Hydro One Networks Inc.
7th Floor, South Tower
483 Bay Street
Toronto, Ontario M5G 2P5
www.HydroOne.com

Tel: (416) 345-5680
Cell: (416) 568-5534
frank.dandrea@HydroOne.com

Frank D'Andrea
Vice President, Regulatory Affairs & Chief Risk Officer

BY RESS, EMAIL AND COURIER

November 1, 2019

Ms. Christine E. Long
Board Secretary
Ontario Energy Board
Suite 2700, 2300 Yonge Street
P.O. Box 2319
Toronto, ON M4P 1E4

Dear Ms. Long,

EB-2011-0043 – 2019 Regional Planning Status Report of Hydro One Network Inc.

Section 3C.3.3 of the Transmission System Code requires transmitters to submit an annual report to the Ontario Energy Board, on November 1st of each year, that identifies the status of regional planning for all regions.

Please find attached Hydro One Networks Inc.'s 2019 Regional Planning Process Annual Status Report, pursuant to the above noted Code section.

Sincerely,

ORIGINAL SIGNED BY FRANK D'ANDREA

Frank D'Andrea

Regional Planning Process

Annual Status Report

2019

November 1st, 2019

[This page is intentionally left blank.]

EXECUTIVE SUMMARY

Transmitters are required under Section 3C.3.3 of the Transmission System Code[1] (TSC) to submit an annual report to the Ontario Energy Board (OEB or Board) on November 1st of each year which identifies the status of the regional planning for their respective regions. This is the sixth Annual Status Report produced by Hydro One Networks Inc. (Hydro One) and provides an update to the status of regional planning activities, recommended regional plans and accomplishments between November 2018 and October 2019.

Progress to Date

The first cycle of the regional planning for the 21 regions was completed in 2017 as per the process developed by the Planning Process Working Group (PPWG)[2]. During the first regional planning cycle, several lessons were learned to undertake improvements to the process, methodology, and assessments with respect to replacement of major transmission assets at or near their end of life (EOL) along with justification and documentation with respect to "right sizing" of equipment. In addition, as a Lead Transmitter, Hydro One also sent formal communications to Local Distribution Companies (LDCs) to seek feedback on prioritization and scheduling of regional planning for the regions, as well as seeking suggestions for enhancements in the second cycle of regional planning. These enhancements have been incorporated into the process, thereby significantly enhancing the quality of the planning reports. At this time, no significant changes to the formal prioritization to initiate regional planning are proposed. However, Hydro One is keeping abreast of the needs in the province and has advanced regional planning for several regions based on emerging urgent needs in these areas of the province.

The Regional Infrastructure Planning (RIP) report of the first cycle (February 2017) and the Needs Assessment (NA) report of the second cycle (May 2017) of regional planning process for the Burlington to Nanticoke Region were the first set of reports to include some of the enhancements discussed above. Subsequently, these changes were further enhanced and incorporated by Hydro One in the Needs Assessment reports completed to date for the second regional planning cycle currently underway (these reports cover the following regions: Burlington to Nanticoke, Greater Ottawa, GTA North, Toronto, Windsor-Essex, Kitchener-Waterloo-Cambridge-Guelph, GTA West, GTA East, East Lake Superior, and Greater Bruce/Huron).

The status of regional planning for each region is summarized in Table 1.

Table 1. Regional Planning Status Summary

Region	Sub-region	1st Cycle (2013-2017)				2nd Cycle (2017→)			
		NA (2)	SA (2)	IRRP (2)	RIP (2)	NA (2)	SA (2)	IRRP (2)	RIP (2)
Burlington to Nanticoke	Brant	May, 2014	Sep, 2014	Apr, 2015	Feb, 2017	May, 2017	Aug, 2017	*Feb, 2019*	Oct, 2019
	Bronte			Jun, 2016					
	Greater Hamilton			*Not Required*					
	Caledonia-Norfolk		*Not Required*	*Not Required*					
Toronto Area	Central Downtown	Jun, 2014	*Note1*	Apr, 2015	Jan, 2016	Oct, 2017	Feb, 2018	*Aug, 2019*	Q1 2020
	Northern		*Not Required*	*Not Required*					
Windsor-Essex		*Note1*		Apr, 2015	Dec, 2015	Oct, 2017	Mar, 2018	*Sep, 2019*	Q1 2020
GTA North	York	Jun, 2014	*Note1*	Apr, 2015	Feb, 2016	Mar, 2018	Aug, 2018	Q1 2020	
	Western		*Not Required*	*Not Required*					
Greater Ottawa	Ottawa	Jul, 2014	Nov, 2014	Apr, 2015	Dec, 2015	Jun, 2018	Sep, 2018	Q4 2019	
	Outer Ottawa		*Not Required*	*Not Required*					
Kitchener-Waterloo-Cambridge-Guelph		*Note1*		Apr, 2015	Dec, 2015	Dec, 2018	Apr, 2019	Q4 2019	
GTA West	Northwestern	May, 2014	Sep, 2014	Apr, 2015	Jan, 2016	May, 2019	Aug, 2019		
	Southern			*Not Required*					
Greater Bruce/Huron		May, 2016	*Not Required*	*Not Required*	Aug, 2017	May, 2019	Sep, 2019	In Progress	
East Lake Superior		Dec, 2014	*Not Required*	*Not Required*	Dec, 2014	Jun, 2019	Oct, 2019	Q1 2021	
GTA East	Pickering-Ajax-Whitby	Aug, 2014	Sep, 2014	Jun, 2016	Jan, 2017	Aug, 2019	Q4 2019		
	Oshawa-Clarington			*Not Required*					
London Area	Greater London	Apr, 2015	Aug, 2015	Jan, 2017	Aug, 2017	Expected to commence 2nd cycle in 2020			
	Alymer-Tillsonburg			*Not Required*					
	Strathroy			*Not Required*					
	Woodstock			*Not Required*					
	St. Thomas			*Not Required*					
Peterborough to Kingston		Feb, 2015	*Not Required*	*Not Required*	Jul, 2016				
South Georgian Bay/Muskoka	Barrie/Innisfil	Mar, 2015	Jun, 2015	Dec, 2015	Aug, 2017				
	Parry Sound/Muskoka			Dec, 2015					
Sudbury/Algoma		Mar, 2015	*Not Required*	*Not Required*	Jun, 2016				
Northwest Ontario	North of Dryden	*Note1*	Jan, 2015	Jan, 2015	Jun, 2017				
	Greenstone-Marathon			Jun, 2016					
	Thunder Bay			Dec, 2016					
	West of Thunder Bay			Jul, 2016					
Chatham/Lambton/Sarnia		Jun, 2016	*Not Required*	*Not Required*	Aug, 2017	Expected to commence 2nd cycle in 2021.			
Niagara		Apr, 2016	*Not Required*	*Not Required*	Mar, 2017				
North/East of Sudbury		Apr, 2016	*Not Required*	*Not Required*	Apr, 2017				
Renfrew		Mar, 2016	*Not Required*	*Not Required*	Jul, 2016				
St. Lawrence		Apr, 2016	*Not Required*	*Not Required*	Jul, 2016				
North of Moosonee		*Hydro One Transmission is not the lead transmitter in this region. Status to be provided by lead transmitter.*							

Note 1: The planning activity in the region was already in progress prior to the commencement of the regional planning process; hence the NA/SA was deemed to be already completed by the Working Group.
Notet 2: NA – Needs Assessment; SA – Scoping Assessment; IRRP – Integrated Regional Resource Plan; RIP – Regional Infrastructure Plan.

TABLE OF CONTENTS

Executive Summary 2
1. Introduction 5
2. Regional Planning Process Overview 6
    2.1 Regions 7
    2.2 Conservation & Demand Management (CDM) and Distributed Generation (DG) 9
3. Status of Regions 10
    3.1 Burlington to Nanticoke 10
    3.2 Toronto 15
    3.3 Windsor-Essex 17
    3.4 GTA North 18
    3.5 Greater Ottawa 21
    3.6 Kitchener-Waterloo-Cambridge-Guelph (KWCG) 25
    3.7 GTA West 26
    3.8 Greater Bruce/Huron 27
    3.9 East Lake Superior 28
    3.10 GTA East 29
    3.11 London Area 29
    3.12 Peterborough to Kingston 31
    3.13 South Georgian Bay/Muskoka 31
    3.14 Sudbury/Algoma 33
    3.15 Northwest Ontario 33
    3.16 Chatham/Lambton/Sarnia 35
    3.17 Niagara 36
    3.18 North/East Sudbury 36
    3.19 Renfrew 37
    3.20 St. Lawrence 37
    3.21 North of Moosonee 37
4. Lessons Learned 38
5. Conclusion 40
6. References 41
Appendix A. Conservation, Distributed Generation, and Other Initiatives 42
    A.1 Conservation Achievement 42
    A.2 Distribution Generation 43
    A.3 Other Initiatives 48
Appendix B. Planning Status Letters 50

1. INTRODUCTION

The process for electric power system planning in the Province of Ontario underwent a procedural change in 2013. A new regional planning process, which enables transparent, coordinated and cost-effective planning of regional transmission and distribution systems, was mandated by the Ontario Energy Board (OEB or Board) on August 26, 2013 through amendments to both the Transmission System Code[1] (TSC) and the Distribution System Code[3] (DSC). This process is outlined in the Planning Process Working Group's (PPWG) Report to the Board, titled "The Process for Regional Infrastructure Planning in Ontario"[4], revised May 17, 2013.

As per Section 3C.3.3 of the TSC, transmitters are required to submit an annual report to the Board on November 1st of each year, which identifies the status of the regional planning process and its deliverables in their respective regions. This sixth (2019) Annual Status Report, produced by Hydro One Networks Inc. (Hydro One), provides an update to the accomplishments and progress status of the regional planning activities from November 2018 to October 2019. It also identifies plans and projects already in execution to address new and previously identified needs.

The Report is structured as follows:

- Section 2 provides a brief overview of the regional planning process.
- Section 3 discusses the various regional planning activities and plans or projects completed or being undertaken.
- Section 4 identifies lessons learned and improvements made to the regional planning process.
- Section 5 provides a brief summary of the current status of regional planning and its accomplishments over the last year.

