = Efd_{OC} at t = 0.

$$RT_{OC_POS} = 50 * \frac{1.95 Efd_{rated} - Efd_{oc}}{1.95 Efd_{rated} - Efd_{rated}}$$

Therefore, using the equation above, the exciter response to the open circuit test should reach at least 1.95*Efd_{rated} within RT_{OC_pos} seconds.

The following is the summary of results.

Generator	MW, Mvar output	Efd _{oc}	Efd Required (1.95*Efd _{rated})	RT _{OC_pos} Required	Efd Simulated	RT _{OC_pos} Simulated
Kipling G3	0	1.15 pu	3.888 pu	72.3 ms	5.385 pu	< 5ms
Little Long G3	0	1.15 pu	3.913 pu	72.5 ms	5.385 pu	< 5ms
Harmon G3	0	1.15 pu	3.911 pu	72.5 ms	5.385 pu	< 5ms
Smoky Falls G1	0	1.15 pu	4.064 pu	73.6 ms	5.385 pu	< 5ms

- *Negative Open Circuit Test*

During this particular test, the generator operates effectively in an island. The output of the generator is zero. The terminal voltage is 1.0 pu. The disturbance simulated is a decrease of the exciter reference by -5 %.

The IESO *Market Rules* requirement is the *excitation response time*, i.e the time (in seconds) for the excitation voltage to attain 95% of difference between negative ceiling voltage (-1.4 x Efd) and rated load-field voltage under the specified conditions, must be less than 50 ms. The following equation translates the above requirement to open circuit conditions starting from Efd = Efd_{OC} at t = 0.

$$RT_{OC_NEG} = 50 * \frac{1.28 Efd_{rated} + Efd_{oc}}{1.28 Efd_{rated} + Efd_{rated}}$$

Therefore, using the equation above, the exciter response to the open circuit test should reach at least $1.28 * Efd_{rated}$ within RT_{oc_neg} seconds.

Generator	MW, Mvar output	Efd _{oc}	Efd Required (1.28*Efd _{rated})	RT _{oc_neg} Required	Efd Simulated	RT _{oc_neg} Simulated
Kipling G3	0	1.15 pu	-2.552 pu	40.7 ms	-4.51 pu	< 5 ms
Little Long G3	0	1.15 pu	-2.568 pu	40.6 ms	-4.51 pu	< 5 ms
Harmon G3	0	1.15 pu	-2.567 pu	40.6 ms	-4.51 pu	< 5 ms
Smoky Falls G1	0	1.15 pu	-2.668 pu	40.2 ms	-4.51 pu	< 5 ms

The above methods of finding the *Response Times* are approximations due to the operation of the generators in an island. This is a limitation of the PSS/E tool. However, since the above *Response Time* is less than 5 ms, the excitation systems would likely comply with the *Response Time* requirement if operated connected to the grid.

- *Governor Performance*

The dynamic performance of the new speed governor was simulated to check the damping of the governor and to calculate the droop. The loading of the generator was given a step-increase of 0.1 pu from an initial loading of 0.5 pu of the generator's MVA. These levels were selected to ensure that the resulting governor dynamics are not restricted by any of its limits. The test results are summarized below.

Generator	ΔP _{mech} (pu)	ΔSpeed	ΔGate	Droop = (ΔP _{mech} /ΔGate) x (ΔSpeed/ ΔP _{mech})
Kipling G3	0.1	0.0016	0.04	4%
Little Long G3	0.1	0.0016	0.04	4%
Harmon G3	0.1	0.0016	0.04	4%
Smoky Falls	0.1	0.0016	0.04	4%

The following is the summary of the compliance of generator control systems to IESO *Market Rules*.

Generator	Comply with Exciter Ceiling Requirements	Comply with Exciter Response Time Requirements	Comply with Governor Droop Requirement
Kipling G3	Yes	Yes	Yes
Little Long G3	Yes	Yes	Yes
Harmon G3	Yes	Yes	Yes
Smoky Falls G1	Yes	Yes	Yes

4.10 Short Circuit Level

The following is the summary of short circuit currents (kA) before and after Lower Mattagami Development is incorporated. The values given for Lower Mattagami GS 230 kV buses are for the greater of the L20D and H22D connection.

Bus	Before LMD				After LMD			
	Symmetrical Fault Current		Asymmetrical Fault Current		Symmetrical Fault Current		Asymmetrical Fault Current	
	3ph	LG	3ph	LG	3ph	LG	3ph	LG
Pinard 230 kV	10.96	13.86	12.70	17.34	12.97	15.99	14.79	19.84
Smoky Falls GS 230 kV	-	-	-	-	10.75	10.88	12.84	13.45
Little Long GS 230 kV	7.71	7.83	8.97	9.29	13.33	14.94	16.60	18.72
Kipling GS 230 kV	6.15	6.22	7.13	7.45	8.13	7.64	9.36	9.00
Harmon GS 230 kV	4.50	4.66	5.36	5.83	9.29	9.30	10.97	11.24
Kapuskasing 230 kV	4.96	5.20	5.98	6.43	5.46	5.58	6.49	6.81

Table 3: Short Circuit Levels

Connection equipment installed must be capable of withstanding the short circuit levels as shown above.

4.11 Real Time Monitoring

The Kipling, Harmon, Little Long and Smoky Falls generation facilities include generators that are between 20 MVA and 100 MVA. The IESO *Market Rules* defines such stations as *significant generating facilities*. The proponent must provide real-time monitoring for following quantities for each generator.

- (a) Active power generation
- (b) Reactive power generation
- (c) Terminal breaker status
- (d) Terminal voltage
- (e) AVR and PSS status

All required real-time monitored data will be identified during the IESO Market Entry Process.

4.12 References

[1] SIA Report produced by IESO titled "Installation of Series Capacitors in 500 kV circuits X503E and X504E at Nobel TS and SVCs at Porcupine TS and Kirkland Lake TS", IESO_Rep_0379, May 15, 2007.

[2] SIA Report produced by IESO titled "Northern Ontario Shunt Capacitors", IESO_Rep_0563, May 31, 2009.

- End of Report -

HYDRO ONE CUSTOMER IMPACT ASSESSMENT

1

2

3 The Hydro One Customer Impact Assessment – Lower Mattagami Generation Connection
4 Plan, issued December 20, 2010, is provided as Attachment 1.



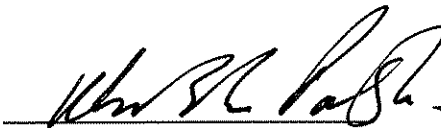
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Customer Impact Assessment
Lower Mattagami Generation Connection Plan

Revision: E
Date: December 20, 2010

Issued by: **System Investment Division**
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DISCLAIMER

This Customer Impact Assessment was prepared based on information available about the Lower Mattagami Generation Connection Plan. It is intended to highlight significant impacts, if any, to affected transmission customers early in the project development process and thus allow an opportunity for these parties to bring forward any concerns that they may have. Subsequent changes to the required modifications or the implementation plan may affect the impacts of the proposed connection identified in Customer Impact Assessment. The results of this Customer Impact Assessment are also subject to change to accommodate the requirements of the IESO and other regulatory or municipal authority requirements.

