REPORT

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System Impact Assessment Report

CONNECTION ASSESSMENT & APPROVAL PROCESS

Issue 1.0

Project: *Woodstock Area Transmission Reinforcement*

Applicant: Hydro One Networks Inc.

CAA ID 2006-253

Final Draft Report

Transmission Assessments & Performance Department

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System Impact Assessment Report

Woodstock Area Transmission Reinforcement

Acknowledgement

The IESO wishes to acknowledge the assistance of Hydro One in completing this assessment.

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 OPGI) 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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WOODSTOCK AREA TRANSMISSION REINFORCEMENT
IESO SYSTEM IMPACT ASSESSMENT

SIA Findings

The proposed Woodstock area transmission reinforcement is a developmental project which is needed to provide reliable power supply to the new Toyota plant load and future load growth projected for the area. The new transmission will eliminate the existing system voltage limitations which are approaching the IESO minimum voltage criteria, until about 2015.

Conclusions

This System Impact Assessment has examined the impact of the proposed Woodstock Area Transmission Reinforcement, on the reliability of the IESO-Controlled grid. The studies concluded that:

1. The existing 115 kV transmission system supplying the Woodstock area load is at its capacity.

2. The proposed project will not have a materially adverse effect on the reliability of the IESO-Controlled grid.

3. The proposed project will significantly improve the voltage profile and increase the supply capability in Woodstock area.

4. All the pre-contingency voltages, post-contingency voltages and voltage declines meet Market Rules requirements.

5. No thermal overload concerns were identified for the monitored transmission circuits in the studied scenarios. All power flows on the monitored circuits were observed to be within the continuous ratings of the circuits.

Notification of Approval for Connection Proposal

It is recommended that Notification of Conditional Approval for connection be issued to Hydro One, subject to IESO's Requirements for Connection listed below, and any further requirements that may be identified by Hydro One Networks Inc. in the Customer Impact Assessment.

IESO's Requirements for Woodstock Area Transmission Reinforcement Connection

The IESO requirements for the connection of the proposed Woodstock Area Transmission Reinforcement are as follows:

- Hydro One is required to install all the equipment needed to continuously monitor the information that is required by the IESO.

- In the future when the short circuit level at Karn TS exceeds 40 kA due to system improvement or reconfiguration, Hydro One is required to upgrade the withstanding (interrupting) capability of the 230 kV and 115 kV equipment and components.

- It is required that Hydro One install circuit switchers on the 230 kV side of the new autotransformers to allow for, quick restoration of the 230 kV circuit in case of an autotransformer fault or an autotransformer planned removal from service without the disconnection of a 230 kV circuit.

1. Project Description

Hydro One Networks is proposing to increase the power supply capability in Woodstock area by reinforcing the local transmission system with a second 230 kV power supply from Ingersoll.

Woodstock area load is being supplied off Buchanan TS by a long 115 kV transmission corridor. The power supply capability of this transmission is limited due to voltage performance and is approaching its capacity. A transmission reinforcement project for the area has been planned for some time, but the need to advance it was triggered by the Toyota plan to build a new automotive plant in the Woodstock area.

Hydro One Networks proposed to construct a new transformer station to supply the new Toyota plant load. The new Toyota TS will provide supply to an ultimate load of 25 MW. For the first couple of years before the proposed Toyota TS comes in service, the initial plant load will be supplied from an existing 27.6 kV feeders off Woodstock TS. To improve voltage profile in Woodstock area, Hydro One is also proposing to install an additional 28.8 kV 21.6 MVAr shunt capacitors at Woodstock TS and transfer 8MW of load from Woodstock TS to Ingersoll TS. The Toyota plant supply and the new low voltage shunt capacitors were the subject of a different SIA which was recently completed by the IESO (CAA ID 2006-225).

Voltage performance in Woodstock area is an on-going problem which limits the power supply to the area load. The SIA study for the Toyota TS concluded that after Toyota TS comes into service, the post-contingency voltage at Toyota TS would be slightly above the minimum required operating voltage of 108 kV. The load at Woodstock TS must be limited to 78 MW so that the voltage at Toyota TS will remain within acceptable levels.