2. REGIONAL PLANNING PROCESS OVERVIEW

Bulk System Planning, Regional Planning and Distribution Planning are the three levels of planning for the electricity system in Ontario. Bulk system planning typically looks at issues that impact the system on a provincial level, and require longer lead times and larger investments. Comparatively, planning at the regional and distribution levels look at issues on a more regional or localized level. Typically, the most essential and effective regional planning horizon is the near- to medium-term (1-10 years), whereas long-term (10-20 years) regional planning mostly provides a future outlook with little details about investments because the needs and other factors may vary over time. On the other hand, bulk system plans are developed for the long term because of the larger magnitude of the investments.

The regional planning process begins with a Needs Assessment (NA) which is led by the transmitter to identify, assess and document which of the needs a) can be addressed directly between the customer and Hydro One along with a recommended plan, and b) that require further regional coordination and identification of Local Distribution Companies (LDCs) to be involved in further regional planning activities for the region.

At the end of the Needs Assessment, a decision is made by the Study Team as to whether further regional coordination is necessary to address some or all of the regional needs. If no further regional coordination is required, recommendation to implement the recommended option and any necessary investments are planned directly by the LDCs (or customers) and the transmitter. The Region's Study Team can also recommend Hydro One and the LDCs to undertake a local planning process for further assessment when needs a) are local in nature, b) require limited investments in wires (transmission or distribution) solutions, and c) do not require upstream transmission investments.

If coordination at the regional or sub-regional levels is required for identified regional needs, then the Independent Electricity System Operator (IESO) initiates the Scoping Assessment (SA) phase. During this phase, the IESO, in collaboration with the transmitter and impacted LDCs, reviews the information collected as part of the Needs Assessment phase, along with additional information on potential non-wires or resource (e.g., Conservation and Demand Management (CDM), Distributed Generation (DG), etc.) alternatives in order to make a decision on the most appropriate regional planning approach including Local Plan (LP), Integrated Regional Resource Plan (IRRP) and/or Regional Infrastructure Plan (RIP).

The primary purpose of the IRRP is to identify and assess both resource and wires options at a higher or macro level, but sufficient to permit a comparison of resource options vs. wire infrastructure to address the needs. Worth noting, the LDCs' CDM targets as well as contracted DG plans provided by IESO and LDCs are reviewed and considered at each step in the regional planning process.

If and when an IRRP identifies that resource and/or wires options may be most appropriate to meet a need, resource/wires planning can be initiated in parallel with the IRRP or in the RIP phase to

undertake a more detailed assessment, develop specific resource/wires alternatives, and recommend a preferred wires solution.

As a final step of the regional planning process, Hydro One as the lead transmitter undertakes to develop a RIP with input from the Study Team for the region and publishes a RIP report. The RIP reports include a complete discussion of all options and recommended plans and wire infrastructure investments within each region identified in earlier phases. As a result, RIP reports are also referenced as supporting evidence in a cost of service or Leave-to-Construct approval application.

Figure 1 illustrates the various steps of the regional planning process that include NA (also known as Needs Screening), SA (also known as Scoping Process), LP, IRRP, and RIP.

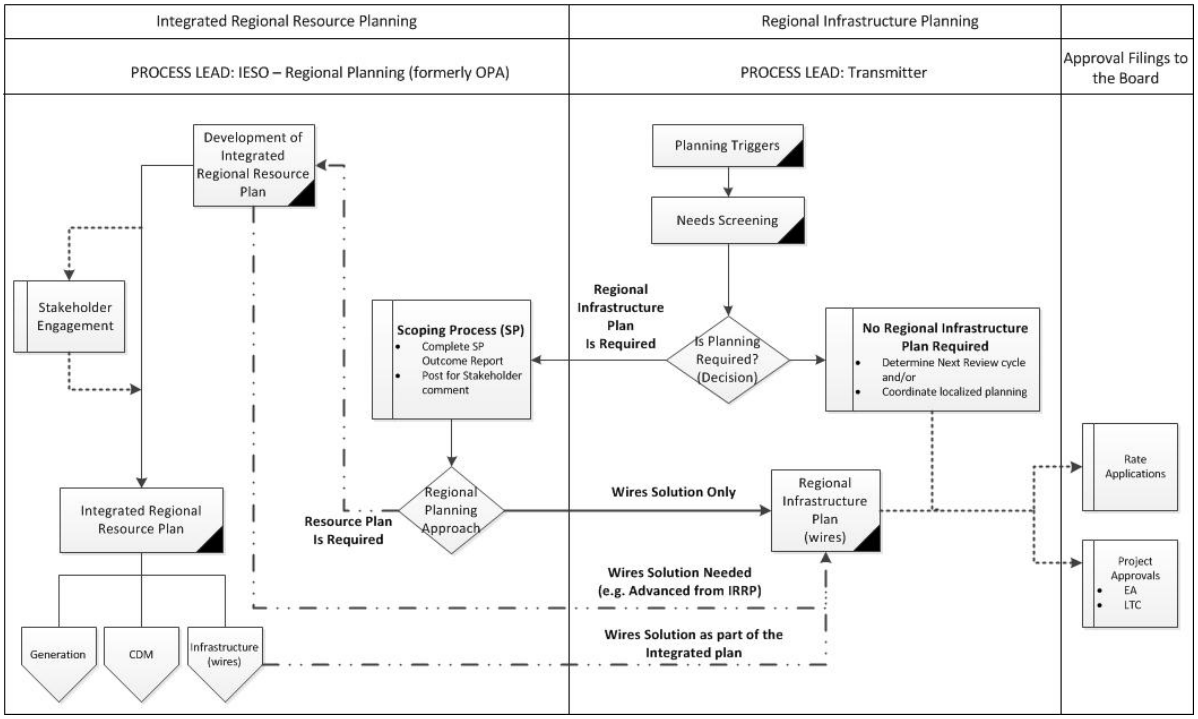

Figure 1. Regional Planning Process Flowchart

2.1 Regions

The province has been divided into 21 regions to undertake regional planning. In first cycle, 21 regions were placed into 3 groups to manage and prioritize regional planning activities. Moving forward, grouping of regions is not relevant and regional planning is triggered based on emerging needs or not to exceed five year.

Hydro One is the lead transmitter in all regions, except the East Lake Superior[1] and North of Moosonee Regions. For each regional planning activity at the regional or sub-regional level, a Study Team is established for each region with representatives from the IESO, Hydro One, and respective LDCs of the area. During the regional planning process, the Study Team may further divide a region into two or more sub-regions based on electrical characteristics, contiguity and the need for efficient and effective assessment.

The planning regions are listed in Table 2 and shown pictorially in Figure 2.

Table 2. Regional Planning Regions

Burlington to Nanticoke	Northwest Ontario	Chatham/Lambton/Sarnia
Greater Ottawa	Windsor-Essex	Greater Bruce/Huron
GTA East	East Lake Superior	Niagara
GTA North	London Area	North of Moosonee
GTA West	Peterborough to Kingston	North/East of Sudbury
KWCG	South Georgian Bay/Muskoka	Renfrew
Toronto	Sudbury/Algoma	St. Lawrence

Figure 2. Regional Planning Regions

[1] Hydro One Sault Saint Marie, an affiliate of Hydro One Networks, is the lead transmitter for East Lake Superior. This Report includes the status of the regional planning activities in the East Lake Superior Region.

2.2 Conservation & Demand Management (CDM) and Distributed Generation (DG)

CDM is taken into account at each step of the regional planning process. It is based on input from municipalities, requirements of individual LDCs to comply with conservation targets that are to be achieved through the provision of CDM programs to each customer segment in their service territories[5]. The CDM information is provided by the IESO and prepared jointly by the LDC for regional planning assessments.

Consistent with Section 21.2.2 (g) of the IESO License and Section 3C.3 of the TSC, the IESO provides peak demand offsets resulting from LDC's CDM programs and total installed and effective capacity of the IESO contracted DG projects which are either in service or are under development for regions or sub-regions for which an IRRP is completed. The CDM and DG summary provided by the IESO is attached in Appendix A.

It is worth noting that peak demand offsets resulting from LDC CDM programs are the total offsets to be achieved by the LDC within its service territory and hence may not be limited to or reflective of offsets within the specific region. In addition, contracted DG plans have also been taken into account during the planning assessment. Both, CDM and DG information is used to develop a net forecast from the gross load forecast provided by the LDCs.

3. STATUS OF REGIONS

Regional Infrastructure Plans (RIPs) have been completed for all regions for the first cycle of the Regional Planning Process. During the first regional planning cycle, several lessons were learned to undertake improvements to the process, methodology, discussion, assessment and documentation with respect to replacement of assets at or near EOL along with justification for "right sizing" of major transmission equipment. In addition, as a Lead Transmitter, Hydro One also sent formal communication to the LDCs to seek feedbacks on prioritization of regions to undertake regional planning for scheduling, and suggestions for enhancements in the second cycle. These enhancements have been incorporated in the process and planning reports. LDCs did not suggest any changes to the prioritization to initiate regional planning. However, Hydro One undertook advance regional planning in several regions based on discussions with the LDCs with regard to emerging needs in various parts of the province.

Needs Assessment (second cycle – May 2017) and RIP (first cycle – Feb 2017) for the Burlington to Nanticoke region were the first reports to include some of these enhancements, which were duly incorporated in the second cycle of regional planning process. Each subsequent Needs Assessment (NA) and/or RIP reports (Greater Ottawa, GTA North, Toronto, Windsor-Essex, Kitchener-Waterloo-Cambridge-Guelph, GTA West, GTA East, East Lake Superior, and Greater Bruce/Huron) led and developed by Hydro One on behalf of the Study Team have incorporated these changes. These reports are available on the Hydro One's Regional Planning website. The second cycle of regional planning is currently underway, with Needs Assessments for ten (10) regions completed to date.

3.1 Burlington to Nanticoke

Burlington to Nanticoke Region comprises the municipalities of Burlington, Hamilton, Oakville, Brantford, and the Counties of Brant, Haldimand, and Norfolk. Within the context of regional planning, the region is divided into four sub-regions: Brant, Bronte, Greater Hamilton, and Caledonia-Norfolk sub-regions.

The 2nd cycle Needs Assessment phase led by Hydro One was completed and a report was published in May, 2017. Study Team decided that IRRP was only required for the sub-region of Hamilton. Following the completion of Hamilton sub-region IRRP, Hydro One has completed and published RIP report in October 2019. Updates to the regional plans for each sub-region are discussed below.