Hydro One shall not be liable to any third party which uses the results of the Customer Impact Assessment under any circumstances whatsoever for any indirect or consequential damages, loss of profit or revenues, business interruption losses, loss of contract or loss of goodwill, special damages, punitive or exemplary damages, whether any of the said liability, loss or damages arises in contract, tort or otherwise.

1.0 INTRODUCTION

1.1 Background

This Customer Impact Assessment (CIA) study assesses the potential impacts of the proposed Lower Mattagami Expansion Project on the load customers and generators in the local vicinity. This study is intended to supplement the System Impact Assessment “CAA ID 2006-239” issued March 31st, 2010 by the IESO.

Ontario Power Generation Inc (OPGI) is proposing to upgrade the existing hydroelectric generating stations in the Lower Mattagami River area. The Lower Mattagami River area is located approximately 70km north of the Town of Kapuskasing. The increase in generation for the four (4) hydroelectric generating stations is as follows in Table 1 below.

OPGI Generating Station	Existing		Proposed		Approximate Increase in Generation
	Output Per Unit	Total Output	Output Per Unit	Total Output	
Little Long SS	2 Units @ 68 MW	136 MW	3 Units @ 70 MW	210 MW	74 MW
Kipling GS	2 Units @ 79 MW	158 MW	3 Units @ 79 MW	237 MW	79 MW
Harmon GS	2 Units @ 70 MW	140 MW	3 Units @ 78 MW	234 MW	94 MW
Smoky Falls GS	4 Units @ 13 MW	52 MW	3 Units @ 88 MW	264 MW	212 MW
Total Increase in Area					~459 MW

Table 1: OPGI Proposed Generation Increases in Lower Mattagami Area

These upgrades will result in a net generation increase of approximately 459 MW.

To accommodate these upgrades, transmission facilities in the Lower Mattagami Area require upgrades and modifications.

1.2 Lower Mattagami Area Transmission System Upgrades

1.2.1 230kV Transmission Line Work

New 230 kV line from Smoky Falls GS to H22D/L20D

Smoky Falls GS currently connects to the 115kV system via circuits S3S/S4S. As part of OPGI's generation station upgrades, Smoky Falls has proposed to connect to the 230kV transmission system. This will be accomplished by constructing approximately 5km of new 230kV line from Smoky Falls GS to connect to H22D and L20D. S3S/S4S will become idle circuits.

H22D Circuit Extension

The 230 kV circuit H22D will be extended from the Harmon GS to the Kipling GS (approximately 4 km) where it will be used as one of the tap points for the upgraded Kipling GS.

Tap Points for H22D/L20D Connections

The Kipling GS, Harmon GS, Smoky Falls GS, and the Little Long GS will terminate/re-terminate to H22D and L20D via tap points.

1.2.2 Additional Connection Work

115kV Circuit Upgrading

The 115 kV circuits H6T and H7T between La Forest Junction and Timmins TS will be upgraded. The NE Load & Generation Rejection Scheme will be modified. The Under-Frequency Load-Shedding Scheme will be modified.

1.3 Customer Connections

The purpose of this CIA is to assess the potential impacts on the existing transmission connected customer(s) in the vicinity of the Mattagami generation expansion. The primary focus of this study was on customers supplied by stations connected to the 230 kV, 115 kV systems between Kapuskasing TS and Hunta TS. The following load connected transmission station buses were monitored:

- Kapuskasing
- O'Brien
- Calstock DS
- Nagagami CGS
- Nagagami SS
- Epcor Calstock
- Tembec Spruce Falls
- Carmichael Falls
- Fauquier DS
- Tembec Smooth Rock
- Smooth Rock DS

2.0 METHODOLOGY & CRITERIA

2.1 Planning Criteria

To establish the adequacy of Hydro One transmission system incorporating the proposed additional generation facilities, the following post-fault voltage decline criteria were applied as per “IESO Transmission Assessment Criteria”:

http://www.theimo.com/imoweb/pubs/marketAdmin/IMO_REQ_0041_TransmissionAssessmentCriteria.pdf

- The loss of a single transmission circuit should not result in a voltage decline greater than 10% for pre-transformer tap-changer action (including station loads) and 10% post-transformer tap-changer action (5% for station loads);
- The loss of a double transmission circuit should not result in a voltage decline greater than 10% for pre-transformer tap-changer action (including station loads) and 10% post-transformer tap-changer action (5% for station loads);
- Voltages below 50 kV shall be maintained in accordance with CSA 235.

2.2 Study Assumptions

The following proposed modifications are modeled at maximum capacity and used for power flow analysis:

- Little Long GS upgraded to a maximum capacity of 235 MW and connects to both H22D and L20D
- Smoky Falls GS upgraded to a maximum capacity of 265 MW and connects to both H22D and L20D
- Harmon GS upgraded to a maximum capacity of 235 MW and connects to both H22D and L20D
- Kipling GS upgraded to a maximum capacity of 235 MW and connects to both H22D and L20D
- All loads modeled as constant MVA loads
- 300MV/-100MVar SVC on 230 kV Porcupine TS bus in-service
- Series capacitors between Hanmer TS and Essa TS in-service
- 21.6 MVar capacitor bank at 27.6 kV Kapuskasing TS bus in-service
- 2 X 32.4 MVar capacitor banks at 27.6 kV Pinard TS bus in-service
- 149 MVar capacitor bank at 230 kV Hanmer TS bus in-service
- 2 X 100 MVar capacitor banks at 230 kV Porcupine TS bus in-service
- 245 MVar capacitor bank at 230 kV Essa TS bus in-service
- Tembec Spruce Falls Load is approximately 100MW
- Northeastern GR/LR/Cross-Tripping Special Protection Scheme enabled

2.3 Power System Analysis

Power system analysis is an integral part of the transmission and distribution planning process. It is used by Hydro One to evaluate the capability of the existing network to deliver power and energy from generating stations to provide a reliable supply to customers.

- Short-Circuit Studies: Short circuit studies are used to determine the impact of the new facilities to customers at their points of connection to Hydro One.
- Load Flow Studies: The PTI PSS/E AC load flow program was used to set up detailed base cases.

3.0 ASSESSMENT OF HYDRO ONE NETWORKS SHORT CIRCUIT LEVELS AT CUSTOMER CONNECTION

Short circuit studies were carried out to assess the fault contribution of the new Lower Mattagami Generation connection project. The study area encompasses the Smoky Falls SS and Kapuskasing TS surrounding regions. The following assumptions are made from:

- Base case assumes existing and committed generating facilities in-service.