The proposed Woodstock area transmission reinforcement will address the voltage concerns and increase the area transmission supply capability by providing a new 230 kV power supply point in Woodstock area. The proposed project includes modifying the existing system and installing new facilities as follows:

1. Removing the existing 14 km section of 115 kV circuits W7W/W12W between Ingersoll and Woodstock TS.
2. Establishing a new 230 kV/115 kV transformer station, Karn TS, immediately to the west of Woodstock.
3. Building 12 km 230 kV double circuits from Ingersoll to Karn.
4. Installing two 150/200/250 MVA, 242/121 kV transformers and associated equipment at Karn TS.
5. Building 2 km 230 kV double circuit line from Karn TS to Woodstock TS, initially to be operated at 115 kV.

A schematic diagram of the 230/115 kV transmission system in Woodstock area as well as the proposed Woodstock Area Transmission Reinforcement is shown in Figure 1. The proposed arrangement of Karn TS is shown in Figure 2.

The project is scheduled for completion by April 2010.

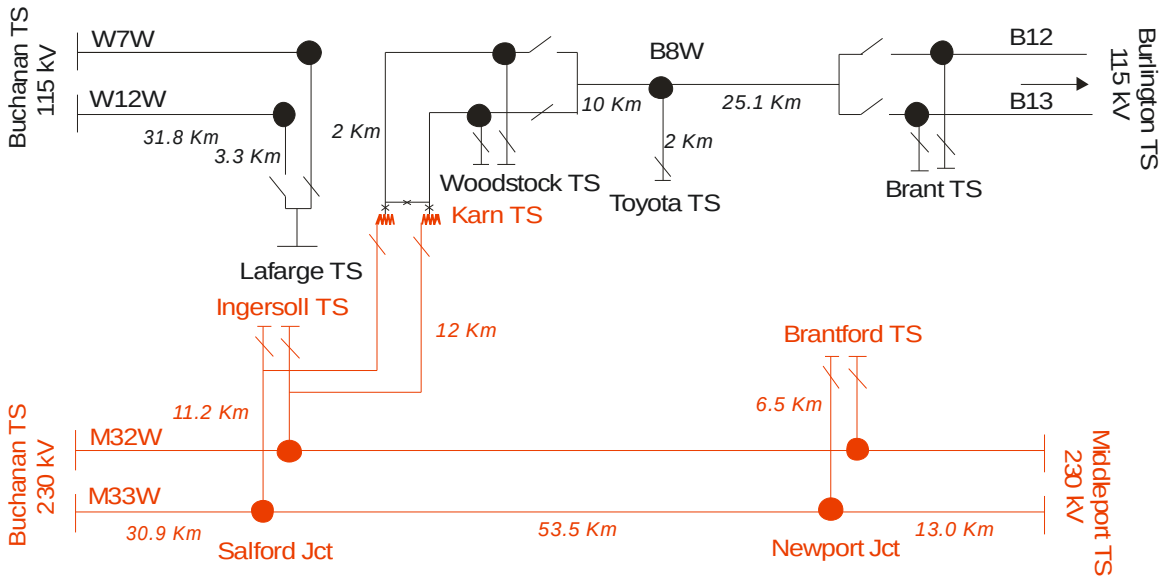

Figure 1. Proposed Woodstock Area Transmission Reinforcement

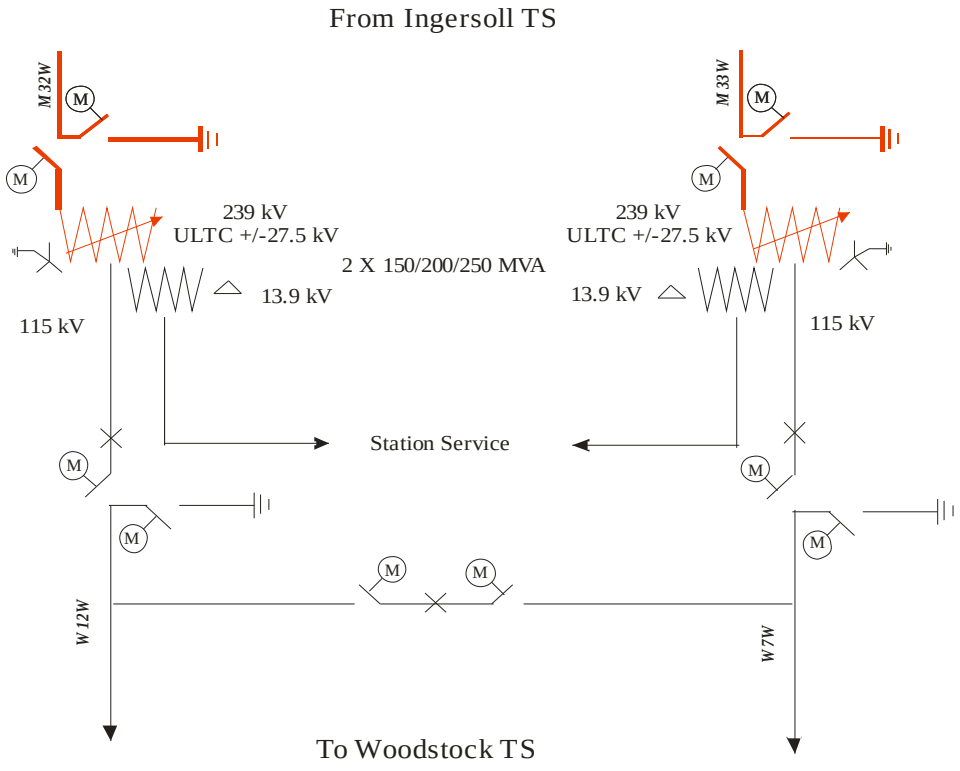

Figure 2. Proposed Arrangement of Karn TS

– End of Section –

2. Review of Connection Proposal

2.1 Connection Arrangement

2.1.1 230 kV circuits

The proposed Woodstock Area Transmission Reinforcement project includes building a 14 km 230 kV double circuit steel lattice line extension to M32W/M33W tap. This extends the line from Ingersoll to the site of the future Karn TS autotransformer station. The line extension will be constructed with a minimum 1192 kcmil ACSR conductor.

The circuits are to have the following ratings as provided by Hydro One:

- Maximum operating voltage: 250 kV
- Maximum Continuous Rating: 1410 A (Summer, 30 °C)
- Maximum Emergency Rating: 1590 A (Summer, 30 °C)

2.1.2 115 kV circuits

Additional line work is required to remove the 115 kV W7W/W12W from Ingersoll to Woodstock TS to make room for the new 230 kV line, and replace W7W/W12W from Karn TS to Woodstock TS. This new 2 km line section from Karn TS to Woodstock TS is to be steel pole or lattice built for 230 kV operation but initially operated at 115 kV. The new 115 kV line is to have the following ratings as provided by the connection applicant:

