



Hydro One Networks Inc.  
483 Bay Street  
Toronto, Ontario  
M5G 2P5

**NEEDS SCREENING REPORT**

**Region: GTA North**  
**Subregion: Western**

**Date: June 27, 2014**

Prepared by: GTA North, Western Subregion Study Team



<b>Study Team Participants</b>	
<b>Organization</b>	<b>Name</b>
Hydro One Networks Inc. (Lead Transmitter)	Nafiz Somjee Warren King
Independent Electricity System Operator	Phillip Woo
The Ontario Power Authority	Alexandra Barrett
Enersource Hydro Mississauga Inc.	Branko Boras
Hydro One Brampton Networks Inc.	Tom Wasik
Hydro One Networks Inc.(Distribution)	Charlie Lee
PowerStream Inc.	Richard Wang
Toronto Hydro-Electric System Limited	Angelo Boschetti

## **Disclaimer**

This Needs Screening Report was prepared for the purpose of identifying potential needs in the GTA North, Western Subregion and to assess whether those needs require further coordinated regional planning. The potential needs that have been identified through this Needs Screening Report may be studied further through subsequent regional planning processes and may be reevaluated based on the findings of further analysis. The load forecast and results reported in this Needs Screening Report are based on the information and assumptions provided by study team participants.

Study team participants, their respective affiliated organizations, and Hydro One Networks Inc. (collectively, “the Authors”) make no representations or warranties (express, implied, statutory or otherwise) as to the Needs Screening Report or its contents, including, without limitation, the accuracy or completeness of the information therein and shall not, under any circumstances whatsoever, be liable to each other, or to any third party for whom the Needs Screening Report was prepared (“the Intended Third Parties”), or to any other third party reading or receiving the Needs Screening Report (“the Other Third Parties”), for any direct, indirect or consequential loss or damages or for any punitive, incidental or special damages or any loss of profit, loss of contract, loss of opportunity or loss of goodwill resulting from or in any way related to the reliance on, acceptance or use of the Needs Screening Report or its contents by any person or entity, including, but not limited to, the aforementioned persons and entities.

## NEEDS SCREEN EXECUTIVE SUMMARY

<b>REGION</b>	GTA North, Western Subregion (the “Subregion”)		
<b>LEAD TRANSMITTER</b>	Hydro One Networks Inc. (“Hydro One”)		
<b>START DATE</b>	April 28, 2014	<b>END DATE</b>	June 27, 2014

### 1. INTRODUCTION

The purpose of this Needs Screening report is to undertake an assessment of the GTA North, Western Subregion and determine if there are regional needs that would lead to coordinated regional planning. Where regional coordination is not required and a “wires” only solution is necessary, such needs will be addressed between the relevant Local Distribution Companies (LDCs) and Hydro One and other parties as required.

For needs that require further regional planning and coordination, the Ontario Power Authority (OPA) will initiate the Scoping process to determine whether an OPA-led Integrated Regional Resource Planning (IRRP) process or the transmitter-led Regional Infrastructure Plan (RIP) process (wires solution) is required, or whether both are required.

### 2. REGIONAL ISSUE/ TRIGGER

The Needs Screening for the Subregion was triggered in response to the Ontario Energy Board’s (OEB) new Regional Planning process approved in August 2013. To prioritize and manage the regional planning process, Ontario’s 21 regions were assigned to one of three groups - Group 1 Regions are being reviewed first. The GTA North, Western Subregion belongs to Group 1 and the Needs Screening for this Region was triggered on April 28, 2014 and was completed on June 27, 2014.

### 3. SCOPE OF NEEDS SCREENING

The scope of this Needs Screening assessment was limited to the next 10 years because relevant data and information was collected up to the year 2023, as per the recommendations of the Planning Process Working Group Report to the Board. Needs emerging over the near-term (0-5 years) and mid-term (6-10 years) should be further assessed as part of the OPA-led Scoping Assessment and/or IRRP, or in the next planning cycle to develop a 20-year plan and strategic direction for the Region.

The assessment included a review of transmission system connection facilities capacity which covers station loading, thermal and voltage analysis, system reliability, operational issues such as load restoration and assets approaching end-of-useful-life.