- Pre-fault voltage of 250.00 kV at 220 kV stations is assumed.
- Pre-fault voltage of 127.0 0kV at 115 kV stations is assumed.

The study results are summarized in Table 2 below showing both symmetric and asymmetric (3-cycle) fault levels. The study also assumes maximum contribution from the addition of the Lower Mattagami Generation connection from the present Hydro One system arrangement.

	Pre-Fault Voltage Level	Existing			
		Symmetrical (kA)		Asymmetrical (kA)	
		3Ph Fault	LG Fault	3Ph Fault	LG Fault
Kapuskasing Jct	250kV	5.131	5.327	6.160	6.563
O'Brien Jct	250kV	5.145	5.477	6.247	6.901
Calstock DS Jct	127kV	1.594	1.408	1.692	1.483
Nagagami CGS	127kV	1.305	1.317	1.452	1.531
Nagagami SS	127kV	2.096	1.842	2.218	1.925
Epcor Calstock Jct	127kV	2.096	1.843	2.218	1.926
Tembec Spruce Falls Jct	127kV	5.446	5.698	6.189	6.312
Carmichael Fals Jct	127kV	4.154	2.733	4.158	2.735
Fauquier DS Jct	127kV	4.161	2.699	4.166	2.701
Tembec Smooth Rock Jct	127kV	5.230	2.986	5.236	2.990
Smooth Rock DS Jct	127kV	5.060	2.954	5.066	2.957
Kapuskasing EZ Bus	24.9kV	12.603	9.363	16.273	13.026

	Pre-Fault Voltage Level	with Lower Mattagami Expansion			
		Symmetrical (kA)		Asymmetrical (kA)	
		3Ph Fault	LG Fault	3Ph Fault	LG Fault
Kapuskasing Jct	250kV	5.13	5.34	6.16	6.57
O'Brien Jct	250kV	5.13	5.48	6.23	6.9
Calstock DS Jct	127kV	1.57	1.4	1.67	1.47
Nagagami CGS	127kV	1.29	1.31	1.44	1.52
Nagagami SS	127kV	2.06	1.82	2.18	1.9
Epcor Calstock Jct	127kV	2.06	1.82	2.18	1.91
Tembec Spruce Falls Jct	127kV	4.99	5.36	5.74	5.98
Carmichael Fals Jct	127kV	4.29	2.77	4.3	2.77
Fauquier DS Jct	127kV	4.3	2.73	4.31	2.74
Tembec Smooth Rock Jct	127kV	5.53	3.05	5.61	3.09
Smooth Rock DS Jct	127kV	5.29	3	5.31	3.03
Kapuskasing EZ Bus	24.9kV	12.61	11.26	16.27	15.42

Table 2

These results show that existing fault levels meet the maximum symmetrical three-phase and single line-to-ground faults (kA) of 230 kV, 115 kV, and 27.6 kV for all equipment connected to Hydro One transmission system. The requirements are set out in 'Appendix 2' of the *Transmission System Code* (TSC) and summarized below.

- The maximum symmetrical three-phase and single line-to-ground faults given in the TSC may be summarized as follows:

Nominal Voltage (kV)	Max. 3-Phase Fault (kA)	Max. SLG Fault (kA)
230	63	80
115	50	50
44	20	19
27.6	17	12
13.8 and under	21	10

Table 2 also shows that there is very limited increase in short circuit level at other locations. Although the Kapuskasing LV EZ bus shows the single line-ground fault nearing the TSC threshold, Hydro One is aware

of the situation and will continue monitoring for any new future projects in the area which may impact the single line to ground fault level. Overall, the increased short circuit level is significantly below the TSC limit and the existing equipment rating.

4.0 ASSESSMENT OF HYDRO ONE NETWORKS VOLTAGE PERFORMANCE AT CUSTOMER CONNECTIONS

Load flow studies were carried out for the incorporation of the Lower Mattagami Generation Connection Plan. The studies reviewed performance on the local 230 kV and 115kV system and customer stations in the vicinity. The area under study encompasses stations connected to North Eastern Ontario grid (lines D501P, L20D, H22D, K38S, and H9K).

This section compares present day conditions (2008) with the addition of the Lower Mattagami Expansion. Also, this section will analyze how specific circuit contingencies impacted the voltage performance on key buses in the area. The impact was assessed using post-contingency load flows. Key 500 kV/230 kV/115 kV buses were monitored as well as customer buses represented as load buses that are connected to any of the aforementioned circuits.

The IESO has included the need to modify the existing Northeast G/R to include the new generators associated with the Lower Mattagami Expansion. Please refer to Section 4.4 of IESO's System Impact Assessment Report on the Lower Mattagami Generation Development IESO_REP_0517.

The following assumptions were made:

2008 Present Day Condition

- Smoky Falls GS is connected to Kapuskasing TS via the 115kV circuit S3S/S4S. This 115kV connection bypasses the Tembec Spruce Falls customer facilities.
- Tembec Spruce Falls load is modeled at 80MW
- Model is based on full generation and loading.
- Northeast Load and Generation Rejection Limits are applied during contingencies (L20D/H22D, L21S)

Lower Mattagami Expansion

- System configured as described in Section 2.2
- Capacitor banks at Kapuskasing TS, Pinard TS, Porcupine TS, and Pinard TS (installed with Mattagami expansion)
- Northeast Load and Generation Rejection Limits are applied during contingencies (L20D/H22D, L21S)

4.1. Contingency Analysis

Three (3) contingency scenarios were analyzed for voltage impact:

	Contingency (Loss of)	Line Section
a)	H22D	Kipling GS to Pinard TS
b)	L20D	Kipling GS to Pinard TS
c)	L21S	Little Long SS to Kapuskasing TS

Voltage impact results for these scenarios are shown are summarized in Appendix A.

Following the worst contingencies, the worst voltage changes summarized in Appendix A are well within the voltage decline requirements given in the IESO's Transmission Assessment Criteria (summarized below in Table 2) and Canadian Standard Association document CAN-3-C235-83. IESO will control the amount of generation production to limit voltage levels.

Contingency Voltage Change Limits						
Nominal Bus Voltage (kV)	500	230	115	Transformer Station Voltages		
				44	27.6	13.8
% voltage change <i>before</i> tap changer action	10%	10%	10%	10%	10%	10%
% voltage change <i>after</i> tap changer action	10%	10%	10%	5%	5%	5%
AND within the range						
Maximum* (kV)	550	250	127	112% of nominal		
Minimum* (kV)	470	207	108	88% of nominal		

Table 2

*The maximum and minimum voltage ranges are applicable following a contingency. Certain buses can be assigned specific maximum and minimum voltages as required for operations. In northern Ontario, the maximum continuous voltage for the 230 and 115 kV systems can be as high as 260 kV and 132 kV respectively. After the system is re-dispatched and generation and power flows are adjusted the system must return to within the maximum and minimum continuous voltages [from IESO document IMO_REQ_0041 Issue 5.0]

Load flow studies thus confirmed that incorporation of the Lower Mattagami Generation Connection Plan will not degrade the voltage performance at any customer delivery points. Following the worst single contingency, the voltage changes are well within the voltage decline guideline for customer buses of less than 10% voltage drop before transformer tap-changer operation. It should be noted Smoky Falls GS and the new Harmon, Kipling and Little Long generators will need to be included into the Northeast G/R Scheme to provide operating flexibility during contingencies.