- Maximum operating voltage: 127 kV
- Maximum Continuous Rating: 1300 A (Summer, 30 °C)

The maximum emergency rating is not provided by Hydro One.

2.1.3 Karn TS

The new Karn TS will be connected to the 230 kV circuits M32W/M33W via 230 kV double circuit line from Ingersoll to Karn. The existing Woodstock TS as well as the proposed Toyota TS, which in the current configurations are supplied from Buchanan TS, will be supplied by the new autotransformers.

Hydro One proposes to connect each autotransformer to the IESO-controlled grid via one 230 kV motorized disconnect switch with a maximum operating voltage of 250 kV.

Appendix B of the IESO Ontario Resources and Transmission Assessment Criteria identifies general requirements for station layouts based on good utility practices. The goal of a good station layout is to minimize the effect of a contingency. Thus a contingency should result in the fewest possible number of elements removed from service. In the case of Karn TS, the loss of one auto-transformer would result in tripping of the corresponding circuit from Buchanan to Middleport. The Buchanan to Middleport 230 kV lines are part of one of the main Ontario transmission interfaces, the “Bruce Longwood Input”. Sometimes, this transmission interface becomes congested and influences the transmission system ability

to evacuate power out of the Bruce Complex. Any increase in the risk of outages to this interface may affect the system reliability.

It is thus required that Hydro One install two 230 kV circuit switchers on the high voltage side of the autotransformers to allow quick restoration of the 230 kV circuit in case of an autotransformer fault.

In support of this requirement, Schedule F of the Transmission System Code also specifies technical requirements for tapped transformers stations supplying load. Supply considerations require that transmitter's tapped transformer stations shall provide clearing of faults (in the load customer's systems) via a high voltage interrupting device which shall be a circuit breaker unless otherwise authorized by the transmitter.