3.1.1 Brant Sub-region

Brant sub-region encompasses the County of Brant, City of Brantford and surrounding areas. The electricity supply to this area is provided by Brant TS, Powerline MTS, and Brantford TS. Updates to previously identified needs are as follows:

- **115 kV B12/B13 – Transmission Line Capacity**
  Brant IRRP and the RIP for the region identified an immediate need for additional transmission supply capacity in the Brant-Powerline 115 kV subsystem. The 2017 SA recommended to be addressed directly between Hydro One and the local LDC, as non-wires

options were not feasible. The preferred option involves construction of a new switching facility that consists of three (3) new 115 kV breakers and associated disconnect switches. This will provide approximately 61 MW of additional supply capacity by providing a third 115 kV supply circuit (B8W) from Karn TS. The project has been completed in August 2019.

3.1.2 Bronte Sub-region

Bronte sub-region includes the area served by Bronte TS in Oakville, supplied by 115 kV circuits B7/B8 circuits and two 230 kV supply stations of Burlington TS and Cumberland TS. Updates to identified needs in this sub-region are as follows:

- **115 kV B7/B8 – Transmission Line Capacity**
  Bronte IRRP and the RIP for the region identified an immediate need for additional transmission supply capacity in the Bronte 115 kV subsystem. The Bronte IRRP recommended addressing this need through local area transfers being the most economical solution. Oakville Hydro, LDC in the area, will limit the maximum load at Bronte TS within Bronte subsystem's supply capacity by transferring loads (as required) from Bronte TS to other stations in Oakville Hydro's franchise territory.

- **Bronte TS - T5/T6 Transformers and Switchgear End-Of-Life**
  The recommended plan is to replace end of life (EOL) T5/T6 93 MVA transformers with standard 83 MVA units and refurbish EOL low voltage switchgear. This will address the needs at Bronte TS by maintaining the station's operability and reliability of supply. The project has been completed.

- **115 kV Circuit B7/B8 End-Of-Life Section (Burlington TS x Nelson JCT)**
  The 115kV double circuit line B7/B8 supplies around 130 MW to Burlington and Oakville area loads through Bronte TS. Line section from Burlington TS to Nelson junction (approximately 2.3 km) was built in 1920's and was assessed that the conductor on this line section from Burlington TS to Nelson junction has reached end of useful life. This project is expected to be completed and to be in-service by Q4 2020.

- **Cumberland TS - Power Factor**
  The power factor at Cumberland TS under peak load conditions is lagging slightly below the requirement of 0.9. Burlington Hydro has installed capacitor banks on the distribution system supplied by Cumberland TS to improve power factor. Hydro One and Burlington Hydro will continue monitoring the power factor at this station and will take appropriate action as required.

- **Burlington TS – T12 Autotransformer and LV Switchgear End-Of-Life**
  Burlington TS is a major switching and transformer station in the city of Burlington. The facilities at this station include a 230 kV switchyard, four 230/115 kV autotransformers, a 115 kV switchyard and a 230/27.6 kV DESN. Hydro One has identified that the autotransformer T12 and its DESN's LV Metalclad switchgear are approaching their EOL. The DESN LV switchgear and the T12 autotransformer are currently planned to be replaced by 2026 and 2030 respectively.

3.1.3 Greater Hamilton Sub-region

The Greater Hamilton Sub-region encompasses the City of Hamilton and surrounding areas. Following is an update to the identified needs in this sub-region:

- **Beach TS - T3/T4 Transformers End-Of-Life**
  The recommended plan was for Hydro One to proceed with reconfiguring the 115 kV T3/T4 DESN to a 230 kV configuration by replacing the existing EOL non-standard transformers with standard 100 MVA 230/13.8 kV units. The project has been completed in Q3 2018.

- **Horning TS -T1/T2 Transformers and LV Switchgear End-Of-Life**
  The recommended plan was for Hydro One to proceed with replacement of EOL T1/T2 transformers with similar 100 MVA 230/13.8 kV units and refurbishing EOL low voltage metalclad switchgears. The project has been completed in Q4 2018.

- **Mohawk TS - Station Capacity and T1/T2 Transformers End-Of-Life**
  The recommended plan was for Hydro One to proceed with replacement of the existing non-standard EOL supply transformers at Mohawk TS with standard 75 MVA units to address the issue of aging infrastructure and providing sufficient station supply capacity. The project has been completed in Q4 2018.

- **115 kV Circuit B3/B4 End-Of-Life Section (Horning Mountain Jct. to Glanford Jct.)**
  The 115 kV B3/B4 line supplies Hamilton sub-region loads including Dundas TS (T1/T2 DESN) and Mohawk TS. The 11 km long section of this line from Horning Mountain Jct. to Glanford Jct. is approximately 100 years old and at its end of useful life. The recommended plan is to refurbish this EOL line section from Horning Mountain Jct. to Glanford Jct. This refurbishment project is expected to be completed and to be in service by Q4 2020.

- **Elgin TS - T1/T2/T3/T4 Transformers and LV Switchgear End-Of-Life**
  The recommended plan is for Hydro one to reconfigure the station and replace the four smaller EOL transformers with two larger units supplying two switchgears. Under this plan, the EOL T1/T2 and T3/T4 DESNs will be replaced by a single T5/T6 DESN with two 100 MVA standard units and four new switchgears. This project is expected to be completed and to be in service by Q4 2021.

- **Newton TS - T1/T2 Transformers End-Of-Life**
  The recommended plan for Hydro One is to proceed with the replacement of the existing non-standard EOL T1/T2 transformers at Newton TS with new standard 75 MVA units. Recently the transformer T2 has failed and is being replaced on an emergency basis and transformer T1 is also showing signs of deterioration. This transformer replacement project is expected to be completed by 2021.

- **Kenilworth TS - Transformers and Switchgears End-Of-Life and Power Factor**
  The recommended plan is for Hydro One to proceed with the reconfiguration of the station reducing from two DESNs to a single DESN with two transformers and two switchgears. The recently replaced transformer and one of the existing metalclad switchgear will be utilized while one transformer and switchgear will require to be replaced. The new transformer will

be a unit similar to standard unit replaced in 2014. This refurbishment project is expected to be completed and to be in service by 2021.

The power factor at Kenilworth TS is also lagging below the requirement of 0.9. The LDC is addressing this need by installing a capacitor bank at Kenilworth TS following the completion of above Kenilworth TS refurbishment and reconfiguration work in 2021. The power factor correction project is currently planned to be in service by 2022.

- **Dundas TS - Load Transfers**
  Dundas TS has two DESN units; one of the two units has loads in excess of its supply capacity while the other DESN has spare capacity to accommodate these excess loads. The recommended plan is to balance the load between the two Dundas TS DESNs. This project is currently planned to be completed by 2021.

- **Gage TS - T3/T4/T5/T6 Transformers and LV Switchgear End-Of-Life**
  The recommended plan for Hydro One is to reconfigure the station and reduce it from 3 DESNs to 2 DESNs. Under this plan, the EOL two T3/T4 and T5/T6 DESN's of 56 MVA transformers will be replaced by a single T10/T11 DESN with two 100 MVA standard units, and switchgear currently supplied by T5/T6 transformers will also be replaced. This project is expected to be in service by 2021.

- **Birmingham TS – T1 Transformer and LV Switchgears End-Of-Life**
  The recommended plan is to replace EOL T1 transformer with a similar unit and the three EOL 13.8 kV LV metalclad switchgears at Birmingham TS to meet the unique connection needs of the customer at this station. This refurbishment project is expected to be completed and to be in service by 2025.

- **Nebo TS – T3/T4 Transformers End-Of-Life**
  Nebo TS has two DESN units T1/T2 and T3/T4 supplying Hamilton area loads at 27 .6 kV and 13.8 kV respectively. The T3/T4 transformers at this station have been identified as approaching end of life in the 2025- 2029 timeframe requiring replacement. The current tentative plan is to replace these nonstandard 75 MVA transformers with 100 MVA standard units. This transformer replacement need is far in future, the Study Team recommends reviewing these needs again in the next regional planning cycle.

- **115 kV Cables in Hamilton Sub-Region - HL3/HL4, K1G/K2G, H5K/H6K End-of-Life**
  Underground cables in Hamilton sub-region (listed below) are expected to be approaching their EOL over the next 10 years.

  - **115 kV H5K/H6K Cable (Beach TS to Kenilworth TS)**
  - **115 kV K1G/K2G Cable (Kenilworth TS to Gage TS)**
  - **115 kV HL3/HL4 Cable (Newton TS to Elgin TS to Stirton TS)**

Given that the replacement of high voltage underground cables will be very challenging and costly, it is required that alternatives be developed and assessed ahead of time. Hydro One has developed tentative options to address these mid-term EOL cable replacement needs.
The Study Team recommends that the options developed by Hydro One in the RIP be further assessed by Hydro One and the IESO to develop a recommended plan. After the completion of this assessment, an addendum to Hamilton Area IRRP and RIP will be incorporated in 2020.

- **Beach TS - T1/T7/T8 Autotransformers and T5/T6 Transformers End-Of-Life**
  Beach TS is a major switching and transformer station in East Hamilton. Station facilities include a 230 kV switchyard, three 230/115 kV autotransformers (T1/T7/T8), a 115 kV switchyard and two 230/13.8 kV DESNs. Hydro One has identified that the autotransformers T1, T7 and T8; and the T5/T6 DESN transformers are approaching their EOL, requiring replacement by 2027. The Study Team recommends that the replacement of autotransformers to be assessed as part of the Middleport area bulk transmission planning study by the IESO in coordination with Hydro One. This DESN transformer replacement need is far in future and will be reviewed again in the next regional planning cycle.

- **Lake TS - T1/T2 Transformers and LV Switchgears End-Of-Life**
  Lake TS is located in the city of Hamilton, which has two DESN's: T1/T2 and T3/T4 DESN's supplying Hamilton sub-region loads at 27.6 kV and 13.8 kV respectively. The T1/T2 230/27.6 kV transformers and both 13.8 kV and 27.6 kV LV switchgears are at their EOL and have been identified requiring replacement by the year 2027. This transformer 00replacement need is far in future, the Study Team recommends reviewing this need again in the next regional planning cycle.

3.1.4 Caledonia-Norfolk Sub-region

This sub-region includes the Haldimand and Norfolk Counties, and covers the southern part of Burlington to Nanticoke Region. Several new needs were identified in this sub-region.