5.0 Connection Line Reliability

By providing two circuit connections to Kipling GS, Harmon GS, Smoky Falls GS and Little Long GS, the reliability of the supply from these generators will improve.

6.0 Preliminary Outage Impact Assessment

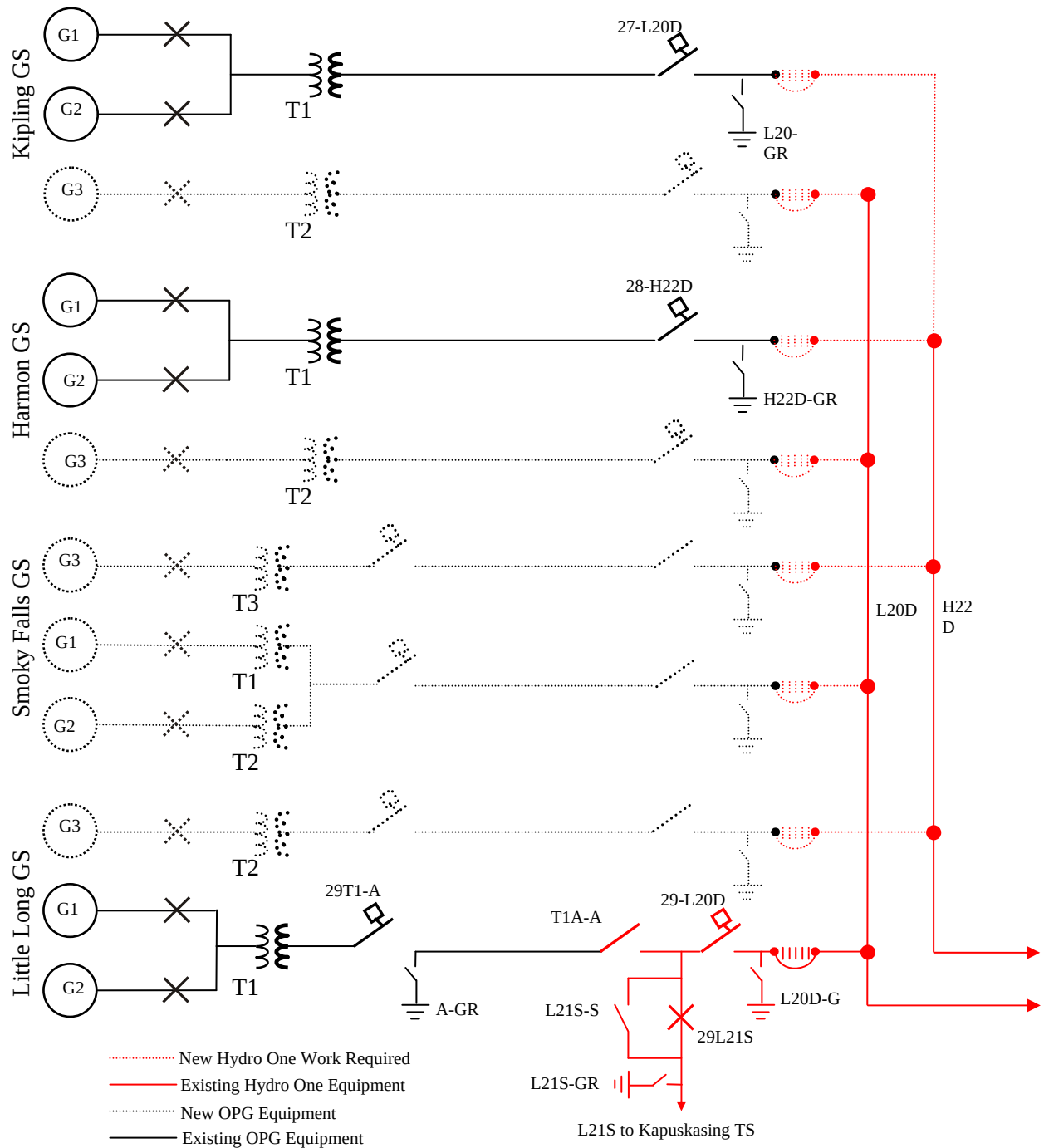
Outages associated with the construction work to Hydro One's system will be identified when a detailed construction schedule is established in consultation with Ontario Power Generation Inc and the load customers in the Kapuskasing Area. The line work associated with the Little Long SS expansion is not expected to result in load customer outages. Exact outage schedule will be made available during the detailed engineering phases of the project development. The outage duration will be minimized and risk managed with proper outage planning and co-ordination.

7.0 Conclusions and Recommendations

This Customer Impact Assessment (CIA) presents results of short-circuit and voltage performance study analysis.

The overall findings of this CIA provided that the above recommendations are implemented are:

- The results of the short circuit analysis showed that some area's stations encountered small (insignificant) increases in fault level at the connection points. These increases were within the capability of the existing facilities. However, the customers connected in the area should review the fault levels at their connection points to confirm their equipment is capable of withstanding the increased fault and voltage levels.
- When in operation, the Lower Mattagami expansion will assist in supporting the voltages seen by the connected customers under system disturbances and will not adversely impact the local voltage performance in the Kapuskasing area
- It is not possible to assess the impact of outages during construction at this time because the required outages have yet to be defined.

