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LOCAL PLANNING REPORT

Woodstock Sub-region Restoration Region: London Area

Date: May 19, 2017

Revision: Final

Prepared by: Woodstock Sub-region Local Planning Study Team



This report is prepared on behalf of the Woodstock Sub-region Local Planning study team with the participation of representatives from the following organizations:

Organizations
Hydro One Networks Inc. (Lead Transmitter)
Erie Thames Powerlines Corporation
Hydro One Networks Inc. (Distribution)

Disclaimer

This Local Planning Report was prepared for the purpose of developing wires-only options and recommending a preferred solution(s) to address the local needs identified in the Needs Assessment (NA) report for the London Region that do not require further coordinated regional planning. The preferred solution(s) that have been identified through this Local Planning Report may be reevaluated based on the findings of further analysis. The load forecast and results reported in this Local Planning Report are based on the information and assumptions provided by study team participants.

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LOCAL PLANNING EXECUTIVE SUMMARY

REGION	London Region (the “Region”)		
LEAD	Hydro One Networks Inc. (“Hydro One”)		
START DATE	September 16, 2016	END DATE	May 19, 2017
1. INTRODUCTION			
<p>In 2015, a Needs Assessment study was conducted to assess the transmission system supplying the London Region and a number of issues were identified. Subsequently, the IESO carried out its Scoping Assessment to determine the degree of regional coordination required to address each need. It was concluded that Woodstock sub-region restoration need is local in nature and is best addressed by wires options through local planning led by Hydro One with participation of the impacted LDCs. The purpose of this Local Planning report is to develop wires-only options and recommend a preferred solution that will address the Woodstock sub-region restoration need referenced in both Needs Assessment and the Scoping Assessment reports for London Area.</p> <p>The development of the LP report is in accordance with the regional planning process as set out in the Ontario Energy Board’s (“OEB”) Transmission System Code (“TSC”) and Distribution System Code (“DSC”) requirements and the “Planning Process Working Group (PPWG) Report to the Board”.</p>			
2. LOCAL NEED ADDRESSED IN THIS REPORT			
<p>During Needs Assessment, it was identified that more than 180 MW of load will be interrupted by configuration following the simultaneous loss of the 230 kV supply circuits M31W/M32W and this report is developed to address the restoration need.</p>			
3. FINDINGS			
<p>Based on the updated load forecast and transfer capability information, there is sufficient transfer capability in the existing system to restore interrupted loads from neighbouring regions within prescribed time frames and therefore, satisfying the restoration criteria.</p>			
4. CONCLUSION			
<p>The local planning study team agreed that no action is required at this time.</p>			

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1 Introduction

As part of the OEB-mandated regional planning process, a [Needs Assessment](#) study for London area was conducted in 2015 by Hydro One Transmission, Independent Electricity System Operator (“IESO”), Erie Thames Powerlines, Entegrus, Hydro One Distribution, London Hydro, St. Thomas Energy, Tillsonburg Hydro and Woodstock Hydro. The study assessed the electricity infrastructure supplying the London Region for the ten – year period starting from 2014 and it identified a number of constraints in the area. The IESO subsequently carried out its [Scoping Assessment](#) and concluded that, among other things, need in the Woodstock sub-region should be addressed through Local Planning between Hydro One Transmission and impacted local distribution companies (“LDCs”).

This Local Planning report was prepared for the purposes of addressing the Woodstock sub-region M31W/M32W restoration need referenced in both Needs Assessment and the Scoping Assessment reports for London Area. Following the acquisition of Woodstock Hydro, the Woodstock sub-region Local Planning study team is consist of Erie Thames Powerlines, Hydro One Distribution and Hydro One Transmission.

1.1 Geographical Area and Existing Supply Network

The Woodstock sub-region is located in southwestern Ontario and includes town of Ingersoll, City of Woodstock and rest of northern part of Oxford County.

Woodstock sub-region’s electricity demand is a mix of residential, commercial and industrial loads. There is no major generation facility in the Woodstock sub-region and power is delivered by the 230 kV and 115 kV transmission lines in the vicinity. The 230 kV double circuit line, M31W and M32W connecting Buchanan TS and Middleport TS, is tapped off at Salford Junction and supplies Karn TS and step-down transformer station Ingersoll TS. Karn TS currently houses two autotransformers which were placed in-service in 2011 as part of the “Woodstock Area Transmission Reinforcement” project and they provide necessary transformation from 230 kV level to 115 kV level. The 115 kV double circuit lines K7/K12 supplied out of Karn TS are approximately 22 km in length and the three transformer stations connected – namely Woodstock TS, Commerce Way TS, and Toyota Woodstock TS – step 115 kV transmission voltage level down to lower distribution voltages for serving customers in the area. Electricity distribution services to customers in the Woodstock sub-region are provided by Erie Thames Powerlines and Hydro One Distribution.