- **115 kV C9/C12 – Norfolk Area Supply Capacity**
  Norfolk area is currently supplied by Norfolk TS and Bloomsburg DS through 115 kV double circuit supply (C9/C12) from Caledonia TS autotransformers. The area supply capacity is limited by voltage decline limit in the event of loss of one the two (C9 or C12) supply circuits. This area has recently seen a significant interest from greenhouse developers and loads in this area are expected to grow significantly. The Study Team recommends in the near term the load growth need will be met through load transfers from Norfolk area to Jarvis TS and by installing capacitor bank(s) at Norfolk TS.

  Hydro One has developed options to address the forecasted needs in the mid-term. The Study Team recommends further assessment be carried out by the IESO and Hydro One to review the options identified above and/or other non-wires solutions, to address the capacity needs for the Norfolk Area in advance of the next planning cycle. Following the assessment, an addendum will be included to the RIP report in 2020.

- **Norfolk TS - LV Switchgear End-Of-Life**
  The recommended plan is to refurbish the Norfolk TS LV switchgear which is at its EOL. This project is currently expected to be in service in 2026.

- **Caledonia TS (T1) and Jarvis TS (T3/T4) Transformer End-Of-Life**
  The Caledonia TS T1 and Jarvis TS T3/T4 transformers are approaching end of life in the 2025- 2029 timeframe. These transformer replacement needs are far in future, the Study Team recommends reviewing these needs again in the next regional planning cycle.

3.2 Toronto

The Toronto (formerly referred to as Metro Toronto) Region comprises the area within the municipal boundary of the City of Toronto. In the previous regional planning cycle, the region was divided into two sub-regions: Central Toronto and Northern Toronto sub-regions. In the current cycle, the Toronto Region is assessed as a whole and no sub-regions are created.

The second cycle RIP is currently underway and is anticipated to be completed by Q1 2020. The Needs Assessment report for this region has been completed and published by Hydro One in October 2017 and the IRRP was completed by the Study Team and report published in August 2019. Updates to the needs and plans recommended in this region are provided below.

Following transmission projects were developed to address near- and medium-term needs identified in the first cycle of RIP:

- **West Toronto Area Station and Line Capacity**
  This project was completed and the station was in service in Q4 2018. This project includes adding a new 115/27.6kV DESN at the Runnymede TS site and upgrading the respective 115kV circuits, K1W/K3W/K11W/K12W.

- **Southwest Toronto Station Capacity**
  The planned in-service date is currently scheduled for Q4 2020. This project includes adding a new 230/27.6kV DESN at the Horner TS site. New distribution feeder ties are also required to be built between Manby TS and Horner TS by THESL to accommodate load transfer out of Manby TS to Horner TS as the loading at Manby TS exceeds its capacity. Hydro One is continuing the development and estimate work for this project.

- **Downtown District Station Capacity (Copeland MTS)**
  Phase 1 has been in service since Q4 2018. Phase 2 of the project includes adding a second 115/13.8kV DESN at the Copeland MTS site. Based on the station capacity consideration for the Downtown District stations, the need date for Phase 2 is in the medium to long term.

- **Richview TS to Manby TS Corridor Line Capacity**
  This need is required in 2020 at the earliest. The recommended plan is staged as follows:

  Stage 1: Rebuild existing 115kV idle line to 230kV and reconfigure two existing circuits R2K and R15K into “Super-circuits”. Stage 1 is currently expected to be in-service in Q3 2023.

Stage 2: Terminate the new conductors on VxR circuits and Manby TS (3 new breakers) and complete station work coincident with Manby TS EOL replacement work, both of which are planned for completion in Q3 2025.

- **Breaker Failure at Manby TS**
  The project was completed in Q4 2018. To address the risk of breaker failure at Manby TS causing the outage of any two of the three 230/115kV autotransformers at either the west or east yard of Manby TS and resulting in the remaining transformer exceeding its Short Term Emergency (STE) rating, the RIP recommended the installation of a Remedial Action Scheme (RAS) to protect equipment overloading.

Below are the updates for the new needs identified in the second cycle Needs Assessment and IRRP report:

- **East Harbor / Port Lands Area Transformation Capacity**
  The LDC has identified an emerging area of load growth in the East Harbor and Port Lands in Toronto. The current load in the area is supplied from Esplanade TS and Basin TS. Transformation capacity in the area is sufficient with present day loading; however, due to the potential growth in area load, there may be a need for increased capacity around 2025+. This need will be further assessed in the next regional planning cycle to review options and to develop a preferred plan.

- **Load Restoration – C14L+C17L, C5E+C7E, and K3W+K1W**
  For the loss of circuits, C14L+C17L, C5E+C7E, and K3W+K1W, the load interrupted by configuration can exceed 150 MW and/or 250 MW and are required to be restored within the prescribed timelines as described in the ORTAC[6]. This need has been assessed in the IRRP phase, which determines that there is sufficient low voltage load transfer and switching capabilities to meet the load restoration requirements.

Several EOL equipment needs were identified for replacement in the Toronto Region in the second cycle Needs Assessment report. The Needs Assessment Study Team recommended that the following refurbishment or replacement needs do not require further regional coordination and "right size" will be to replace with similar type of equipment with the same or higher ratings. Hydro One is coordinating with Toronto Hydro to develop implementation plans for the following stations:

  - **Bridgman TS T11/T12/T13**
  - **Cecil TS T1**
  - **Charles TS T3/T4**
  - **Dufferin TS T1/T3**
  - **Fairbank TS T1/T3, T2/T4**
  - **Fairchild TS T1/T2**
  - **Runnymede TS T3/T4, 115 kV line grounding switches**
  - **Richview TS T2, 230kV breakers**
  - **Sheppard TS T3/T4**
  - **Strachan TS T12**
  - **Main TS – T3/T4, 115 kV line disconnect switches, installation of 115 kV CVTs**

Expected Replacement Timing: 2021-2022

- **115kV H7L/H11L underground cable**
  - Main TS to Lumsden JCT
  - Todmorden JCT to Leaside TS
- **115kV C5E/C7E underground cable Esplanade TS to Terauley TS**
  Expected Replacement Timing: 2024-2025
- **115 kV H1L/H3L/H6LC/H8LC overhead line Bloor St. JCT to Leaside JCT**
  Expected Replacement Timing: 2020-2021
- **115kV L9C/L12C overhead line Leaside TS to Balfour JCT**
  Expected Replacement Timing: 2021-2022

The Study Team recommended the following refurbishment or replacement needs may require further regional co-ordination. These needs are being assessed further in the RIP phase to review options and to develop a recommended plan for the following:

- **Bermondsey TS – T3/T4**
  Expected Replacement Timing: 2022-2023
- **John TS – T1, T2, T3, T4, T6, 115 kV breakers**
  Expected Replacement Timing: 2024-2025
- **Manby TS – T7, T9, T12 autotransformers, T13 step-down transformer, and, rebuild 230kV yard**
  Expected Replacement Timing: 2024-2025

3.3 Windsor-Essex

The Windsor-Essex region includes the most southerly portion of Ontario, extending from Chatham southwest to Windsor. It consists of the City of Windsor, the Municipality of Leamington, the Town of Amherstberg, the Town of Essex, the Town of Kingsville, the Town of Lakeshore, the Town of LaSalle, the Town of Tecumseh, and the Township of Pelee, as well as the western portion of the Municipality of Chatham-Kent.

The second cycle of regional planning was triggered in 2017 and the Needs Assessment report for the region was completed and published by Hydro One in October 2017. The IRRP was completed and report was issued in September 2019. The RIP phase is currently underway and is anticipated to be completed by Q1 2020.

Updates to needs identified in the first IRRP are as follows:

- **J3E/J4E Load Restoration**
  During the first cycle, it was identified that SECTR project might not fully address the load restoration challenges in the J3E/J4E sub-system following the loss of C23Z/C24Z. The Study Team has further assessed load restoration need in IRRP and confirmed that existing transmission reconfiguration options are sufficient to restore the interrupted load. So there are no additional load restoration requirements for the study period of the second cycle of Regional Planning.

- **Leamington TS Capacity**
  The Needs Assessment has identified that Leamington TS may require additional station supply capacity by 2021. Since the completion of the Needs Assessment, the updated load forecast shows that by 2021 the load demand in the Leamington area will exceed the capacity of the existing Leamington TS by about 200 MW. As a consequence, Hydro One is in the process of expanding the transformation capacity at Leamington TS with the addition of 2 x 75/125 MVA, 230/27.6 kV transformers. The anticipated in-service date is December 2019.

- **Kingsville TS – T1/T2/T3/T4 Transformers End-Of-Life**
  As the result of significant load increase in the Kingsville area, consistent with the commendations in the NA and IRRP, Hydro One is planning to replace the existing 4x42MVA units with 2x83MVA units. The first 83MVA unit was in service in 2018, while the second unit is expected to be in service in Q4 2021.

- **Keith TS – T11/T12 Autotransformers End-Of-Life**
  T11 and T12 are to be replaced with larger 250MVA units to improve load supply and restoration capability for the 115kV J3E/J4E subsystem. This work is currently planned to be completed in Q3 2023.

- **Crawford TS – T3 Transformer End-Of-Life**
  T3 was replaced with similar 83MVA unit in May 2018.

- **Malden TS – 27.6kV Breaker End-Of-Life**
  Two (2) feeder breakers were replaced with SF6 equivalent units in November 2018.

- **Lauzon TS Transformers End-Of-Life**
  At Lauzon TS, there are two autotransformers T1/T2, and two DESNs – DESN #1 supplied by step-down transformers T5/T6, and DESN #2 supplied by step-down transformers T7/T8. T6 and T8 and T1/T2 are currently planned for replacement with similar size units by 2030.

The second cycle IRRP has concluded that the following needs require further assessment in RIP:

- Capacity needs in the Kingsville and Leamington areas
- Capacity needs at Lauzon and Kent TS

The IRRP has confirmed K6Z, and C23Z/C24Z can meet the load security and restoration needs and no further actions are required.

3.4 GTA North

The GTA North Region is approximately bounded by the Regional Municipality of York, and also includes parts of the Cities of Toronto, Brampton, and Mississauga. For the purpose of regional planning, the region was divided into two sub-regions: York and Western sub-regions.

