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LOCAL PLANNING REPORT

Strathroy TS Transformer Capacity
Region: London Area

Date: September 12, 2016
Revision: Final

Prepared by: Strathroy Sub-region Local Planning Study Team

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

Organizations
Hydro One Networks Inc. (Lead Transmitter)
Entegrus Inc.
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	June 17, 2016	**END DATE**	September 12, 2016

1. INTRODUCTION

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 Strathroy TS transformer capacity 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 Strathroy TS transformation capacity need referenced in both Needs Assessment and the Scoping Assessment reports for London Area.

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".

2. LOCAL NEEDS ADDRESSED IN THIS REPORT

During Needs Assessment, it was forecasted that Strathroy TS transformer will exceed its capacity and this report is developed to address this transformer capacity need.

3. FINDINGS

Based on the updated load forecast information, while load at Strathroy TS is expected to experience a mild growth over the next ten years, there is sufficient transformer capacity at Strathroy TS over the study period.

4. CONCLUSION

The local planning study team agreed that no action is required at this time.

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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 Power, 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 Strathroy 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 Strathroy TS transformation capacity need referenced in both Needs Assessment and the Scoping Assessment reports for London Area.

1.1 Geographical Area and Existing Supply Network

Strathroy Transformer Station ("TS") is a transmission substation that is located in Middlesex County in Southwestern Ontario and supplies the surrounding mainly-rural area, including the Middlesex county and townships of Adelaide-Metcalfe, Warwick, Strathroy-Caradoc. Presently, Strathroy TS is supplied radially from Buchanan TS, 45 km to the east, via 115 kV circuit W2S. Alternately, it can be supplied from the west from Scott TS via 115 kV circuit S2N. Strathroy TS houses two 25/33/42 MVA 110/28 kV step-down transformers and currently supplies Entegrus and Hydro One Distribution at 27.6 kV level.

Following the replacement of transformer T2 at Strathroy TS in August 2012, there is plan in place to replace T1 like-for-like by 2017.

The physical location of Strathroy TS and the existing substation assets are shown in Figure 1 and Figure 2 respectively.