FIGURE 2 – PROPOSED LAYOUT FOR LOWER MATTAGAMI GENERATION CONNECTION

APPENDIX A – PSS/E LOAD FLOW RESULTS

	Present Day Pre-C Voltages	With Lower Mattagami Pre-C Voltage	w/o L. Mattagami		with L. Mattagami			
			After ULTC Post-C Voltage		Before ULTC Post- C Voltage		After ULTC Post-C Voltage	
			kV	Δ%	kV	Δ%	kV	Δ%
Loss of H22D								
Kipling Junction H22D	244.67	242.6	n/a	n/a	*OOS*	*OOS*	*OOS*	*OOS*
Kipling Junction L20D	244.67	243.9	244.77	0.04%	243.7	-0.1	243.8	0.0
Harmon Junction H22D	243.34	242.2	*OOS*	*OOS*	*OOS*	*OOS*	*OOS*	*OOS*
Harmon Junction L20D	n/a	243.8	n/a	n/a	243.7	-0.1	243.7	0.0
Smoky Falls Junction H22D	n/a	241.4	n/a	n/a	*OOS*	*OOS*	*OOS*	*OOS*
Smoky Falls Junction L20D	n/a	243.7	n/a	n/a	243.5	-0.1	243.6	0.0
Little Long Junction H22D	244.14	240.9	n/a	n/a	*OOS*	*OOS*	*OOS*	*OOS*
Little Long Junction L20D	244.14	243.5	244.25	0.04%	243.3	-0.1	243.3	-0.1
Tembec Spruce Falls	240.49	243.5	238.21	-0.95%	243.3	-0.1	243.4	-0.1
Nadagam CGS	128.30	129.1	127.92	-0.30%	128.6	-0.4	128.6	-0.4
Calstock DS	127.14	128.1	126.68	-0.36%	127.5	-0.5	127.5	-0.5
Hearst TS	126.09	127.2	125.56	-0.42%	126.5	-0.6	126.4	-0.6
Calstock CGS	127.46	128.3	127.08	-0.30%	127.8	-0.4	127.8	-0.4
Carmichael Falls CGS	128.01	128.2	127.59	-0.33%	128.2	0.0	127.9	-0.2
Fauquier DS	127.33	127.5	126.86	-0.37%	127.5	0.0	127.2	-0.2
Tembec Smooth Rock Falls	128.65	128.3	128.54	-0.08%	129.0	0.6	128.5	0.1
Smooth Rock Falls DS	128.69	128.4	128.62	-0.06%	129.2	0.6	128.6	0.2
Kapuskasing TS EZ Bus	26.33	26.2	26.37	0.15%	25.3	-3.5	26.1	-0.4
Loss of L20D								
Kipling Junction H22D	244.67	242.6	n/a	n/a	242.6	0.0	242.6	0.0
Kipling Junction L20D	244.67	243.9	*OOS*	*OOS*	*OOS*	*OOS*	*OOS*	*OOS*
Harmon Junction H22D	243.34	242.2	245.09	0.72%	242.2	0.0	242.3	0.0
Harmon Junction L20D	n/a	243.8	n/a	n/a	*OOS*	*OOS*	*OOS*	*OOS*
Smoky Falls Junction H22D	n/a	241.4	n/a	n/a	241.4	0.0	241.5	0.0
Smoky Falls Junction L20D	n/a	243.7	n/a	n/a	*OOS*	*OOS*	*OOS*	*OOS*
Little Long Junction H22D	244.14	240.9	n/a	n/a	240.9	0.0	241.0	0.0
Little Long Junction L20D	244.14	243.5	*OOS*	*OOS*	*OOS*	*OOS*	*OOS*	*OOS*
Tembec Spruce Falls	240.49	243.5	232.33	-3.39%	249.9	2.6	249.6	2.5
Nadagam CGS	128.30	129.1	128.10	-0.16%	129.1	0.0	129.0	-0.1
Calstock DS	127.14	128.1	126.90	-0.19%	128.1	0.0	128.0	-0.1
Hearst TS	126.09	127.2	125.81	-0.22%	127.2	0.0	127.1	-0.1
Calstock CGS	127.46	128.3	127.26	-0.16%	128.3	0.0	128.2	-0.1
Carmichael Falls CGS	128.01	128.2	127.53	-0.37%	128.9	0.5	128.6	0.3
Fauquier DS	127.33	127.5	126.77	-0.44%	128.3	0.7	127.9	0.3
Tembec Smooth Rock Falls	128.65	128.3	128.44	-0.16%	129.4	0.9	128.9	0.4
Smooth Rock Falls DS	128.69	128.4	128.56	-0.10%	129.6	0.9	129.0	0.4
Kapuskasing TS EZ Bus	26.33	26.2	26.33	0.00%	25.8	-1.7	26.3	0.2

STAKEHOLDER AND COMMUNITY CONSULTATIONS

1.0 INTRODUCTION

This exhibit outlines OPG's consultation and communication process, and input received to date regarding the LMR Project, including the Proposed Line. OPG is committed to ensuring that any community and stakeholder concerns regarding the Proposed Line are addressed, and that municipal staff, elected officials, the general public and relevant government ministries are kept informed of the status of the LMR Project and the Proposed Line.

OPG's public consultation process for the LMR Project has included providing information about the required transmission upgrades including the Proposed Line. OPG's consultation approach for the Proposed Line, within the context of the consultation process for the LMR Project, has focused on notifying key stakeholders in the vicinity of the Proposed Line who may have an interest in it, and ensuring information is available via OPG's website for the LMR Project and through other means such as open houses.

Significant public, First Nations and government agency consultation has been undertaken as part of the federal environmental assessment ("Federal EA") process. There is broad support for the LMR Project in First Nations communities and the community at large. The provincial government also supports the LMR Project. Most interest has been directed at potential construction employment and business opportunities. A small number of environmental issues regarding the hydroelectric facilities have been raised, and these have been addressed by OPG. OPG will continue to inform area elected officials and relevant provincial government ministries and agencies of the status of the LMR Project and the Proposed Line. During the construction and commissioning stages of the Proposed Line, OPG will continue to consult with the local community and other interested stakeholders to ensure potential concerns are addressed where appropriate.

2.0 NOTIFICATION OF ELECTED OFFICIALS AND STAFF

In an effort to ensure local municipal officials were aware of OPG's plans with respect to the Lower Mattagami River, OPG hosted a briefing in February 2009 to outline, among other

1 things, the transmission requirements. Attendees included the mayor and other officials from
2 Kapuskasing, and officials from Smooth Rock Falls. Representatives of both communities
3 were supportive. The mayors and councils of Kapuskasing and Smooth Rock Falls were also
4 notified about the LMR Project, in writing, on March 10, 2009. The MPP for Timmins – James
5 Bay, Gilles Bisson, was also notified about the LMR Project. To date, no issues have been
6 raised by any of these stakeholders.

7
8 On March 17, 2009 OPG received a Council resolution from the Town of Kapuskasing
9 providing overwhelming support for the LMR Project, and on March 26, 2009 a Council
10 resolution from the Town of Smooth Rock Falls in support of the project.

11 **3.0 CONSULTATION UNDER THE CANADIAN ENVIRONMENTAL ASSESSMENT ACT**

12 The *Canadian Environmental Assessment Act* (“CEAA”), as it read in February 2007 (prior to
13 amendments to it effective July 2010), required that public consultation occur as follows
14 during a Comprehensive Study:

- 15 • On the proposed scope of the project;
- 16 • During the preparation of the Scoping Document (subsection 21(1) of the *CEAA*)
- 17 • During the comprehensive study (section 21.2 of *CEAA*); and,
- 18 • With respect to a Comprehensive Study Report (“CSR”) prior to the federal Minister of the
19 Environment’s issuance of an environmental assessment decision statement (section 22
20 of *CEAA*).
- 21

22
23 Descriptions of the consultations held to address these requirements are provided below.
24 Additional discussion of the consultation for the Federal EA under the CEAA is provided in
25 Ex. B-T6-S5.