The first cycle of Regional Planning was completed in February 2016 with the publishing of the RIP report. The Needs Assessment led by Hydro One for the second cycle was completed and the report was published in March 2018. The IRRP phase is currently underway, and it is anticipated for

completion in Q1 2020. The RIP will be initiated after the completion of IRRP to recommend and develop wires plans.

3.4.1 York Sub-region

This sub-region is further classified into Southern York and Northern York areas to reflect the layout of the electricity infrastructure. Southern York area includes the municipalities of Vaughan, Markham, and Richmond Hill; while the Northern York area encompasses the municipalities of Aurora, Newmarket, King, East Gwillimbury, Whitchurch-Stouffville and Georgina, as well as some load in Simcoe County that is supplied from the same electricity infrastructure.

Below are updates to the York Sub-region needs identified during the first cycle of Regional Planning:

- **Load Security on V71P/V75P – Parkway to Claireville**
  In the first planning cycle, the Study Team recommended the installation of in-line switches at the Vaughan MTS #1 junction in order to improve the capability of the system to restore load in the event that both 230 kV circuits V71P/V75P are lost. Though this will improve load restoration, this does not address the load security need on V71P/V75P. This need requires regional coordination and is being currently assessed in the IRRP to review options to develop a preferred plan.

- **Vaughan MTS Transformation Capacity**
  Based on the current extreme summer weather non-coincident peak net load forecast, the need for additional transformation capacity is identified beyond 2027. This need is being currently assessed in the IRRP phase and will be further addressed in the RIP to develop a preferred plan.

- **Markham MTS Transformation Capacity**
  In the first cycle RIP, the study team recommended to continue the assessment of wires and non-wires options to address the need for additional transformation capacity in the Markham-Richmond Hill area and to refine the need timing. Based on the latest extreme summer weather non-coincident peak net load forecast, the need for additional transformation capacity is projected to be in the 2023. The IESO has issued a letter of support to Hydro One Transmission and Alectra to begin wires planning for a new 230/27.6kV DESN. Hydro One and Alectra are currently in the process of selecting a preferred location to connect to 230 kV circuits P45/P46. The Study Team has reaffirmed this need and further updates will be provided upon completion of the IRRP and RIP reports.

- **Station Service Supply to York Energy Centre**
  In the previous RIP, a need for addressing station service supply to York Energy Centre (currently supplied from Holland TS) in the event of a (i) low-voltage breaker failure at Holland TS or (ii) double circuit 230 kV contingency was identified. These events can result in an interruption to the station service supply to York Energy Centre and therefore the loss of all generation output until the station service can be restored from the alternate source. This need has been reaffirmed and is currently being assessed in the IRRP phase to review options in order to develop a preferred plan.

- **Northern York Area Transformation Capacity**
  In the previous RIP, the study team recommended that the need for additional transformation capacity in the Northern York Area, along with associated transmission capacity, will be further assessed in the current regional planning cycle. The latest electricity demand growth forecast shows that the transformer stations capability (Holland TS/Armitage TS) will be exceeded post 2027. However, if the CDM savings are not achieved as forecasted the need date could be as soon as 2024. This need is being currently assessed in the IRRP phase to review options in order to develop a preferred plan.

The second cycle of Needs Assessment has identified following new needs in the York Sub-region:

- **Woodbridge TS Transformer T5 End-Of-Life**
  Woodbridge TS supplies both Alectra and THESL. Woodbridge TS comprises one DESN unit, T3/T5 (75/125 MVA), with two secondary winding voltages at 44 kV and 28 kV. T5 is currently about 45 years old and has been identified to be refurbished or replaced. The study team recommended that there is limited opportunity to reconfigure and resize the facility. Replacement should be undertaken by Hydro One and impacted LDCs with no further regional co-ordination required. The current timing of replacement for Transformer T5 is 2022-2023.

- **Load Restoration – P45+P46**
  Based on the latest extreme summer weather coincident peak net load forecast and following the simultaneous loss of two 230kV circuits P45 and P46, load supplied by the Parkway to Buttonville circuits is at risk of not meeting the 30 minute restoration guidelines under 2021 peak load conditions as established by Ontario Resource and Transmission Criteria (ORTAC[6]). This need is currently being assessed in the IRRP phase to review options and to develop a recommended plan.

3.4.2 Western Sub-region

This sub-region comprises the Western portion of the City of Vaughan, roughly bordered geographically by Highway 407 on the south, King-Vaughan Road on the north, Highway 50 on the west, and Islington Avenue on the east.

Below is an update on Western Sub-region needs identified during the first cycle RIP:

- **Load restoration for 230 kV circuit V43 and V44**
  V43 and V44 circuits supply Woodbridge TS, Vaughan #3 MTS, and Kleinburg TS. The need was identified in 2016 during the first cycle Needs Assessment for the GTA North – Western Sub-Region because the load restoration timelines as per the ORTAC [6] may not be met. At that time, the study team recommended that this need should be addressed as part of IESO's GTA West bulk system planning initiative. However, the restoration need was not addressed in the subsequent GTA West bulk system study. As a result, this need is currently being assessed in this Regional Planning cycle. The Study Team is currently reviewing options in the IRRP phase in order to develop a preferred plan.

3.5 Greater Ottawa

Greater Ottawa Region covers the municipalities bordering the Ottawa River from Stewartville in the West to Hawkesbury in the East and North of Highway 43. For the purpose of regional planning, the region is divided into two sub-regions: Ottawa Area and Outer Ottawa.

Following the completion of the RIP for the Greater Ottawa Region in December 2015, the second cycle Needs Assessment led by Hydro One was initiated in February 2018. The Needs Assessment report was completed and published in June 2018. The IRRP phase is currently underway with an anticipated completion in December 2019. The Hydro One led RIP will be initiated in Q1 2020, after the publishing of the IRRP report. Updates for the two sub-regions are discussed below:

3.5.1 Ottawa Area Sub-region

The Ottawa Area sub-region covers the central part of the Greater Ottawa Region and includes the City of Ottawa and the surrounding municipalities. Updates to previously identified needs from the last Rigional Planning cycle are as follows:

- **Merivale TS T22 – LTR Exceeded**
  The need for additional 230/115kV auto-transformation capacity at Merivale TS was assessed by Study Team as part of the broader South West Area's need for capacity (described below) in the IRRP phase. Hydro One will continue working closely with affected LDCs to develop a preferred plan for T22 replacement.

- **South West Area – Capacity**
  The project consists of rebuilding 10.9km of 115kV circuit S7M from S7M STR673N JCT to Manotick JCT to Cambrian JCT as a double circuit 230kV line. Project will also build 1.3km of double circuit 230kV line from Cambrian JCT to Cambrian MTS to supply a MTS, which will be built by Hydro Ottawa. New 230kV lines and station project ("South Nepean") to provide capacity in this area are undergoing an environmental assessment with target in-service date by year 2021.

- **S7M Circuit – Supply Capacity**
  Line rating for the circuit was increased and will be adequate to meet load forecasted up to year 2026. Capacity beyond 2026 will be assessed by the Study Team as part of the South Nepean project in the IRRP and addressed in RIP.

- **Hawthorne TS T5 and T6 – LTR Exceeded**
  The project is currently under execution with the recent completion of transformer T6 replacement. Protection upgrades of T5 and T6, and T5 replacement are expected to be completed by 2021. Project timeline has been changed in order to accommodate the earlier replacements of end-of-life Hawthorne T7 and T8 transformers in 2019.

- **Russell TS and Riverdale TS (Part of Ottawa Center 115kV Area – Station Capacity)**
  The loading on these stations will be kept within equipment limits through the construction of feeder ties by Hydro Ottawa to transfer excess loads to other area stations. Feeder ties are expected to be completed by 2020.

- **Overbrook TS (Part of Ottawa Center 115kV Area – Station Capacity)**
  Step-down transformers at Overbrook TS were identified to be approaching EOL. To address the EOL and additional future capacity needs in the region, the station transformers have been replaced with standard sized units that resulted in an increase in the station capacity from 72MW to 130MW. The replacement work is now completed.

- **Hawthorne TS – T7 and T8 LTR exceeded**
  To address the EOL need of T7 and T8 transformers, Hydro One is installing larger, 75/100/125 MVA transformers with a LTR of 153MW. The replacement work is currently under execution. The expected in-service date is Q4 2019.

- **Bilberry Creek TS – Refurbishment & Orleans TS – Reliability**
  Bilberry Creek TS consists of a 115/27.6 kV step-down transformer in East Ottawa, supplying up to 85 MW of load to both Hydro Ottawa and Hydro One Distribution. The station was built in 1964 and a number of its key components have been identified for replacement by Hydro One. A decision will be required by 2020 on whether to refurbish the station and keep the load on the 115 kV systems or to retire the station and move the load over to the 230 kV systems by supplying it from the newly built Orleans TS.

  Supply configuration at Orleans TS will also be impacted by the Bilberry Creek TS refurbishment options. These options are being further reviewed and assessed by Study Team and will be addressed in the RIP.

- **Ottawa Center 115kV Area – Station Capacity**
  Ottawa downtown station (including Russell TS, Riverdale TS, and Overbrook TS) capacity needs are being currently reassessed within the context of updated forecasts, EOL stations upgrades and feeder ties by Study Team and will be addressed in the RIP.

- **King Edward TS – Station Capacity**
  The capacity at King Edward TS is limited to 71MW. Station assessment identified station equipment that is at end of life and requires replacement, including the replacement of the T3 power transformer, protection, control and telecom (PCT) equipment along with disconnect switches. The T3 power transformer is being replaced with a larger sized unit rated 115-14.2-14.2kV, 60/80/100MVA that is similar with the companion T4 unit ratings. The project is currently under execution, and the expected in-service date is Q1 2022.

- **Almonte TS/Terry Fox MTS – Voltage Regulation**
  Circuit E34M/T33E is a 290 km line between Clarington TS in Oshawa, and Merivale TS in Ottawa. If the circuit E34M is open at the Merivale TS end, Terry Fox MTS and Almonte TS will need to be supplied radially by Clarington TS. However, studies have shown that Clarington TS will not be able to provide adequate support for Almonte TS and Terry Fox MTS during peak loading period, which would in turn result in voltages below the minimum allowable levels. This is currently being assessed during the IRRP with the consideration of the upcoming South Nepean project. Based on the findings it will be further addressed in RIP phase.