The proposed Karn TS will be equipped with two 150/200/250 MVA, 239/121/13.9 kV autotransformers including delta-connected tertiary winding rated for 60MVAr that may be used for the supply of station service or as connection point for future shunt compensation. The two autotransformers are identical and each transformer is configured with a wye winding on the high side (neutral solidly grounded). The LV windings are also wye connected and the neutral is to be solidly grounded. The delta tertiary winding will have provision for operation with the delta open if the winding is not used for station service. Each transformer is equipped with under-load tap changers located on the 230 kV winding with ± 27.5 kV voltage band achieved in 21 steps.

The connection applicant indicated that the HV to LV impedance should be approximately 10% on the nameplate rating of 250 MVA. (Impedance tolerance is to be +/-7.5% of the impedance, implying a range of 9.25% to 10.75% for HV-LV Z1 impedance)

Three new 115 kV circuit breakers will be provided at Karn TS with the following ratings:

- Rated continuous current: 2000 A or higher
- Rated short circuit current: 40 kA Symmetrical
- Rated maximum voltage: 127 kV or higher
- Insulation level: 550 kV BIL
- Rated interrupting time: 3 cycles or less

2.2 On-line Monitoring

The Market Rules (Chapter 4 section 7.4) require that each transmitter shall provide the IESO on a continual basis with on-line monitored quantities as specified in Appendix 4.16. It is required that Hydro One install all the equipment needed to monitor the information required by the IESO on a continuous basis.

The IESO requires that the following quantities at Karn TS be provided to the IESO on a continual basis via approved communication protocols:

1. The voltage on the 230 kV bus
2. The status of the 230 kV switches
3. The voltage on the 115 kV bus
4. The status of the transformer 115 kV breakers
5. The status of the transformer 115 kV switches
6. The real and reactive power flow through both transformers
7. The transformer tap position for both transformers

Hydro One is required to install all the equipment needed to continuously monitor the information that is required by the IESO. The IESO will finalize items to be monitored during the IESO Facility Registration Process.

2.3 Protection Systems

With respect to the protection and telecommunication requirements, the connection applicant will have to follow the Transmission System Code technical requirements for tapped transformer stations supplying load.

The diagram that was provided by the applicant shows each transformer being separated from the transmission system via a motorized disconnection switch. As detailed in section 2.1.3, the IESO requires that the disconnect switches be replaced with circuit switchers. For this particular arrangement the Transmission System Code requires that transfer trip of the Transmitter's breakers at the terminal stations be provided for transformer faults or for a condition of failure to operate of the 115 kV breakers. In the case of Karn TS, which is to be connected to the double circuit 230 kV lines M32W/M33W the transfer trip must be sent to the Buchanan TS and Middleport TS terminals of the faulted circuit.

The circuit switchers will allow the fast disconnection of the faulted elements and the restoration of the affected 230 kV circuit. In addition, the isolation of one of the new autotransformers for planned outages can be achieved by operating the circuit switcher without removing from service the 230 kV circuit.

The connection applicant indicated that standard protective relaying is to be provided for the new Karn TS. Existing M32W/M33W protections at Buchanan and Middleport will be modified as required to accommodate the line extension and autotransformers. New line protections and associated remote trip communication shall be installed at Karn TS for protection of the 115 kV facilities connected to Karn TS.

The protection systems associated with W7W/W12W are to be revised as required.

– End of Section –

3. Data Verification

Based on standards for supply of municipal electrical utilities the capability of a transformer station is defined as the maximum load that one transformer can carry for a predefined period of time. This value is usually computed using specific transformer data and daily loading curves, and temperature data specific to the transformer location. Hydro One has provided a 10 day summer Limited Time Rating of 400 MVA.

The system performance standards listed in the Transmission System Code requires that the 230 kV and 115 kV systems fault levels not exceed 63 kA and 50 kA (Sym.), respectively. This indicates that 230 kV and 115 kV equipments must be sized to interrupt 63 kA and 50 kA (Sym.), respectively.

The connection applicant has indicated that all new 230 kV and 115 kV equipment and components are capable of withstanding (interrupting) the effects of the station short circuits currents of 40 kA which is below 63 kA and 50 kA as specified in Transmission System Code.

It is required that Hydro One upgrade the withstanding (interrupting) capability of the 230 kV and 115 kV equipment and components when the short circuit level at Karn TS exceeds 40 kA due to system improvement or reconfiguration in the future.

The high voltage motorized disconnect switches are designed to meet the requirements with maximum continuous operating voltage of 250 kV. The applicant has advised that interrupting rating not required for the switches. However, each disconnect switch shall be rated to interrupt the maximum magnetizing current of the specified 250 MVA transformer.