### 4. INPUTS/DATA

Study team participants, including representatives from relevant LDCs, the OPA, the IESO, and Hydro One transmission provided information for the GTA North, Western Subregion. The information included historical load, load forecasts, Conservation and Demand Management (CDM) information, Distributed Generation (DG) information, and load restoration and performance information along with end-of-useful-life of any major equipment. See Section 4 for further details.

## **5. ASSESSMENT METHODOLOGY**

The assessment’s primary objective over the study period (2014 to 2023) was to identify the electrical infrastructure needs in the region. The study reviewed available information and load forecasts and conducted single contingency analysis to confirm needs, if any, and when they may be required. See Section 5 for further details.

## **6. RESULTS**

Transformer stations and transmission facilities in the Subregion have sufficient capacity to accommodate the expected load over the study period.

Inherent to radial configuration, loss of two radial 230 kV circuits V43 and V44 will result in loss of load. Load restoration for the loss of these two circuits as per the ORTAC guidelines is being further assessed as part of the OPA led Integrated Regional Resource Plan (IRRP) for the GTA West, Northern Subregion.

See section 6 for details.

## **7. RECOMMENDATIONS**

Based on the findings of the Needs Screening process, the study team recommends that further coordinated regional planning is required to assess load restoration for the loss of two radial elements (230 kV circuits V43 and V44). OPA will coordinate the assessment of this need currently underway as part of GTA West Northern Subregion IRRP process with the study team.

## TABLE OF CONTENTS

Table of Contents .....	6
1 Introduction.....	7
2 Regional Issue/Trigger.....	9
3 Scope of Needs Screening .....	9
3.1 Subregion Description and Connection Configuration .....	9
4 Inputs and Data .....	11
4.1 Load Forecast .....	11
5 Assessment Methodology .....	11
6 Results.....	12
6.1 230kV Supply in the Subregion .....	12
6.2 Transformer Stations in the Subregion .....	13
6.3 System Reliability, Operation and Load Restoration.....	13
6.4 Aging Infrastructure and Replacement Plans for Major Equipment.....	13
7 Recommendations.....	13
8 Next Steps.....	14
9 References.....	14

## 1 INTRODUCTION

This Needs Screening report provides a summary of needs that are emerging in the GTA North, Western Subregion (the “Subregion”) over the next ten years. The development of the Needs Screening report is in accordance with the regional planning process as set out in the Ontario Energy Board’s (OEB) Transmission System Code (TSC), Distribution System Code (DSC) and the Planning Process Working Group (PPWG) Report to the Board.

The purpose of this Needs Screening report is to undertake an assessment of the Subregion, and determine if there are regional needs that would lead to coordinated regional planning. Where regional coordination is not required and a wires-only solution is necessary such needs will be addressed between the relevant Local Distribution Companies (LDCs) and Hydro One and other parties as required. For needs that require further regional planning and coordination, the Ontario Power Authority (OPA) will initiate the Scoping process to determine whether an OPA-led Integrated Regional Resource Planning (IRRP) process or the transmitter-led Regional Infrastructure Plan (RIP) process (wires solution) is required, or whether both are required.

The preparation of this report was carried by the GTA North, Western Subregion Needs Screening study team (Table 1) and led by the transmitter, Hydro One Networks Inc. The report captures the results of the assessment based on information provided by the LDCs, the Ontario Power Authority (OPA) and the Independent Electricity System Operator (IESO).

**Table 1: Study Team Participants for GTA North, Western Subregion**

No.	Organization
1.	Hydro One Networks Inc. (Lead Transmitter)
2.	The Ontario Power Authority
3.	The Independent Electricity System Operator
4.	Enersource Hydro Mississauga Inc.
5.	Hydro One Brampton Networks Inc.
6.	Hydro One Networks Inc.(Distribution)
7.	PowerStream Inc.
8.	Toronto Hydro-Electric System Limited