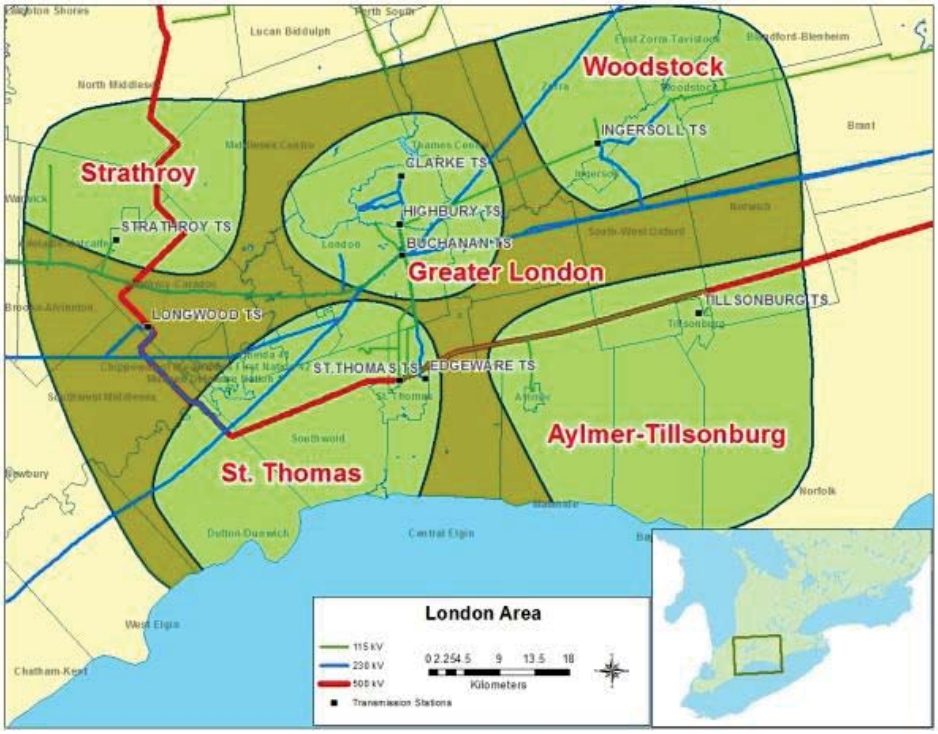

Figure 1 – Map of Strathroy Sub-region and London Region

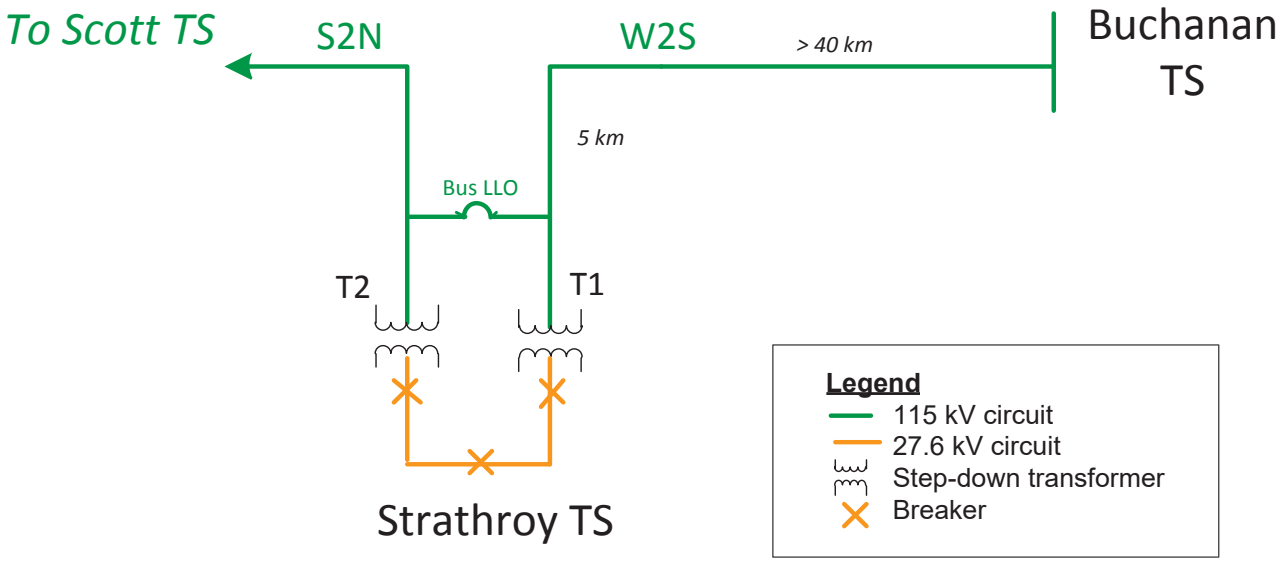

Figure 2 – Simplified schematic of Strathroy TS

2 Load Forecast

Ten – year electricity load forecast was prepared with inputs from downstream LDCs and the IESO. Entegrus and Hydro One Distribution provided gross load forecasts for 2016 – 2025. The station gross load forecast was then extrapolated by applying the corresponding annual growth rates to 2015 historical demand. The net load forecast takes account of conservation 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 forecasted CDM achievement in Strathroy TS is represented by percentages reduction applied to gross peak demand and DG information represents the annual incremental, effective capacity of all generation contracts with the IESO. The 2015 observed station peak for Strathroy TS is 38.9 MW and for planning purpose, the reference point of the forecast was adjusted upward by 6% to account for extreme weather correction. The resultant net load forecast is tabulated in Table 1.

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Station Gross Load		41.8	42.2	42.7	43.1	43.6	44.1	44.6	45.1	45.6	46.1
Incremental DG		0.15	0	0	0	0	0	0	0	0	0
CDM		1%	2%	3%	4%	5%	5%	6%	6%	7%	7%
Station Net Load	41.3	41.1	41.5	41.4	41.5	41.6	41.8	42.0	42.2	42.5	42.8

Table 1 – Ten-year load forecast for Strathroy TS (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. For transformer, in the event where one of the two transformers in a substation suffers an outage, namely a (N – 1) event, loading of the remaining transformer should not exceed its 10 – day limited time rating ("LTR").

At the time of this assessment, the 10 – Day Summer LTR rating for Strathroy TS is 53 MVA (or 50.4 MW at 0.95 power factor)[1]. During Needs Assessment, the combined station load was forecasted to exceed 50 MW in the near term, which means the remaining transformer could be overloaded for the loss its companion transformer. However, in examining the revised and updated load forecast, the 2015 historical actual is tracking 23% lower than the forecasted level in the Needs Assessment and in fact, the revised ten – year net forecast is 17% less than what was previously assumed in Needs Assessment. The downward adjustment

[1] 10 – Day LTR of 53 MVA is rated at 30 °C ambient temperature.

in station load forecast has meant that for the loss of one of the two transformers, the remaining transformer is capable of supplying all of Strathroy TS load while remaining under its 10 – Day LTR rating for the entire study period.

4 Conclusion

Based on the information provided in this report, there is sufficient transformer capacity at Strathroy TS to meet expected load growth over the ten – year study period between 2016 and 2025. Therefore, Entegrus, Hydro One Distribution and Hydro One Transmission agreed that no action is required at this time. Further, the study team will continue to monitor and track the development in the Strathroy sub-region and reconvene should unforeseen needs emerge prior to the next planning cycle starting in 2018.

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