A full description of the connection arrangement of the proposed Woodstock Area Transmission Reinforcement is included in Section 2.1 of this report.

– End of Section –

4. Fault Level Assessment

This project involves the reinforcement of transmission system with loads being radially connected to a new supply point. In general, radial loads do not have a large impact on the system fault levels, but a small contribution in short circuit currents can be observed due to the grounding of the transformers. In the case of Karn TS the high voltage winding is grounded, hence line-to-ground faults will results in a slight increase in fault level but there is no material increase in the short circuit fault levels.

– End of Section –

5. Further Analysis

This connection assessment study concentrated on identifying the effect of the proposed Woodstock Area Transmission Reinforcement on thermal loading of the transmission lines and system voltages for pre and post contingency situations.

5.1 Description of Area Transmission

The loads at Lafarge TS and Woodstock TS are supplied via the 115 kV double circuit line W7W/W12W emanating from Buchanan 115 kV switchyard. Circuits W7W and W12W are joined to a single circuit B8W via disconnect switches at Woodstock TS. The switch on W7W is operated normally open while the other one on W12W is operated normally close. At the other end, the 38.1 km circuit B8W is connected to double circuit 115 kV line B12/B13 at Brant TS via two disconnect switches which are operated normally open.

The proposed Toyota TS consisting of a single 115/13.8 kV, 25/41 MVA transformer is to be connected to the 115 kV circuit B8W. The tap point would be approximately 10 km from Woodstock TS on the 115 kV circuit B8W. A 2 km double circuit 115 kV tap will be built and strung to one circuit only from 115 kV circuit B8W to the transformer-station-site on Toyota's property.

The 230 kV Ingersoll TS and Brantford TS are supplied via 230 kV double circuit line M32W/M33W between Buchanan TS and Middleport TS.

The area transmission is also equipped with one 115 kV, 120 MVAr shunt capacitor at Buchanan TS, 2×20 MVAr LV shunt capacitors at Brantford TS and one 20 MVAr LV shunt capacitor at Woodstock TS.

The existing transmission system in Woodstock area is shown in Figure 3.

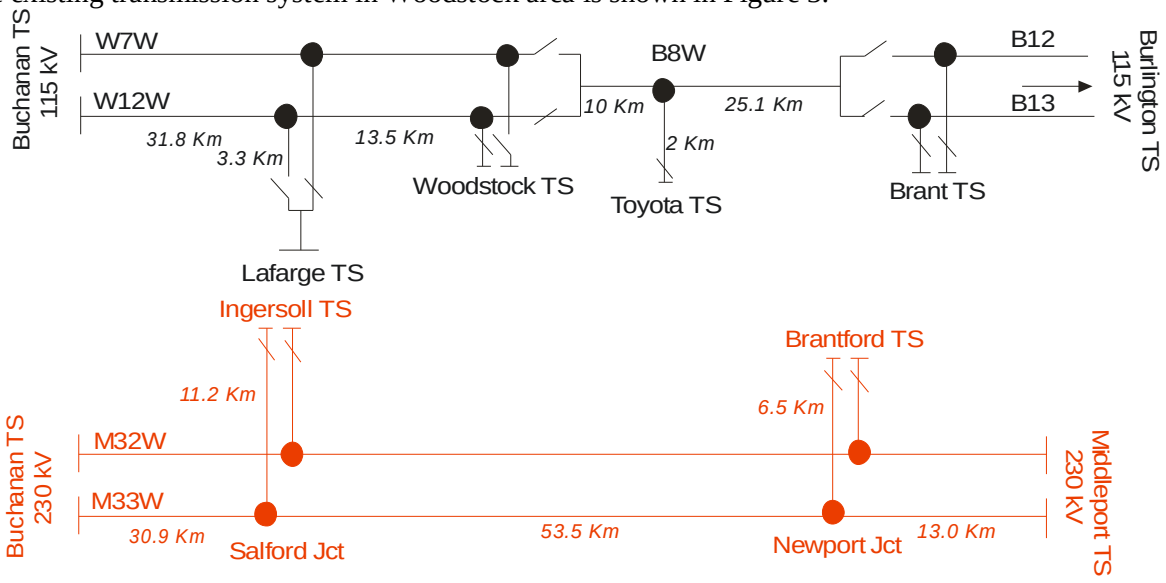

Figure 3 Existing Transmission System with Toyota TS

The 115 kV circuit B8W provides alternative supplies for the area loads at Woodstock TS and Brant TS in case of an outage. Present operating practices allow for the transfer of:

- Maximum 50 MVA of Brant TS load to Buchanan TS via the 115 kV circuit B8W only in emergency situation.