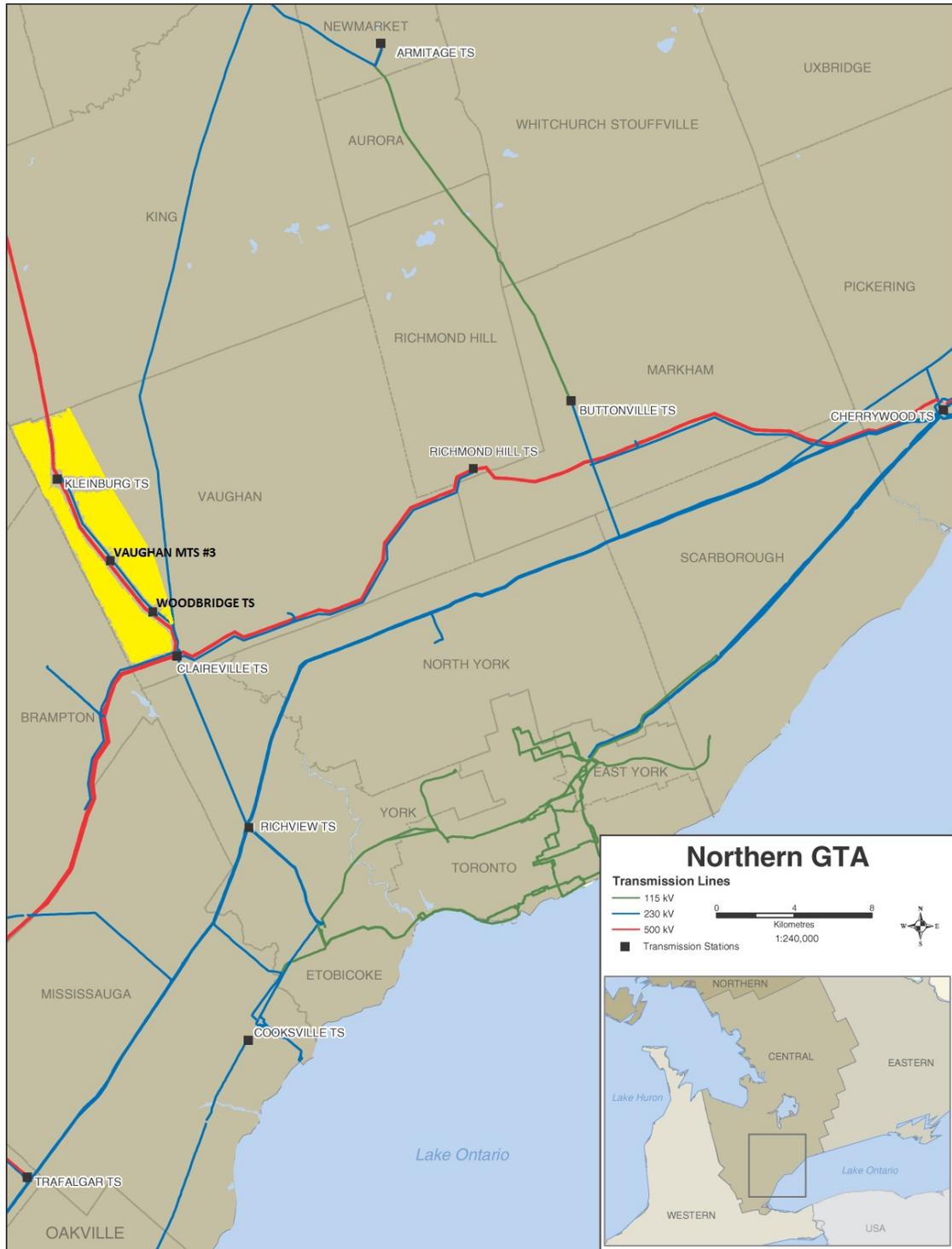


Figure 1: GTA North, and Western Subregion (shown in yellow highlight).

## **2 REGIONAL ISSUE/TRIGGER**

The Needs Screening for the GTA North, Western Subregion was triggered in response to the Ontario Energy Board's (OEB) new Regional Planning process approved in August 2013. To prioritize and manage the regional planning process, Ontario's 21 regions were assigned to one of three groups, where Group 1 Regions are being reviewed first. The GTA North region belongs to Group 1. The Needs Screening for this Subregion was triggered on April 28, 2014 and was completed on June 27, 2014.

## **3 SCOPE OF NEEDS SCREENING**

This Needs Screening covers the Subregion over an assessment period of 2014 to 2023. The scope of the Needs Screening includes a review of system capability which covers transformer station loading and transmission line thermal and voltage analysis. System reliability, operation, load restoration and asset sustainment issues were also reviewed as part of this screening.