A map of the Woodstock sub-region and schematic of the existing transmission system of the area are shown in Figure 1 and Figure 2 respectively.

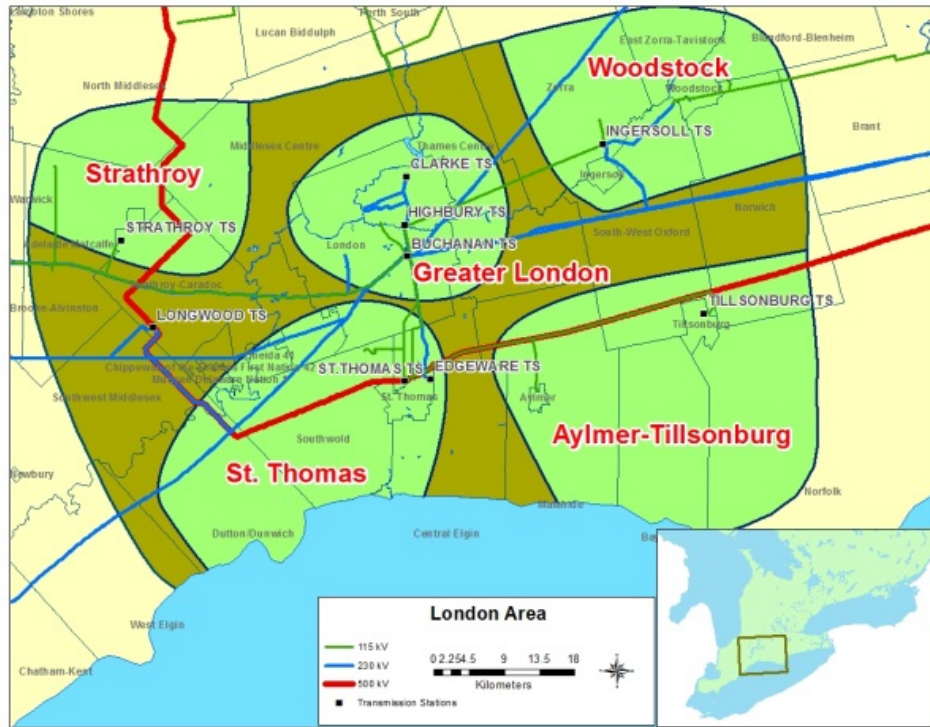


Figure 1 – Map of Woodstock Sub-region and London Region

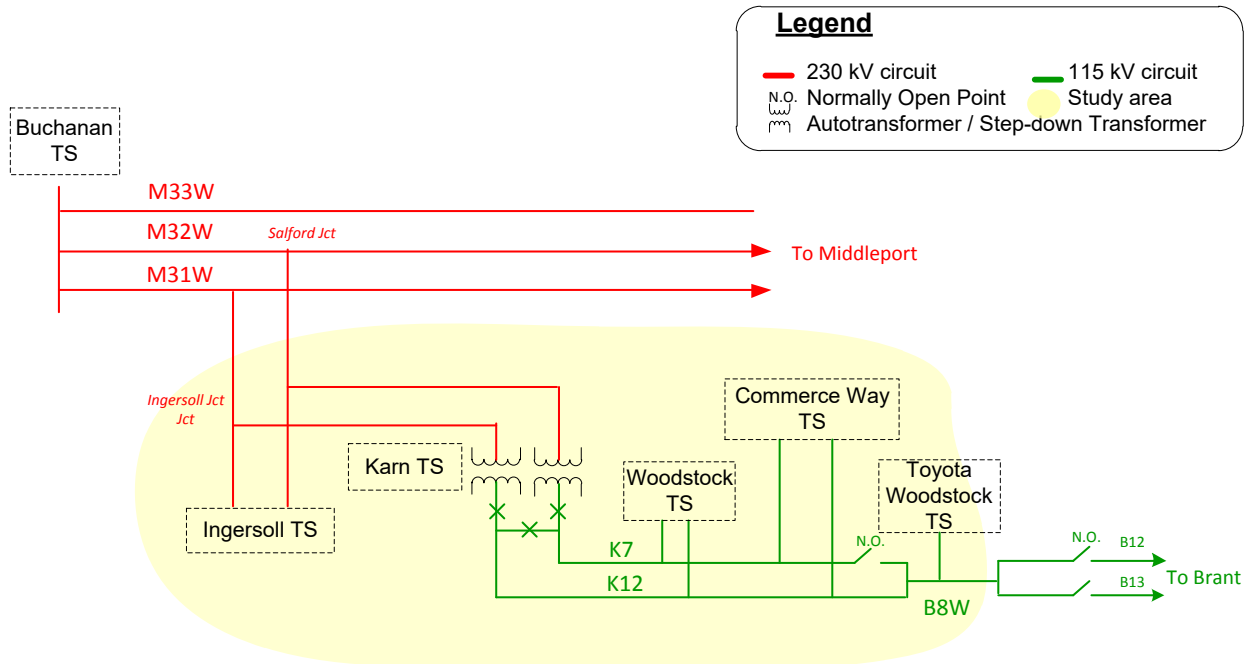


Figure 2 – Simplified schematic of Woodstock sub-region transmission system

1.2 Planned and Committed Facilities

There are several projects currently under development or being planned to address immediate and near term customer needs and reliability issues within the Woodstock sub-region and neighbouring region.

As shown in Figure 2, Woodstock subsystem and Brant subsystem are electrically isolated at the normally-opened points on B12/B13 circuits. In 2015, the Brant Integrated Regional Resource Plan (“IRRPP”) study team comprising of Brant County Power Inc., Brantford Power Inc. Hydro One Distribution, Hydro One Transmission and the IESO recommended new switching facilities to be built at Brant TS to address the near term capacity needs in the Brant-Powerline 115 kV sub-system. By replacing the existing normally-opened points on B12/B13 and B8W with three 115 kV breakers and operating the Karn TS 115 kV tie breaker normally open, this project will provide additional supply capacity to the Brant-Powerline 115 kV sub-system. Further, measures will be in place for B8W in-line breaker to be automatically opened for loss of both Karn TS autotransformers. As a result of this project, the Woodstock sub-region will be connected to its neighbouring Brant sub-region electrically in normal operating conditions. The proposed in-service date for this project is Q1 2019. Hydro One brought forward this proposal in its transmission rates application (EB-2016-0160).

Development for a new overhead extension of 115 kV circuit K7/B8W 3 km in length from Commerce Way Junction to Toyota Woodstock TS and a new step-down transformer at Toyota Woodstock TS is currently underway at customer’s request to improve supply reliability. The project will be subject to OEB’s Leave-to-Construct Section 92 Approval process and the target in-service date is Q1 2019.

These reinforcements are summarized pictorially in Figure 3.