26 **3.1 Consultation Summary**

27 Consultation on the LMR Project and the CSR was undertaken by both OPG and the
28 Government of Canada in accordance with the then applicable subsections 21(1) and 21.2 of
29 the CEAA.
30

1 A Notice of “Consultation on the Proposed Scope of the Project and Availability of Participant
2 Funding” was placed on the Canadian Environmental Assessment Agency (“CEA Agency”)
3 Registry and the public was invited to provide review and comment from the period April 13,
4 2007 to May 14, 2007. The public comment period was extended to June 10, 2007 to
5 incorporate comments from First Nations and the Métis Nation of Ontario. The notice
6 appeared in the Timmins Daily Press, Les Nouvelles, the Weekender, Cochrane Times Post
7 and Wawatay News in April 2007.

8
9 The Notice briefly summarized the LMR Project, identified that it was a Comprehensive
10 Study, and that copies of the Scoping Document for the study were available through the
11 Department of Fisheries and Oceans Canada (“DFO”), the Ontario Government Complex in
12 Timmins, the Ministry of Natural Resources (“MNR”) Office in Moosonee, and the MNR Office
13 in Kapuskasing. The Notice also indicated that \$50k was available for participant funding.
14 No comments were received from the general public in relation to the Scoping Document.
15 Comments from First Nations and the Métis Nation of Ontario were received and are
16 discussed in Section 4.0 below.

17
18 OPG undertook three principal measures to consult with the public about the LMR Project
19 and Federal EA:

- 20 • Launch and operation of a website devoted to the LMR Project
21 • Provision of OPG and consultant staff to handle on-going public inquiries
22 • Two public open houses
23

24 **3.1.1 Website**

25 Starting in September 2008, OPG launched a website www.lowermattagami.com on the LMR
26 Project. This website is updated periodically and provides information on the LMR Project
27 including federal government notices on the Comprehensive Study, open houses, the
28 Scoping Document, contact information, and Cree and plain language summaries
29
30
31

3.1.2 Contact Information

Names, phone numbers, e-mail addresses and postal addresses for OPG contact persons are posted on the LMR Project website and were provided at the open houses.

3.1.3 Open Houses

Two open houses on the LMR Project were held for the general public. The first was held in Kapuskasing on January 27, 2009, with 198 people in attendance. The second one was held in Smooth Rock Falls on January 28, 2009, with 94 attendees. These communities were selected as locations for the open houses as they are the two closest communities to the LMR Hydroelectric Complex, and both access roads to the complex originate from them. These open houses drew interested members of the public from as far west as Opasatika, as far east as Cochrane and as far south as Timmins.

OPG and their consultants, Hatch Energy and SENES Consultants Ltd., had several staff at the meetings (SENES is OPG's environmental consultant for the LMR Project). The DFO and the CEA Agency also attended. Each open house consisted of 19 presentation panels which provided an overview of the LMR Project, the scope and organization of the environmental assessment process, a description of the existing natural and socio-economic environments including Aboriginal interests, an assessment of potential effects, and proposed mitigation measures. The vast majority of the questions were about employment and contracting opportunities, and community benefits associated with the LMR Project. As the LMR Hydroelectric Complex is an already existing facility and a provincial Environmental Assessment ("Provincial EA") was completed and approved on the Project in the 1990s, members of the public in these communities expressed only a few and very isolated concerns with the LMR Project.

A total of 32 comment sheets were returned from the public about the LMR Project. Similar to the comments received verbally at the open houses, all the public responses were supportive, with most expressing support in light of the economic benefits. A couple of comments expressed concern about existing water levels on the Kapuskasing River up-river of the LMR Hydroelectric Complex, and OPG has indicated that the LMR Project will not

1 result in any changes to the existing levels and flows upstream of the LMR Hydroelectric
2 Complex identified in the Mattagami River System Water Management Plan.

3
4 OPG has also conducted consultations about the LMR Project with other provincial agencies,
5 municipal officials and local agencies, for purposes outside the scope of the Federal EA.

6 7 **4.0 CONSULTATIONS WITH ABORIGINAL PEOPLES**

8 In August 2008, representatives from the DFO, CEA Agency, Ontario Ministry of the
9 Environment ("MOE"), MNR (Hearst District and Northeast Region offices) and OPG met to
10 discuss consultation with Aboriginal Peoples. Along with the consultation the federal
11 agencies are undertaking as part of the Federal EA, provincial agencies are required to
12 consult with Aboriginal Peoples about the implementation of the Provincial EA and
13 subsequent permitting requirements.

14
15 OPG and government agencies identified First Nations and Aboriginal organizations with a
16 potential interest in the LMR Project and the Federal EA. Consultation opportunities were
17 extended even where there was no previously expressed interest in the study area.
18 Subsequent consultations with Aboriginal organizations are summarized in Table 1 below.

19
20 **Table 1**
21 **Aboriginal Consultations**

Date	Consulting Agencies	Aboriginal Groups Consulted	Purpose
May 4, 2007	• DFO	• Moose Cree First Nation ("MCFN") • Taykwa Tagamou Nation • Wabun Tribal Council • Mushkegowuk Tribal Council • MoCreebec Council of the Cree Nation	Request comments on the Scoping Document and discuss availability of participant funding.

Date	Consulting Agencies	Aboriginal Groups Consulted	Purpose
November 2008 & January 2009	Federal Government	- Taykwa Tagamou Nation - Wabun Tribal Council - Flying Post First Nation - Matachewan First Nation - Mattagami First Nation - Wahgoshig First Nation - Métis Nation of Ontario - MoCreebec Council of the Cree Nation	Invite interested First Nations and Aboriginal organizations to be consulted and offering to meet with their respective communities.
January 10, 2009	OPG	Métis Nation of Ontario	Information was provided at a Métis Community Meeting and Citizens' Discussion Forum. No impacts on Métis land and resource use as a result of the LMR Project were identified. Additionally, OPG negotiated a work plan with the Métis Nation of Ontario as part of the Federal EA process and committed to funding Métis communications and employment opportunities on the LMR Project, providing additional funding for a special interests study and providing financial support for education.
March 23, 2009	- DFO - CEA Agency - OPG, MNR and MOE as observers	MCFN	Discuss the LMR Project and Federal EA. MCFN members indicated they understand that environmental concerns are being addressed and are comfortable with the LMR Project and the current status of the Federal EA.