### **3.1 Subregion Description and Connection Configuration**

The GTA North, Western Subregion includes the area roughly bordered geographically by Steeles Avenue on the south, King-Vaughan Rd on the north, Highway 50 on the west and Weston Road on the east. The GTA North Western Subregion comprises the Western portion of the City of Vaughan.

Electrical supply to the GTA North Western Subregion is provided through 230 kV transmission lines and step-down transformation facilities as shown in Figure 1 above and Figure 2 below. Supply to this Subregion is provided through the 230 kV Claireville TS to Kleinburg TS transmission lines (V43 and V44). The distribution systems supplied by this Subregion operate at 27.6 kV and 44 kV.

The 230 kV Claireville TS to Brown Hill TS and the Claireville TS to Parkway TS transmission lines and the stations supplied from these lines are not included in the GTA North Western Subregion but are included in a the York Subregion of GTA North.

Table 2 below lists the substations in the GTA North, Western Subregion, the LDCs supplied by each station and the stations' actual 2013 non-coincident summer peak demand as per IESO data.

**Table 2: 2013 Summer Peak Station Demand**

Station	2013 Peak Station Demand (MW)	LDCs
Woodbridge TS	151	Enersource Hydro Mississauga Inc.
		Hydro One Brampton Networks Inc.
		PowerStream Inc.
		Toronto Hydro-Electric System Limited
Vaughan MTS #3	152	Powerstream Inc.
Kleinburg TS	136	Hydro One Networks Inc. (Distribution)
		PowerStream Inc.

A single line diagram of the Subregion’s transmission supply and transformer stations is shown in Figure 2 below. Goreway TS is not part of this Subregion, but its loading is considered due to the impact on the V43 circuit which supplies the Subregion. The 2013 coincident summer peak demand supplied by the 230 kV V43/V44 circuits is approximately 500 MW, which includes the portion of Goreway TS coincident summer peak demand supplied by the V43 circuit.



\* Goreway TS is not part of the GTA North, Western Sub-Region study but its loading is considered due to impact on loading of circuit V43.

**Figure 2: Single Line Diagram – GTA North, Western Subregion**

## **4 INPUTS AND DATA**

In order to conduct this Needs Screening, study team participants provided the following information and data to Hydro One:

- IESO provided:
  - i. Historical regional coincident peak load and station non-coincident peak load.
  - ii. List of existing reliability and operational issues.
- LDCs and Transmission Connected Customers provided historical (2011-2013) net load and gross load forecast (2014-2023).
- Hydro One provided transformer, station, and line ratings.
- OPA provided Conservation and Demand Management (CDM) and Distributed Generation (DG) data.
- Any relevant planned transmission and distribution investments were provided by the transmitter and LDCs, etc.

### **4.1 Load Forecast**

As per data provided by the study team, gross load in the GTA North, Western Subregion is expected to grow at an approximate rate of 1.1% annually between 2014 and 2023. The near term growth rate, between 2014 and 2018, is expected to be approximately 1.17% per year and the medium term growth rate, between 2018 and 2023, is expected to be 1.03% per year.

The Needs Screening assessment considered gross loads at individual stations based on the 2013 summer peak non-coincident demand and the summer peak non-coincident demand forecasts for stations within the Subregion. The station load forecast was developed by applying load growth rates derived from the LDCs' load forecasts.

## **5 ASSESSMENT METHODOLOGY**

The following methodology and assumptions were made in this Needs Screening assessment:

1. The Subregion is summer peaking so this assessment is based on summer peak loads.
2. The coincident load forecast is based on the forecast growth rates provided by the Subregion's LDCs and historical 2013 summer peak loads as the reference point. The 2013 historical peak loads are adjusted for extreme weather conditions according to Hydro One methodology.
3. The Subregion's non-coincident peak load forecast for station capacity assessment was developed from load forecasts provided by LDCs.