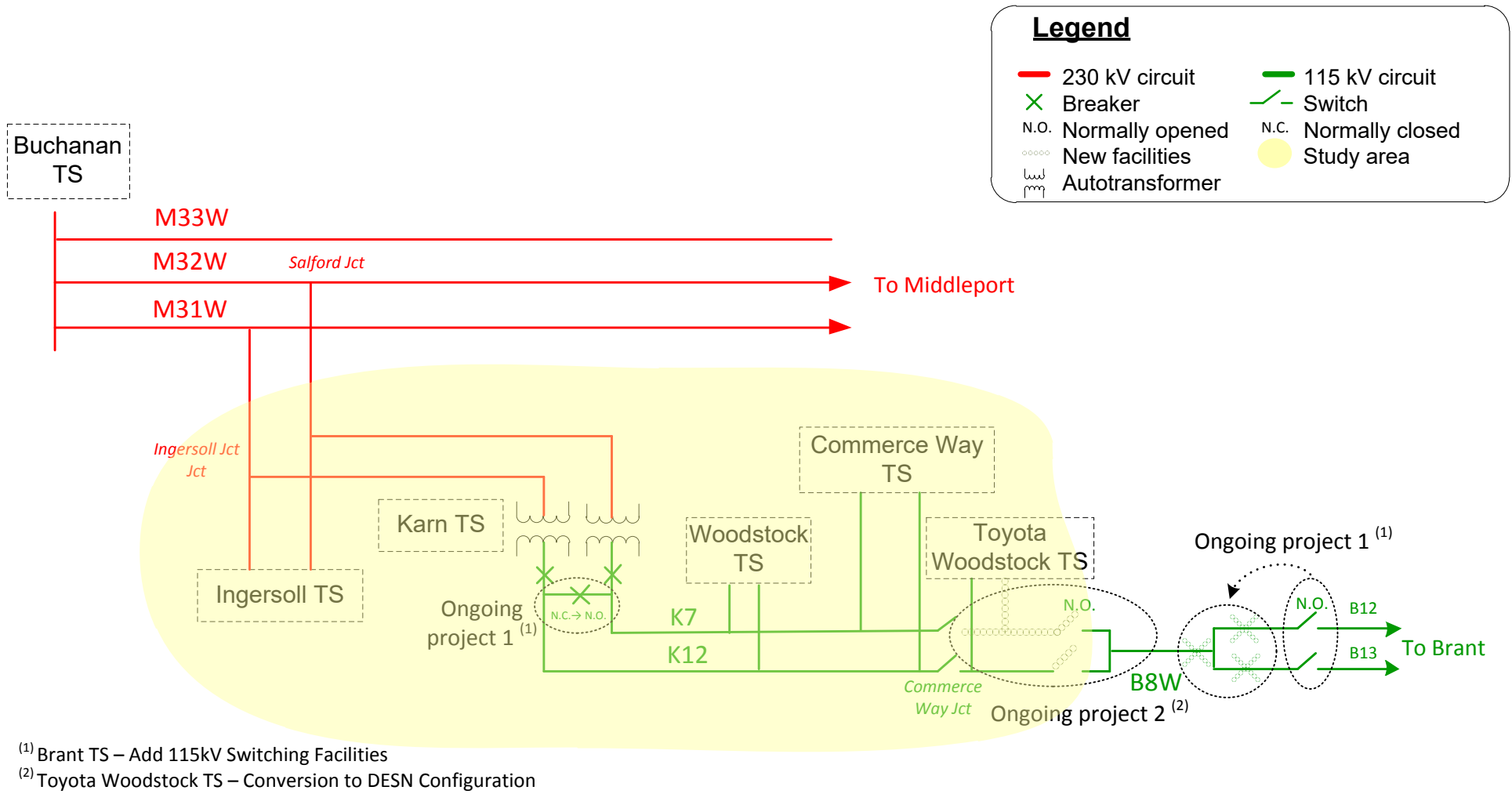


Figure 3 – Planned and committed transmission projects in the Woodstock sub-region

2 Load Forecast

Ten – year electricity load forecast was prepared with inputs from downstream LDCs and the IESO. Erie Thames Powerlines and Hydro One Distribution provided gross load forecasts for 2016 – 2025 inclusive. The station gross load forecast was then extrapolated by applying the corresponding annual growth rates to 2015 historical demand. The Woodstock sub-regional actual coincident peak load in 2015 was approximately 182 MW and for planning purpose, the reference points of step-down transformer stations were adjusted upward by 2 – 4% to account for extreme weather correction¹. The net load forecast takes account of conservation and demand management (“CDM”) programs and distributed generation (“DG”) in the distribution network that are either presently in place or foreseen by the IESO, each of which may have the effect of reducing the forecast demand to be supplied. The DG information included represents the annual incremental, effective capacity of all generation contracts with the IESO and in combination with forecasted CDM, they reflect reduction applied to gross peak demand.

Assuming that large industrial customer load will maintain at its current 20 MW level, the total load in the Woodstock sub-region will remain above 180 MW throughout the study period.

The resultant net load forecast on a station basis is tabulated in Table 1.

(MW)		2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Commerce Way TS	Station Gross Load		34.9	35.0	35.1	35.3	35.4	35.5	35.6	35.8	35.9	36.0
	Incremental DG		0.03	0	0	0	0	0	0	0	0	0
	CDM		0.4	0.6	1.0	1.4	1.7	1.9	2.1	2.2	2.4	2.6
	Station Net Load	33.4	34.5	34.4	34.1	33.9	33.7	33.6	33.5	33.5	33.5	33.4
Ingersoll TS	Station Gross Load		76.4	76.5	76.6	76.6	76.7	76.8	76.9	77.0	77.1	77.2
	Incremental DG		0.00	0.20	0.49	0	0	0	0	0	0	0
	CDM		0.8	1.4	2.2	3.0	3.6	4.1	4.5	4.8	5.2	5.6
	Station Net Load	75.1	75.6	74.9	73.9	73.7	73.1	72.8	72.4	72.2	71.9	71.6
Woodstock TS	Station Gross Load		58.3	58.5	58.7	58.9	59.1	59.3	59.5	59.7	60.0	60.2
	Incremental DG		0.02	0.24	0	0	0	0	0	0	0	0
	CDM		0.6	1.0	1.7	2.3	2.8	3.1	3.5	3.7	4.1	4.3
	Station Net Load	56.5	57.6	57.2	57.0	56.6	56.3	56.2	56.0	56.0	55.9	55.8
Toyota Woodstock TS	Station Load*		20	20	20	20	20	20	20	20	20	20
Woodstock Sub-region Total Net Load			188	186	185	184	183	182	182	182	181	181