- **A4K Supply Capacity**
  This need is to be addressed by providing an additional supply to Overbrook TS from a tap to circuit A6R. Riverdale JCT x Overbrook TS: Build New A6R Tap project was completed and in-service in Q2 2019.

- **Load Loss for S7M Contingency**
  Load forecast for Bridlewood MTS, Fallowfield MTS, Manotick MTS, and Richmond DS was reviewed as part of the IRRP phase, with further assessment to follow.

The second cycle Needs Assessment report has identified new needs in the Ottawa Area Sub-region that require further regional co-ordination. The following needs were assessed in the IRRP phase:

- **S7M 115kV Line Refurbishment**
  The 115 kV conductors, spread across multiple S7M line sections totaling 6.5 km, have been identified at or near their end of service life. As suggested by Hydro One, refurbishment of these line sections is recommended by the Study Team, to replace conductors, wood poles, insulators, and other components. The refurbishment is expected to be completed between 2021 and 2022.

- **Albion TS – EOL T1/T2, Switchgears, Breakers**
  Albion TS is a 230/13.8/13.8kV station connected to 230kV M30A and M31A circuits, supplying Hydro Ottawa. The transformers T1 and T2 rated at 45MVA each, were built in the 1970s, and have been identified to be approaching end of their service lives. As per the recommendation from Needs Assessment, it is being currently assessed by the study team as part of the IRRP. Albion T1 and T2, along with associated metal-clad switchgears and breakers are currently scheduled for replacement in 2028, but the timeline is subject to change depending on the outcome of the RIP assessments.

The Needs Assessment identified that the following new EOL needs in the Ottawa Area Sub-region do not require further regional co-ordination:

- **Slater TS – EOL Transformers T1/T2/T3**
  Slater TS is an 115/13.8/13.8kV station connected to 115kV A3RM, M4G, and A5RK circuits, supplying Hydro Ottawa. Transformers T1, T2, and T3, rated at approximately 65MVA each, built in the 1960s, and have been identified to be at the end of their service life. The Study Team recommended that this need is to be addressed by Hydro One and Hydro Ottawa to coordinate the replacement plan. The replacement of the EOL equipment is expected to be completed by 2022-2023.

- **Merivale MTS Rebuild**
  Merivale MTS is a 115/8.3kV station connected to 115kV circuits A3RM and A8M. Transformers T1 and T2, both rated at 10MVA, built in the 1960s, and have been identified approaching their end of service life. The Study Team recommended that Hydro Ottawa continues with refurbishing Merivale MTS. The work is expected to be completed by 2020.

- **Riverdale TS 13.8kV Switchgear Replacement**
  Riverdale TS is a 115/13.8kV station connected to 115kV circuits A3RM, A5RK, and A6R. Switchgears on Riverdale TS 13.8kV side have been identified approaching their end of

service life. The Study Team recommended that Hydro Ottawa continues with the 13.8kV switchgear replacement plan. The work is expected to be completed between 2021 and 2023.

3.5.2 Outer Ottawa Sub-region

The Outer Ottawa sub-region includes the eastern and western parts of the Greater Ottawa Region. The eastern part extends from the city of Clarence-Rockland, municipality of Casselman and eastward to Champlain Township. Along the Ottawa River there are several LDC-owned distribution stations supplied by the 115 kV circuit 79M1. The western part covers the area west of Kanata.

Previously identified needs during the first cycle RIP phase are re-affirmed in the second cycle Needs Assessment, and updates are as follows:

- **Voltage Regulation at Stewartville TS**
  The load on the Stewartville TS was previously expected to increase significantly as a result of the connection of a large utility load forecasted for 2018. However, the most recent Outer Ottawa Sub-region forecast revealed that loading on Stewart TS is expected to remain at around 25MW over the next 10 years. No further actions are required at this time.

- **79M1 Circuit – Voltage Regulation**
  There is low voltage observed on this circuit and the voltage regulation is dependent on the amount of load being supplied by the circuit. In addition, it is impacted by load supplied by 115kV circuit H9A within the Ottawa Area sub-region. This voltage regulation need is being reviewed during the IRRP phase along with load forecast for stations supplied by 79M1 and planned to be addressed in the RIP.

The following newly emerged EOL needs identified in the second cycle Needs Assessment for the Outer Ottawa Sub-region do not require further regional co-ordination:

- **Arnprior TS – EOL Transformers T1/T2**
  Arnprior TS is a 115/44 kV DESN connected to W6CS and C7BM 115 kV circuits, supplying Hydro One Distribution. Transformers T1 and T2, built in 1960 and 1957, respectively, rated at 42MVA each, have been identified to be at the end of their service life. The Study Team recommended that this need is to be addressed by Hydro One Transmission and Distribution to co-ordinate the replacement plan. The replacement of the EOL equipment is expected to be completed by 2023-2024.

- **Longueuil TS – EOL Transformers T3/T4**
  Longueuil TS is a 230/44kV DESN connected to 230kV B5D and D5A circuits, supplying Hydro One Distribution. Transformers T3 and T4, built in 1965 and 1964, respectively, are rated at 93MVA each, and they have been identified to be at EOL. Considering the relatively flat load growth rate at the station, replacing the EOL transformers with similar size units is recommended in the Needs Assessment. The Study Team recommended that this need is to be addressed by Hydro One and Hydro One Distribution to coordinate the replacement plan. The replacement of the EOL equipment is expected to be completed by 2024-2025.

3.6 Kitchener-Waterloo-Cambridge-Guelph (KWCG)

The KWCG region includes the municipalities of Kitchener, Waterloo, Cambridge and Guelph, as well as portions of Perth and Wellington Counties and the Townships of Wellesley, Woolwich, Wilmot and North Dumfries.

The first RIP was completed in December 2015 and recommended regional plans are being monitored by Hydro One for timely completion. The second cycle of Regional Planning is currently in progress. Needs Assessment phase was complete and Needs Assessment report was published in December 2018.

The following needs were identified in the NA report:

- **Waterloo North Hydro – Step-down Transformation Capacity**
  During the last regional planning cycle a need for a new MTS #4 DESN was identified in the 2024 timeframe. The current load forecast defers this need beyond the Needs Assessment study period.

- **Energy+ MTS #2**
  Energy+ has initially identified a future need for a new DESN station (MTS #2) in the city of Cambridge near Preston TS. This station need is due to a potential new load center growth in their service territory. The additional supply capacity due to EOL transformer replacement and available new feeder positions at Preston TS, will defer this new MTS need beyond the study period of current regional planning cycle.

- **Waterloo North Hydro – Supply Reliability at Elmira TS**
  Hydro One has developed a supply reliability improvement plan for Elmira TS loads and discussed with Waterloo North Hydro. The plan to improve supply reliability of Elmira TS loads will be included in the RIP report.

- **Cambell TS T3/T4 DESN Overloading**
  At Campbell TS, there are two DESNs – T1/T2 DESN and T3/T4 DESN. The T3/T4 DESN is expected to exceed its supply capacity during the study period. After replacement of T1 transformer and addressing the secondary equipment limitations there will be sufficient spare supply capacity on T1/T2 DESN to accommodate T3/T4 DESN excess loading. Hydro One and Alectra Utilities will work together to balance loads between the two Campbell TS DESNs, when required.

- **End-of-Life Transformers Replacement**
  The implementation and execution plan for these needs will be coordinated by Hydro One with affected LDCs:
    i. Cambell TS
    ii. Hanlon TS
    iii. Cedar TS
    iv. Kitchener MTS #5
    v. Preston TS
    vi. Detweiler TS (Auto Transformer)

Hydro One will continue working closely with LDCs to develop preferred plans to address the needs in the second cycle of the Regional Planning.

3.7 GTA West

The GTA West Region covers the Regional Municipalities of Halton and Peel, and comprises the municipalities of Brampton, South Caledon, Halton Hills, Mississauga, Milton, Oakville and parts of Burlington.

The first cycle of regional planning for this region was completed in January 2016. The second cycle of Regional Planning for the GTA West Region is currently underway. The Needs Assessment Report was completed and published in May 2019. A brief update based on GTA West NA findings is provided below:

- **Additional Station Capacity need at Halton TS**
  Halton TS supplies Halton Hills Hydro and Milton Hydro. The recommendations were to build two new step-down stations as follows: Halton Hills Hydro to construct, own and operate a new step-down station at the Halton Hills Gas Generation facility with an anticipated in-service year of 2020. In parallel, Hydro One is developing Halton TS #2, at the site of the existing Halton TS. Engineering work for Halton TS #2 project has commenced in Q2 2019, with an anticipated in-service date of Q2 2022.

- **H29 / H30 Transmission Circuit Supply**
  The thermal capacity limitation for circuits H29/H30 in the medium-term is included into current Regional Planning cycle. As identified in first cycle RIP report & 2nd cycle NA report, Hydro One is planning to replace existing conductor with larger size conductor with targeted in-service date of 2024.

- **T38B/T39B – Thermal Capacity Limitations**
  The supply security and thermal capacity limitations in the medium-term of circuits T38B/T39B under a single-circuit contingency with Halton Hills GS out of service is included in second cycle GTA West regional planning. This is being assessed in the IRRP phase and will be further followed in the RIP to develop a preferred plan.

- **Richview X Trafalgar Transmission Circuit Capacity**
  Loading limitations on 230 kV circuits between Richview TS and Trafalgar TS are being assessed as part of the IESO-led Bulk System Planning study. IESO's Bulk system planning is not yet taken place and the regional planning Study Team will be provided an update by the IESO on the outcome of the assessment.

- **Northwest Greater Toronto Area (NWGTA) Electricity Corridor Need**
  In February 2018, the IESO and the Ministry of Transportation have announced a joint corridor identification study on a proposed land corridor in the Northwest Greater Toronto Area (NW GTA). The purpose of this study was to identify land to be protected for future multi-purpose linear infrastructure (such as transmission lines and transportation infrastructure) to ensure it can be accommodated if and when the need arises. This long-term need will continue to be studied as part of the second cycle of Regional Planning.

- **End-of-Life Equipment Replacement**
  The implementation and execution plan for these needs will be coordinated by Hydro One with affected LDCs:
    i. Halton TS - PCT and Component Replacements
    ii. Pleasant TS - Breakers, PCT and Component Replacements
    iii. Bramalea TS - PCT and Component Replacements
    iv. Trafalgar TS - Component Replacement
    v. Erindale TS - PCT and Component Replacements
    vi. Palermo TS – T3 / T4 Suppply Transformer

3.8 Greater Bruce/Huron

The Greater Bruce/Huron area is located to the west of the Kitchener-Waterloo region in southwestern Ontario. The region includes the municipalities of Arran–Elderslie, Brockton, Kincardine, Northern Bruce Peninsula and South Bruce. It also includes the township of Huron-Kinloss.