- Maximum 50 MVA of Woodstock TS load to Burlington TS via the 115 kV circuit B8W only in emergency situation.

The amount of load at Brant which can be transferred to Buchanan TS via B8W is dependant on the operating voltage at Woodstock TS. It should be noted that the proposed Woodstock Area Transmission Reinforcement will improve the voltage profile and the opportunity of load transfer from Brant to Woodstock.

5.2 Load Forecasts

The IESO forecasts the summer peak load at existing Woodstock TS, Lafarge TS, Ingersoll TS and Brantford TS based on the operation records and Market Participants' forecasts. The load forecast at Toyota plant was provided by Hydro One.

The assumptions/sources for the forecast are:

1. The IESO operation records indicated that the coincident summer peak load at Woodstock in 2006 was 89.4 MW. Hydro One indicated that 8 MW load will be transferred to Ingersoll in 2007 and the load growth at Woodstock is 5.1% to 2010 and 2.7% between 2010 and 2016.
2. Lafarge load forecast was provided by Market Participants.
3. Load at Toyota plant was provided by HO.
4. IESO records indicated that the coincident summer peak at Ingersoll was 79 MW in 2006. Load growth is 3% to 2010 and 2% afterwards as provided by Market Participants. In 2007, 8 MW load will be transferred from Woodstock to Ingersoll in 2007 and then will be transferred to the new Woodstock #2 TS in 2010.
5. Load forecast for Brantford was provided by Market Participants.

The load forecast for these stations as well as the station load capabilities are summarized in Table 1.

Table 1 Station Capability (MVA) and Load Forecast (MW)

Stations	Capability	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Woodstock	92 MVA	89.4	86.0	90.3	95.0	99.8	102.5	105.3	108.1	111.0	114.0
Lafarge	N/A*	10	11	11	11	11	11	11	11	11	11
Toyota	N/A**	0	8	15	25	25	25	25	25	25	25
Ingersoll	175 MVA	79.0	89.4	92.1	94.8	89.7	91.5	93.3	95.1	97.0	99.0
Brantford	173 MVA	172	176	180	184	188	191	194	197	201	204

*: data not available
**: single transformer

It should be noted that the loads at Woodstock TS and Brantford TS exceed the station load capability. Hydro One is planning to build Woodstock TS #2 to alleviate the overloading problem at the existing Woodstock TS. As indicated in the SIA study for Powerline TS (CAA ID 2005-196), load at Brantford is

to be limited within the station capability and all the loads above the capability in that area will be supplied via Powerline TS.

5.3 Study Assumptions

This system impact study was performed for 2009 summer peak area loads. A modified summer 2006 base case was used with the following assumptions:

1. Toyota TS is in service,
2. Load power factor of 0.9 for loads at stations in Table 1,
3. 2 × 20 MVAr LV shunt capacitors at Woodstock TS in service,
4. Existing 2 × 20 MVAr LV shunt capacitors at Brantford TS in service, one existing and one new,
5. Existing 1 × 120 MVAr 115 kV shunt capacitor at Buchanan TS in service,
6. Voltage dependent load model for post-contingency pre-ULTC simulations (50% constant impedance and 50% constant current for active power and 0% constant current and 100% constant impedance for reactive power).

5.4 Voltage Analysis

The following IESO criteria must be satisfied before any new equipment is connected to the transmission system:

1. The pre-contingency voltage on 230 kV buses can not be less than 220 kV.
2. The post-contingency voltage on 230 kV buses can not be less than 207 kV.
3. The pre-contingency voltage on 115 kV buses can not be less than113 kV.
4. The post-contingency voltage on 115 kV buses can not be less than 108 kV.
5. The voltage drop following a contingency can not exceed 10% pre-ULTC and 10% post-ULTC.

Voltage performance at Woodstock TS is a big concern especially when there is a contingency associated with W7W or W12W. This was identified in SIA study for Toyota TS (CAA ID 2006-225).

Load flow studies have been carried out to examine the voltage performance at stations with the proposed Woodstock Area Transmission Reinforcement project.