Date	Consulting Agencies	Aboriginal Groups Consulted	Purpose
April 1, 2009	• OPG	• First Nations Métis communities and potential Aboriginal groups The communities included: • MCFN • Mocrebec Council of the Cree Nation • Taykwa Tagamou Nation • Wabun Tribal Council communities (Beaverhouse, Brunswick House, Chapleau Ojibwe, Matachewan, Wahgoshig, and Flying Post First Nations) • Métis Nation of Ontario	OPG notified First Nations Métis communities and potential Aboriginal groups, in writing, about OPG's plans to construct a new transmission line and its intention to file this leave to construct application. These First Nations Métis communities and potential Aboriginal groups were originally identified by OPG through its contact with the Department of Indian and Northern Affairs and the Ministry of Aboriginal Affairs.
April 21, 2009	• DFO • CEA Agency • MOE as observer	• Wabun Tribal Council • Mattagami First Nation	Update the two groups on the status of the Federal EA and discuss any potential concerns about the LMR Project. Wabun Tribal Council noted that they would represent the interests of the local First Nation communities. It was identified that Flying Post First Nation and Mattagami First Nation would have an interest but that peripheral First Nations such as Wahgoshig and Matachewan may have less interest. The attendees concurred that a community meeting should be held to inform community members on the LMR Project and raise any potential concerns. DFO was to be informed if any communities expressed interest in meeting with the federal government.

Date	Consulting Agencies	Aboriginal Groups Consulted	Purpose
April 29, 2009	• DFO • CEA Agency • OPG as observer	• Métis Nation of Ontario James Bay/Abitibi-Temiscamingue Protocol Committee	Inform the committee of the federal environmental assessment process and follow-up on the discussions held between OPG and local Métis Nation of Ontario members in January 2009. The committee acknowledged that no significant issues or concerns or objections were raised by the citizens in attendance at this meeting. The Métis Nation of Ontario indicated that they do not have the capacity or the technical expertise to provide comments on the Comprehensive Study document, but they developed a number of recommendations.
May 19, 2009	• DFO • CEA Agency • OPG, MNR and MOE as observers	• MoCreebec Council of the Cree Nation	Discuss the LMR Project and the Federal EA. MoCreebec expressed interest in the LMR Project with the majority of their concerns revolving around navigational issues and sediment deposition at the mouth of the Moose River and in James Bay. Interest in employment opportunities were also noted by MoCreebec. It was recommended that a community meeting be held in Moose Factory prior to the finalization of the CSR.

1

2 In addition to the consultations identified in Table 1 above, OPG has been in ongoing
3 consultations with the Moose Cree First Nation ("MCFN") on the LMR Project since 2006.
4 This has led OPG and MCFN to sign a Comprehensive Agreement identifying MCFN's
5 interests associated with the LMR Project. The MCFN assisted in writing part of the CSR,
6 providing input on various sections and reviewing and editing the document. Under the
7 Comprehensive Agreement, MCFN has an opportunity to become an up to 25 per cent
8 interest partner in the LMR Project.

1 Further, OPG has advised Taykwa Tagamou Nation about the LMR Project as part of its
2 ongoing consultations and negotiations on past grievance issues. OPG has entered into
3 agreements with Taykwa Tagamou Nation identifying and providing for Taykwa Tagamou
4 Nation's interests associated with the LMR Project. Taykwa Tagamou Nation has expressed
5 support for the project within these agreements.

6
7 Based on the consultations and analysis undertaken to date, the LMR Project is not likely to
8 have any negative impacts on the current use of lands and resources for traditional purposes
9 by Aboriginal groups. OPG plans to continue to work closely with the Aboriginal groups to
10 ensure that the natural and cultural environments are protected during construction and
11 operation of the LMR Project including the Proposed Line.

ENVIRONMENTAL ASSESSMENT

1.0 PROVINCIAL ENVIRONMENTAL ASSESSMENT

A provincial environmental assessment for the LMR Project was submitted to the Ontario Ministry of the Environment ("MOE") in 1990. A Notice of Approval to Proceed and Order in Council providing approval to proceed with the project, including terms and conditions, was issued by the MOE on December 15, 1994 (the "Provincial EA") with construction to commence before December 1999. By subsequent extensions to the construction start date, the Declaration Order was extended to December 15, 2010. A copy of the letter of approval of the extension to December 15, 2010, from the Minister of the Environment, is provided as Attachment 1.

The MOE has established the Mattagami Extensions Coordinating Committee ("MECC"), an environmental oversight body to oversee LMR Project implementation and to ensure OPG meets the terms and conditions of the Provincial EA. The MECC has seats for representatives of First Nation communities in the Lower Moose River Basin, and an OPG member. The primary goal of the MECC is to facilitate the successful implementation of the terms and conditions of the Provincial EA and to act as a forum for information exchange with respect to the LMR Project. An official MECC chairperson was selected and a number of meetings have been held to date.

The Provincial EA identifies the transmission line from Smoky Falls GS as a 7 km line to Little Long Sub-Station rather than the 3 km line now proposed (see Ex. B-T3-S1, Alternative 2). OPG is in the process of obtaining a variance to the Provincial EA to reflect the changed route for the line. As the currently proposed line is shorter than that originally proposed and travels adjacent to an existing transmission right-of-way, early discussions with the MOE indicate that the variance will likely be treated as minor and will not require any consultation. Official confirmation from the MOE that the variance is minor will be sought by OPG in early to mid 2011. The variance request will be presented to the MECC and once approved by the MECC, will be submitted to the MOE.

2.0 FEDERAL ENVIRONMENTAL ASSESSMENT

OPG submitted a Project Description for the LMR Project to the Canadian Environmental Assessment Agency in 2006. The Department of Fisheries and Oceans Canada ("DFO") determined that some of the components sufficiently differed from the project description of the LMR Project originally submitted for review in 1995-96, particularly with regard to Smoky Falls GS. Accordingly, a new federal environmental assessment ("Federal EA") was ordered. The DFO posted the commencement of the Comprehensive Study for the LMR project under the *Canadian Environmental Assessment Act* on February 21, 2007, and in June 2008 OPG submitted a draft environmental assessment report to the federal government. The Comprehensive Study Report was completed and was publicly posted for 30 day review on October 9, 2009. The decision was made on March 29, 2010, that the project would not be likely to cause significant adverse environmental effects. The Minister of the Environment (Canada)'s decision on the Project is outlined in the letter dated April 27, 2010 provided as Attachment 2. In addition, the decision of March 29, 2010 is also provided as part of Attachment 2.

DEC-10-2005 11:21

MIN. OF ENVIRONMENT

Ministry
of the
Environment

Ministère
de
l'Environnement

Office of the Minister

Bureau du ministre

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DEC 14 2005

ENV1283MC-2005-5042

Ms. Cara Clairman
Ontario Power Generation
Law Division, 18th Floor
700 University Avenue
Toronto ON M5G 1X6

Dear Ms. Clairman:

This letter is to provide you with an update of Ontario Power Generation's request for an extension of the start date for construction of the Mattagami River Hydroelectric Generating Stations Extensions Project.

After careful consideration, I have decided to grant an extension of Declaration Order OPG-1 under the *Environmental Assessment Act* until December 15, 2010.

If construction of the Project has not started by this date, the Declaration Order will terminate. Before construction of the Project can begin, however, OPG must meet an extensive set of terms and conditions of approval and obtain other technical permits and approvals.