Hydro One completed the first cycle for the region with the publishing of the RIP report in August 2017. At the time the Study Team determined that no regional coordination was required for the identified needs. However, with increased load requests in the region, a regional planning was triggered in early 2019. The second cycle new Regional Planning for the regionis currently underway with the Hydro One led Needs Assessment report published in May 2019.

In the current regional planning cycle, the Study Team has reaffirmed the needs identified in the previous cycle along with identifying new needs associated with aging infrastructure in the region. Below is an update to the needs reaffirmed or identified during the current cycle Needs Assessment:

- **115kV L7S Circuit – Capacity Increase**
  L7S is a single 115 kV circuit transmission line operated radial from Seaforth TS to St. Mary's TS approaching its thermal loading limits during peak load conditions.

  Overloading of 115 kV circuits L7S (under contingency) – options to mitigate the near-term need of upgrading the emergency thermal ratings of L7S are outlined in the Local Plan, prepared in the last Regional Planning cycle. Hydro One Transmission and the LDCs will revisit and assess the viability of the options proposed in the Local Plan.

  Overloading of 115 kV circuits L7S (all in-service condition) – further assessment in the IRRP phase is required for the limited capacity of circuit L7S. In the IRRP phase, the Study Team will assess possible wires and non-wires to develop recommendation to address expected load growth in the sub-region supplied by the circuit.

- **Aging Infrastructure**
  The implementation and execution for the replacement of the following EOL transmission assets will be coordinated between Hydro One and the affected LDCs and/or customers, where required.

i. Wingham TS – T1/T2, PCT and Component Replacement
ii. Stratford TS – T1 and Component Replacement
iii. Seaforth TS – T1/T2/T5/T6, PCT & Component Replacement
iv. Hanover TS – T2 and Component Replacement

3.9 East Lake Superior

Hydro One has completed the acquisition of transmission assets from the former Great Lake Power Transmission on Oct 31, 2016 under the new name Hydro One Sault Ste. Marie, and therefore became the lead transmitter in the East Lake Superior (ELS) Region. The second cycle of Regional Planning was initiated by Hydro One in 2019, with the NA report published in June 2019 and the IRRP is scheduled to begin in Q4 2019. The ELS Region includes all of Hydro One Sault Ste. Marie's 560km of high-voltage transmission lines as well as ties to the rest of the provincial grid at Wawa TS in the northwest and Mississagi TS in the northeast. The region also includes Hydro One's 115kV W2C circuit supplying the Town of Chapleau from Wawa TS. During the first cycle of regional planning (led by the former Great Lakes Power Transmission), only local needs were identified and they did not require further regional coordination.

The NA Report identified the following needs and recommendations:

- **Third Line TS Station & Transmission Supply Capacity**
  Based on planning criteria, Third Line TS 230/115kV Autotransformers T1 and T2 are expected to approach their 10-Day Limited Time Rating over the near/mid-term planning horizon. IESO has provided further analysis in Scoping Assessment and it has recommended to study the overload scenario further in the IRRP phase of the Regional Planning.

- **115kV No.1 Algoma Circuit Overload**
  Based on the first cycle NA, 115kV No.1 Algoma Circuit may become overloaded after a breaker failure contingency at Patrick St. TS that removes No.2 Algoma and No.3 Algoma circuits by configuration. This overload condition is dependent on the amount of load being supplied from Patrick St. TS. Further analysis during Scoping Assessment determined that the most appropriate planning approach to address this issue is to study further through the upcoming IRRP phase of the Regional Planning.

- **Load Restoration**
  Load restoration time at the following stations might not meet the ORTAC[6] guidelines:
  i. Andrew TS
  ii. Batchawana TS
  iii. Goulais TS
  During Scoping Assessment, the Study Team determined that Hydro One and impacted LDC(s) will further examine load restoration time and possible mitigation measures through local planning.

- **End-Of-Life Assets**
  The implementation and execution for the replacement of the following EOL transmission assets will be coordinated between Hydro One Sault Ste. Marie and the affected LDCs and/or customers, where required.
  i. Echo River TS – Breaker Replacement

ii. No. 3 Sault Conductor and Structure Replacement
iii. Third Line TS – Autotransformer T2 & Protection Replacement
iv. Patrick St TS – HV Breaker Replacement
v. Batchawana TS / Goulais Bay TS – Station Refurbishment
vi. Northern Ave TS – Transformer T1 Replacement
vii. DA Watson TS – Metalclad Switchgear Replacement
viii. Clergue TS – Switchgear Replacement

3.10 GTA East

GTA East Region comprises the municipalities of Pickering, Ajax, Whitby, Oshawa, and parts of Clarington and other parts of Durham Region.

The first cycle RIP for GTA East Region was completed in January 2017 and recommended regional plans are being monitored by Hydro One for timely completion. The second cycle NA report was completed and published in August 2019. The report identified ongoing work at Seaton MTS with targeted in-service dat of June 2020 and completed work of new Enfield TS. Furthermore, the second cycle NA concluded no additional needs other than the EOL replacement work in the region.

The implementation and execution for the replacement of the following EOL transmission assets is being coordinated between Hydro One and the affected LDCs and/or customers, where required.

- **Cherrywood TS 230kV & 500kV Breaker Replacements**
  Cherrywood TS is a major Bulk Electricity System (BES), Northeast Power Coordination Council (NPCC) station, located at east end of Greater Toronto Area (GTA). The existing 500kV and 230kV Air Blast Circuit Breaker (ABCBs), with an average age of 48 years are obsolete and at end of life. The age, condition and lack of parts present significant difficulties in maintaining these breakers and the associated high pressure air system. The project has been divided into multiple phases. Phase 1 of this project is currently underway. The whole project is expected to be completed in 2027.

- **Cherrywood TS MV Switchyard Refurbishment**
  The MV DESN switchyard, with the exception of step-down transformers T7 and T8, at Cherrywood TS is at end of life due to age and condition. This project is expected to be in-service in 2025.

- **Wilson TS T1/T2 & Switchyard Refurbishment**
  Wilson TS is located in Oshawa and it contains 4 X 75/100/125 MVA, 230/44 kV, transformers that supplies city of Oshawa through Oshawa Power feeders and surrounding areas of Oshawa through Hydro One Distribution owned feeders. The T1 and T2 transformers and majority of assets within 44 kV BY switchyard have reached end of life. This project is expected to be in-service in 2025.

3.11 London Area

The London Area includes the Cities of Woodstock, London and St. Thomas as well as the Counties of Middlesex, Elgin and Oxford. The RIP for the region was completed in August 2017, and the next

cycle of Regional Planning for the London Area Region is currently anticipated to commence in 2020.

The London Area region was divided into five sub-regions based on electrical supply boundaries for further regional planning purposes:

3.11.1 Greater London Sub-region

The Greater London sub-region is a summer-peaking area that includes the City of London, and customers in surrounding municipalities supplied from Buchanan DESN, Clarke, Highbury, Nelson, Talbot, and Wonderland transformer stations (TS). This sub-region includes customers of London Hydro and Hydro One Distribution.

In 2017, condition assessment of Wonderland TS identified it as in poor condition and assessment of replacement is being done in consultation with LDC load forecast. It will be replaced with a similar unit to match the ratings of transformer T6. The project is currently underway, and the expected completion date is Q3 2022.

In addition, two load restoration needs were identified in this sub-region:

- **Loss of W36/W37 (Clarke TS and Talbot TS)**
  For the loss of W36/W37, the Study Team recommended the implementation of automated switching devices on distribution feeders and feeder extensions on the distribution system.

- **Loss of W42L/W43L (Buchanan TS)**
  No further action is required for the loss of W42L/W43L, as load transfer and temporary fixes/emergency by-pass solutions are possible.

3.11.2 Aylmer-Tillsonburg Sub-region

Aylmer-Tillsonburg sub-region includes city of Aylmer, city of Tillsonburg and surrounding areas within service territories of Erie Thames Powerlines, Tillsonburg Hydro, and Hydro One Distribution, supplied by Aylmer TS and Tillsonburg TS.

Needs identified in this sub-region include the following:

- Voltage constraint at Tillsonburg TS
- Thermal constraints at 115kV circuit W8T (Buchanan TS x Edgeware JCT)
- Sub-standard customer delivery performance at Tillsonburg TS.

As per the Study Team recommendation, Hydro One developed budgetary estimates for each of the proposed alternatives to evaluate their cost and feasibility. In June 2019, the Working Group agreed to proceed with decoupling supply to Tillsonburg TS and Aylmer TS by reconfiguring existing normally open points as well as installing low-voltage capacitors at Tillsonburg TS. The project is currently undergo detail cost estimating process and with an expected in service date in 2022.

3.11.3 Strathroy Sub-region

This sub-region includes Strathroy TS that supplies the Middlesex County and townships of Adelaide-Metcalfe, Warwick, Strathroy-Caradoc via Entegrus and Hydro One Distribution.

The Study Team determined that there were no needs and/or no further regional coordination was required for the sub-region.

3.11.4 Woodstock Sub-region

Woodstock region includes town of Ingersoll, City of Woodstock and rest of northern part of Oxford County, supplied by Ingersoll TS, Woodstock TS, Commerce Way TS, and Karn TS.

A load restoration need was identified in this sub-region as the result of simultaneous loss of 230kV circuit M31W/M32W and this need has been further assessed in a Local Plan completed in May 2017. Based on load forecast and transfer capability information, it was determined that there is sufficient transfer capability in the existing system, and therefore no further action is required.

3.11.5 St. Thomas Sub-region

This sub-region includes city of St. Thomas and surrounding areas supplied by Edgeware TS and St. Thomas TS via distribution network of St. Thomas Energy Inc., London Hydro, and Hydro One Distribution.

The Study Team determined that there were no needs and/or no further regional coordination was required for the sub-region.

3.12 Peterborough to Kingston

The Peterborough to Kingston Region includes the area roughly bordered geographically by the municipality of Clarington on the West, North Frontenac County on the North, Frontenac County on the East and Lake Ontario on the South. The region includes Frontenac County, Hasting County, Northhumberland Count, Peterborough County, and Prince Edward County and related municipalities.