Contingencies associated with M32W or M33W are simulated for voltage studies. Simulation results indicate that there is no difference in voltages between contingencies associated with M32W and M33W. Therefore, only results with contingencies involved M32W are shown in this report.

The simulation results for pre- and post-contingency voltages are shown in Table 2.

Table 2 Pre- and Post-contingency Voltages

Stations	**Buchanan**	**Ingersoll**		**Karn**		**Woodstock**		**Toyota**	
Buses (kV)	230	230	27.6	230	115	115	27.6	115	13.8
Pre-contingency (kV)	242.9	239.5	27.7	238.9	121.1	120.8	28.7	120.1	13.9
Pre-ULTC (kV)	242.6	234.7	26.0	233.4	117.3	116.7	26.9	116.0	13.4
Voltage Decline (%)	0.1	2.0	6.1	2.3	3.1	3.4	6.3	3.4	3.6
Post-ULTC (kV)	241.8	232.9	27.3	231.4	116.1	115.4	28.6	114.6	13.4
Voltage Decline (%)	0.5	2.8	1.4	3.1	4.1	4.5	0.3	4.6	3.6

The study results indicate that all the pre-contingency voltages and post-contingency voltage declines meet the Market Rules requirements.

As concluded in the SIA study for Toyota TS, voltage performance at Woodstock TS is a big concern for contingencies associated with W7W or W12W. The post-contingency voltage at the proposed Toyota TS would just meet Market Rule requirements. This will limit the system capability to supply the load growth in the Woodstock area. With the proposed reinforcement the voltage performance of the area transmission exceeds the Market Rule requirements. Further simulations indicate that the reinforcement project will ensure adequate supply to the local area loads until 2015.

5.5 Thermal Study

This section covers an investigation of thermal capability of the 230 kV and 115 kV circuits related to the proposed project and any new thermal problems introduced by the new project. The same modified summer 2006 base case and study assumptions listed in section 5.4 were used.

Ratings of the 230 kV circuits M32W/M33W and the 115 kV circuits W7W/W12W are shown in Table 3. The ratings for the existing circuits were calculated for the summer peak conditions, i.e. temperature of 35ºC, wind speed of 5 km/h and for the day time. Pre-load dependant LTRs were calculated assuming circuit pre-contingency loading of 75%.

Table 3 Circuit Ratings

Circuits	Sections	Continuous Rating		15 Minutes LTR	
		A	MVA*	A	MVA*
M32W/M33W	Buchanan-Middleport	2130	849	3250	1295
	Salford Jct-Ingersoll	830	331	1020	406
	Ingersoll-Karn	1410	561	1590	633
W7W/W12W	Karn-Woodstock	1300	270	N/A**	N/A

*: MVA@ 230 kV for M32W/M33W and 120 kV for W7W/W12W
**: Not provided in Hydro One's planning specification

Simulations were performed to investigate power flows for pre-contingency conditions and after the loss of M32W/W12W or M33W/W7W. Results are shown in Table 4.

Table 4 Pre- and Post-contingency Power Flow

Circuits	M32W/M33W			W7W/W12W
Sections	Buchanan-Middleport	Salford Jct-Ingersoll	Ingersoll-Karn	Karn-Woodstock
Continuous Rating (MVA)	894	331	561	270
Pre-Contingency (MVA)	196.8	105.0	50.7	50.7
% of Continuous Rating	22.0	31.7	9.0	18.8
LTR (MVA)	1295	406	633	>270
Post-Contingency (MVA)	301.8	242.9	124.9	122.7
% of LTR	23.3	59.8	19.7	<45.4

The results indicate that pre-contingency power flows are far below the circuit continuous ratings and the post-contingency power flows on the remaining circuits are well within the LTR of the circuits. Therefore, it can be concluded that there is no thermal concern for the 230 kV and 115 kV circuits with the proposed Woodstock Area Transmission Reinforcement project.

5.6 Summary

The findings of analysis are summarized as follows:

1. The proposed Woodstock Area Transmission Reinforcement project will solve the Woodstock area voltage problems identified in the SIA performed for the proposed transformer station, Toyota TS.

2. Pre-contingency and post-contingency voltages in Woodstock area with the proposed project meet Market Rules requirements.

3. There is no thermal overloading concern associated with the 230 kV and the 115 kV circuits with the proposed Woodstock Area Transmission Reinforcement project.

– End of Report –