Should you or your staff have any questions about the next steps for proceeding with the Project in accordance with the terms and conditions of approval for this Project, as set out in the 1994 Notice of Approval (O.C. 3618/94) and 1999 Declaration Order OPG-1 (O.C. 2174/99), please contact Heather Brown, Special Project Officer, Environmental Assessment and Approvals Branch, at (416) 314-7232.

Yours truly,

A handwritten signature in black ink, appearing to read "Laurel C. Broten".

Laurel C. Broten
Minister of the Environment



DEC-13-2005 11:21

MIN. OF ENVIRONMENT

Ms. Cara Clairman

Page 2

c: Gilles Bisson, MPP, Timmins-James Bay
Chief Randy Kapashesit, McCreebec Council of the Cree Nation
Chief Dwight Sutherland, Taykwa Tagamou Nation
Chief Patricia Faries, Moose Cree First Nation

Minister of the Environment



Ministre de l'Environnement

The Honourable L'honorable

Jim Prentice

Ottawa, Canada K1A 0H3

APR 27 2010

Mr. Tom Mitchell
President and CEO
Ontario Power Generation
700 University Avenue
Toronto ON M5G 1X6

Chief Norm Hardisty Junior
Moose Cree First Nation
P.O. Box 190
Moose Factory ON P0L 1W0

Dear Mr. Mitchell and Chief Hardisty:

Thank you for your letter of March 12, regarding the environmental assessment for the Lower Mattagami River project (the Project).

On March 29, I made my environmental decision regarding the Project pursuant to section 23 of the *Canadian Environmental Assessment Act* (the Act). Having taken into consideration the comprehensive study report and the results of the public comment period, I am of the opinion that no additional information is necessary. Public concerns have been taken into account and there is no need to address them further through the comprehensive study. Further, the Project, taking into account the mitigation measures described in the comprehensive study report, is not likely to cause significant adverse environmental effects. Finally, the mitigation measures and follow-up program described in the comprehensive study report are appropriate for the proposed Project.

I have referred the Project back to the responsible authority, Fisheries and Oceans Canada, for appropriate action under section 37 of the Act.

For your convenience, I have provided the link to my Environmental Decision Statement: http://www.acee-ceaa.gc.ca/050/details-eng.cfm?cear_id=26302.

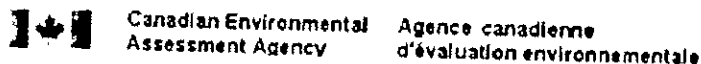
Sincerely,

The Honourable Jim Prentice, P.C., Q.C., M.P.



Canada





Home > Registry > 07-03-26302 > Minister's Decision

ENVIRONMENTAL ASSESSMENT DECISION STATEMENT

Lower Mattagami Hydroelectric Complex Redevelopment Ontario (ON)

March 29, 2010 – The Honourable Jim Prentice, Canada's Environment Minister and Minister responsible for the Canadian Environmental Assessment Agency, has reviewed the federal environmental assessment of the project to redevelop the Lower Mattagami Hydroelectric Complex by Ontario Power Generation.

Having taken into consideration the comprehensive study report and the results of the public comment period pursuant to section 22 of the *Canadian Environmental Assessment Act* (the Act), the Minister is of the opinion that:

no additional information is necessary. Public concerns have been taken into account and there is no need to address them further through the comprehensive study;

the project, taking into account the mitigation measures described in the comprehensive study report, is not likely to cause significant adverse environmental effects; and

the mitigation measures and follow-up program described in the comprehensive study report are appropriate for the proposed project.

The Minister has referred the project back to the responsible authority, Fisheries and Oceans Canada, for appropriate action under section 37 of the Act.

The Minister notes that the responsible authority will ensure the implementation of the mitigation measures described in the comprehensive study report, and will implement the follow-up program described in the comprehensive study report, in order to determine the effectiveness of the measures taken to mitigate any adverse environmental effects and to verify the accuracy of the environmental assessment of the project.

Date Modified: 2010-03-29

LAND MATTERS

1.0 DESCRIPTION OF LAND REQUIRED

The Proposed Line consists of 3 km of new 230 kV double-circuit line running adjacent to the existing 115 kV overhead transmission line right-of-way between Smoky Falls GS and a connection point with the Hydro One L20D/H22D 230 kV transmission line located southwest of Smoky Falls GS. OPG's tenure at Smoky Falls GS is authorized by Water Power Lease Agreement No. 121. However, additional lands will be required for the Proposed Line. A plan showing the proposed transmission line corridor and the area where surface mining rights have been withdrawn is provided as Attachment 1 to this exhibit. The map provided as Ex. B-T1-S2 Attachment 1 provides additional detail on the proposed transmission line corridor.

The Proposed Line will travel approximately 1 km on OPG Water Power Lease No. 121 (upon which Smoky Falls GS is located) adjacent to the existing Hydro One S3S/S4S 115 kV lines. Upon leaving the OPG leased lands, it will continue for approximately 1.97 km on Crown land adjacent to the Hydro One S3S/S4S lines. The portion of the corridor located on Crown land will be approximately 76 meters wide, covering an area of approximately 15 hectares. Surface mining rights have been withdrawn over a corridor 150 meters in width.

The existing Hydro One S3S/S4S 115 kV corridor running from Smoky Falls GS to the Hydro One L20D/H22D 230 kV transmission lines belongs to Hydro One through a Land Use Permit from the Ontario Ministry of Natural Resources ("MNR"). Moreover, the corridor is approximately 45 meters wide, and not sufficiently wide to permit the additional construction of the Proposed Line within its boundaries.

It has been confirmed that there is no private ownership on the land required for the Proposed Line.

2.0 LAND ACQUISITION PROCESS

OPG holds existing property rights for the section of the Proposed Line from Smoky Falls GS to the boundary of OPG Water Power Lease No. 121. OPG will apply to the MNR for permits to construct the Proposed Line along the corridor from the boundary of OPG Water Power

1 Lease No. 121 to the connection point with the Hydro One L20D/H22D 230 kV lines. An
2 Easement Agreement with the Crown will be developed as the final tenure acquisition for the
3 line, and registered in the Land Titles Office.

4
5 OPG has applied to the MNR to request that it refrain from disposing of any Crown lands or
6 issuing any land rights within the area for the Proposed Line. OPG has received written
7 confirmation from the MNR that this request has been granted. OPG has also requested that
8 the Ministry of Northern Development, Mines and Forestry ("MNDM") withdraw these lands
9 from future mining claims. OPG has received written confirmation from the MNDM that this
10 request has been granted.

11
12 Temporary access rights to the lands will be required during construction and once the
13 Proposed Line is built. OPG's contractor, KAP, will complete the MNR's "Application for Work
14 Permit" prior to commencing any work in the area of the proposed transmission line corridor.
15 OPG will apply for a Land Use Permit when construction of the Proposed Line is nearing
16 completion to bridge through to the registration of the final transmission line easement.