4. Gross coincident peak load forecast is used to develop a worst-case scenario to identify needs. Where applicable, net coincident peak load forecast, which includes forecasted CDM and DG contributions, is used to determine the timing of needs.
5. Review and assess the impact of any on-going or planned development project in the Subregion during the study period.
6. Review and assess the impact of any critical/major elements planned/identified to be replaced at the end of their useful life such as auto transformers, cables and stations.
7. To identify the emerging needs in each area, the study was performed observing all elements in service and one element out of service.
8. Station capacity adequacy is assessed by comparing non-coincident peak load with the station's normal supply capacity assuming a 90% lagging power factor for stations having no low-voltage capacitor banks and 95% lagging power factor for stations having low-voltage capacitor banks.
9. Normal supply capacity for transformer stations is the summer 10-Day Limited Time Rating (LTR).
10. Transmission adequacy assessment is primarily based on but is not limited to, the following criteria:
  - With all elements in service, the system is to be capable of supplying forecast demand with equipment loading within continuous ratings and voltages within normal range.
  - With one element out of service, the system is to be capable of supplying forecast demand with circuit loading within their long-term emergency (LTE) ratings and transformers within their summer 10-Day LTR.
  - All voltages must be within pre and post contingency ranges as per ORTAC criteria.

## 6 RESULTS

This section summarizes the results of the Needs Screening in the GTA North, Western Subregion.

### 6.1 230kV Supply in the Subregion

The 230kV transmission system in the Subregion consists of two radial transmission circuits, V43 and V44 which originate from Claireville TS and supply the three stations in the region: Woodbridge TS, Vaughan #3 MTS and Kleinburg TS. In addition to supplying the three stations in the Subregion, V43 supplies Goreway TS which is not within the GTA North, Western Subregion. Loading of Goreway TS has been considered in performing the Needs Screening for the 230 kV transmission supply.

With the expected load growth in the Subregion, the V43 and V44 circuits are expected to remain within their normal supply capacity over the period covered by the Needs Screening. Line voltages under regional peak loading conditions are within the limits specified in ORTAC.

## 6.2 Transformer Stations in the Subregion

Transformer Stations in the Subregion include the following:

- i) Woodbridge TS: Capacity at Woodbridge TS is sufficient to accommodate the expected load growth over the study period.
- ii) Vaughan MTS #3: This station is loaded to its normal rated supply capacity as of 2013. Vaughan MTS #4, which is expected to be in service in 2017, will relieve Vaughan TS #3. The 230 kV transmission lines between Claireville TS and Minden TS, which are expected to supply Vaughan MTS #4, are not part of this Subregion.
- iii) Kleinburg TS: Capacity at Kleinburg TS is sufficient to accommodate the expected load growth over the study period.

## 6.3 System Reliability, Operation and Load Restoration

Generally speaking, there are no significant system reliability and operating issues for one element out of service.

Inherent to radial configuration, loss of two radial 230 kV circuits V43 and V44 will result in loss of load. Load restoration for the loss of these two circuits as per the ORTAC guidelines is being assessed as part of the OPA led Integrated Regional Resource Plan (IRRP) for the GTA West, Northern Subregion.

## 6.4 Aging Infrastructure and Replacement Plans for Major Equipment

During the study period:

- None of the sub-station step-down transformers are expected to reach the end of their useful life.
- No high voltage cables in the area are expected to reach the end of their useful life.

# 7 RECOMMENDATIONS

Based on the findings of the Needs Screening, the study team recommends that further coordinated regional planning is required to assess load restoration for the loss of two radial elements (230 kV circuits V43 and V44). OPA is assessing this need as part of its GTA West, Northern Subregion IRRP and will coordinate the assessment with the study team.

## **8 NEXT STEPS**

Based on the findings of the Needs Screening process, the next steps for this Subregion include:

- a) OPA to include relevant LDCs in the GTA West, Northern Subregion IRRP process to participate in the assessment of load restoration needs identified for this Subregion.
- b) Revisit the Subregion’s needs during the next regional planning cycle, which is expected to be within the next five years.

## **9 REFERENCES**

- i) [Planning Process Working Group \(PPWG\) Report to the Board The Process for Regional Infrastructure Planning in Ontario – May 17, 2013](#)
- ii) [IESO 18-Month Outlook: March 2014 – August 2015.](#)
- iii) [IESO Ontario Resource and Transmission Assessment Criteria \(ORTAC\) – Issue 5.0](#)
- iv) [OPA Terms of Reference for the GTA West, Northern Subregion IRRP.](#)