* Assumed load, based on Hydro One Transmission's information

Table 1 – Ten-year load forecast for Woodstock sub-region (MW)

3 Assessment and Findings

The Ontario Resource and Transmission Assessment Criteria (“ORTAC”) outlines the supply reliability planning requirements to ensure loading on transmission network does not exceed equipment ratings under both normal and contingency operating conditions. Among other things,

¹ Weather correction factors for Commerce Way TS, Ingersoll TS and Woodstock TS are 4%, 2% and 3% respectively

the supply restoration criteria in ORTAC requires that in the planning of electrical services to an area, the delivery system needs to have sufficient ability to restore interrupted load in a reasonable time following the critical double-element of [N – 2] contingency. Specifically, for interrupted load of over 250 MW, the portion above 250 MW must be restored within 30 minutes. For interrupted load level between 150 and 250 MW, the portion above 150 MW must be restored within 4 hours with the remainder restored in 8 hours. Additionally, the maximum amount of load that can be interrupted under the security criterion for a [N – 2] contingency is 600 MW. The application of the security criterion identifies when an area would require an alternative source of supply or a greater diversity of supply to maintain an adequate level of security.

For Woodstock sub-region, the critical line section for [N – 2] contingency is M31W/M32W tap between Salford Junction and Ingersoll Junction, which is approximately 11 km in length. Should this contingency occur, all of the sub-region load, which amounts to 188 MW in 2016 (Table 1), would be interrupted by configuration. In accordance with ORTAC, the system is required to restore 38 MW within 4 hours and the remaining 150 MW within 8 hours.

Under such emergency conditions, depending on system performance and availability of switching facilities, all or a portion of a load station could be restored by transferring load to neighbouring unaffected supply. Hydro One Distribution estimated 10 MW of load at Ingersoll TS can be transferred to Highbury TS. Another 8 MW could be transferred from Commerce Way TS to Tillsonburg TS on the feeder level. On the transmission side, the supply from Brant will be able to restore about 20 MW of load in the Woodstock sub-region before minimum allowable post-contingency voltage limit of 108 kV is reached². These measures can be deployed remotely to manage and mitigate the impact of the [N – 2] contingency within the 4 hours timeframe. To restore the remaining 150 MW of interrupted load within 8 hours, field crew from the nearest staffed centre in London area will be dispatched and install temporary fixes on the transmission system such as building emergency by-pass.

4 Conclusion

Based on the information provided in this report, there is sufficient transfer capability on existing system to meet restoration criteria over the ten – year study period between 2016 and 2025. Therefore, Erie Thames Powerlines, Hydro One Distribution and Hydro One Transmission agreed that no further action is required at this time. The study team will continue to monitor and track the development in the Woodstock sub-region and reconvene should unforeseen needs emerge prior to the next regional planning cycle starting in 2018.

² Based on the load forecast for stations connected to B12/B13 as documented in [Brant IRRP](#) and [Burlington to Nanticoke Local Planning report](#): combined loading of 158 MW was assumed for Powerline MTS and Brant TS; 54 MW for Dundas TS #2.

5 **References**

- [1] [Planning Process Working Group \(PPWG\) Report to the Board: The Process for Regional Infrastructure Planning in Ontario – May 17, 2013](#)
- [2] [IESO Ontario Resource and Transmission Assessment Criteria \(ORTAC\)](#)
- [3] [London Region Needs Assessment Report](#)
- [4] [London Region Scoping Assessment Report](#)

Appendix A: Acronyms

CDM	Conservation and Demand Management
DG	Distributed Generation
DSC	Distribution System Code
IESO	Independent Electricity System Operator
IRRP	Integrated Regional Resource Planning
kV	Kilovolt
LDC	Local Distribution Company
LP	Local Planning
LTE	Long Term Emergency
LTR	Limited Time Rating
LV	Low-voltage
MW	Megawatt
MVA	Mega Volt-Ampere
OEB	Ontario Energy Board
ORTAC	Ontario Resource and Transmission Assessment Criteria
PF	Power Factor
PPWG	Planning Process Working Group
RIP	Regional Infrastructure Planning
SIA	System Impact Assessment
TSC	Transmission System Code