The first cycle of Regional Planning was concluded with RIP report published in July 2016. During the first cycle, there were no major needs identified in the region that required coordinated regional planning.

The second cycle of Regional Planning is expected to be triggered in 2020.

3.13 South Georgian Bay/Muskoka

The geographical area of the South Georgian Bay/Muskoka Region is the area roughly bordered by West Nippising on the North-West, the Algonquin Provincial Park on the North-East, Scugog on the South, Erin on the South-West and Grey Highlands on the West.

The RIP report for this region was completed in August 2017, and the second cycle of Regional Planning for the South Georgian Bay/Muskoka region is currently anticipated to commence in 2020.

The region was divided into following two sub-regions during scoping phase: Barrie/Innisfil and Parry Sound/Muskoka sub-regions.

3.13.1 Barrie/Innisfil Sub-region

The Barrie/Innisfil sub-region includes the areas supplied by Midhurst TS, Barrie TS, Everett TS, and Alliston TS, and transmission circuits E8V/E9V, E3B/E4B, and M6E/M7E. Updates to the previously identified needs are as follows:

- **Transformation Capacity Need in Barrie/Innisfil Sub-Region**
  Barrie/Innisfil sub-region is forecasted to experience significant load growth, limiting station and line capacity and the end of life equipment replacements. The Study Team recommended to rebuild and uprate Barrie TS as the best solution to meet the transformation capacity need in the Sub-Region. Hydro One is currently developing this plan, named 'Barrie Area Transmission Upgrade project'. The plan includes uprating 115kV lines E3/4B to 230 kV, upgrading existing DESN transformer from 115/44 kV, 55/92 MVA to 230/44 kV, 75/125 MVA. The project is planned to be in-service by Q3 2022.

- **Transformation Capacity Need at Uprated Barrie TS**
  Over the 20 year planning period, Barrie TS will experience the biggest growth in the Sub-region. With the forecast data collected, it is determined that the uprated Barrie TS will exceed its LTR by 2031. This need will be monitored and investigated further in the second cycle of the Regional Planning Process.

3.13.2 Parry Sound/Muskoka Sub-region

The Parry Sound / Muskoka sub-region includes the areas supplied by Parry Sound TS, Waubaushene TS, Orillia TS, Bracebridge TS, Muskoka TS, and Minden TS, and transmission circuits M6E/M7E and E26/E27. Updates to the previously identified needs are as follows:

- **Transformation Capacity Need in Parry Sound/Muskoka Sub-Region**
  Based on the current load forecasts, additional transformation capacity relief is required for both Parry Sound TS and Waubaushene TS to accommodate the load growth and improve reliability in this sub-region. The Study Team has determined that replacing both transformers at Parry Sound TS with two standard 50/83MVA units will address the need. The project is currently undergoing estimation and design phase, and the expected in-service date is Q4 2022.

- **Parry Sound/Muskoka Load Restoration**
  For the loss of M7E/M6E transmission lines, the load interrupted with the existing circuit configuration during peak periods will not be able to meet load restoration criteria as described in the ORTAC[6]. Study Team recommended to install motorized disconnect switches (MDS) at the Orillia TS JCT in order to address this need. This project is currently in the execution phase, and its expected in-service date is Q1 2022.

- **Minden TS – End-of-Life Assets**
  Minden T1 and T2 transformers are rated at 25/42 MVA each and are non-standard as per the current standards. The transformers are currently beyond their expected service life and their condition is deteriorating and leak risk is increasing. In mid-2018, Minden T1 transformer failed, and a replacement transformer rated at 50/83 MVA was in service in November 2018.

The preferred alternative for Hydro One was to replace the existing transformers with standard 50/83 MVA units. The new equipment is expected to have a service life of over 50 years and will be able to supply the forecasted load growth in the Minden area. The project is currently undergoing execution, and the expected in-service date for transformer T2 is Q1 2021.

There are potential bulk power system lines that require major refurbishment over the next few years. These lines include 230 kV transmission lines D1M/D2M, E8V/E9V, and M6E/M7E and will be further assessed as part of the bulk system studies by the IESO in coordination with Hydro One.

3.14 Sudbury/Algoma

The Sudbury/Algoma region includes the municipalities of Greater Sudbury and Espanola and surrounding areas. There are municipal LDCs serving each of those municipalities and Hydro One Distribution serves the remainder of the Region. The area is supplied from transformer stations Clarabelle TS, Coniston TS, Elliot Lake TS, Larchwood TS, Manitoulin TS and Martindale TS.

Hydro One has developed and published a RIP report in June 2016. The Study Team at the time determined that no further regional coordination was required.

The second cycle of Regional Planning for the Sudbury /Algoma region is currently anticipated to commence in Q2 2020.

3.15 Northwest Ontario

The Northwest Ontario region is a large geographic area, stretching from the town of Marathon to the western and northern borders of the province, with diverse characteristics. Therefore this region has been divided into four sub-regions for the purpose of regional planning: North of Dryden, Greenstone-Marathon, Thunder Bay and West of Thunder Bay sub-regions.

The first cycle RIP for this region was completed in June 2017 with the publication of the RIP report. The second cycle of Regional Planning for the Northwest Ontario region is currently anticipated to commence in Q4 2019.

3.15.1 North of Dryden Sub-region

This includes the portion of the Northwest Ontario Region north of the cities of Dryden and Kenora that includes Ear Falls, Red Lake and Pickle Lake. The sub-region has residential, commercial and mining load, as well as hydroelectric generation. This sub-region will supply the Remote Communities and has the potential for supplying the future Ring of Fire mining load.

Planning for the North of Dryden sub-region started prior to the implementation of the new regional planning process. The IESO-issued the IRRP report in January 2015 identified a potential need for increased capacity to meet the anticipated increased demand from the mining sector, including the potential for supply to the Ring of Fire, and connection of the Remote Communities. Currently, there is one transmission infrastructure investments being developed to meet the near-term electricity needs north of Dryden:

- **Watay Line to Pickle Lake (Developed by Wataynikaneyap Power Limited Partnership)**
  This project involves building a new 230 kV transmission line from Dinorwic (Dryden area) to Pickle Lake, a new 230 kV switching station at Dinorwic and a new 230/115kV transformer station at Pickle Lake, along with a radial network of 115 kV system to connect the remote communities north of Pickle Lake. Hydro One will connect these facilities to the existing transmission system through a new junction on the 230 kV transmission line D26A at Dinorwic and a new 115 kV switching station at Pickle Lake.

  This project will off-load the existing 115 kV transmission lines E4D and E1C (which currently supply the Pickle Lake area load), resulting in increased capacity for supply in the Red Lake area, without the need for E4D upgrade at this time.

  Wataynikaneyap Power LP (WPLP) is also developing a network of 115 kV system to connect the remote communities north of Red Lake. Hydro One will connect these facilities to the existing transmission system through a new junction on the 115 kV transmission line E2R at Red Lake.

  The Board has granted Leave to Construct for the Pickle Lake and Red Lake projects. Hydro One is in the process of design and cost estimation of its new facilities to connect the new WPLP transmission facilities to Hydro One's transmission system. The expected in-service date is Q4 2020.

- **Ring of Fire Sub-System Need**

  The North of Dryden IRRP indicated that since the Ring of Fire area is remote from the existing transmission system, any additional capacity needs would require new facilities. It indicated that transmission system connection, either from Pickle Lake or from the Marathon area, is the most economic option when compared to diesel generation. Development in the area is still in the early stages and no firm recommendations are made at this time.

3.15.2 Greenstone-Marathon Sub-region

This sub-region covers the southeastern portion of the Northwest Ontario Region. The sub-region has distribution and light industrial load, with a proposal for a new mine and future potential mines.

For the Greenstone-Marathon sub-region, the IRRP report was published in June 2016.

To meet the forecast demand from LDCs, as reported in 2016, with the cancellation of the Energy East pipeline project and the current plans of new mine for embedded generation to meet their supply requirements, no new system enhancements were identified. Accordingly, new industrial and/or mining loads will be monitored and investments will be initiated once formal connection requests are received from the customer(s).

3.15.3 Thunder Bay Sub-region

This sub-region includes the city of Thunder Bay and its vicinity. The sub-region has residential, commercial and industrial load, as well as dispatchable and embedded generation, supplied by the distribution and transmission facilities.

The 2017 RIP for the region identified the need to upgrade the thermal rating of circuit R2LB and the work has been completed. Other projects in the sub-rigion include:

- **Port Arthur TS - Transformation Capacity**
  The limiting low voltage equipment at Port Arthur is nearing end-of-life and is planned to be replaced and upgraded in the mid-term. This upgrade would bring the station capacity up to 59 MW, sufficient to meet the need beyond 2035. No additional plan is required at this time and load at Port Arthur TS will be monitored and supply options will be assessed in the upcoming regional planning cycle.

- **Lakehead TS and Birch TS - Transformation Capacity**
  Currently the Thunder Bay 115 kV system can accommodate approximately 150 MW of additional load growth. Under the high load growth scenario, the Thunder Bay system would require additional supply capacity of approximately 20 MW by 2030. Therefore a potential long-term solution may be required, however no immediate action is recommended beyond monitoring of the sub-system load growth.

3.15.4 West of Thunder Bay Sub-region

This includes the portion of the Northwest Ontario region from of the western boundary of Thunder Bay sub-region up to and including the cities of Dryden and Kenora in the north. The sub-region has residential, commercial and mining load, as well as bio-mass and hydroelectric generation. It supplies the North of Dryden sub-region, when the generation in that sub-region is insufficient to meet the demand. Several LDCs serve the customers in this sub-region.

The 2017 RIP and the IRRP recommended monitoring electricity demand growth closely to determine if and when a decision on Dryden 115kV subsystem is required. As reported previously, the Study Team will also ensure communities are informed of all the bulk, coordinated regional, distribution and community energy planning activities.

3.16 Chatham/Lambton/Sarnia

The Chatham-Lambton-Sarnia region is located to the west of the Greater Toronto Area in southwestern Ontario. The region includes the municipalities of Lambton Shores and Chatham-Kent. It also includes the Townships of Petrolia, Plympton-Wyoming, Brooke-Alvinston, Dawn-Euphemia, Enniskillen, St. Clair, Warwick and the Villages of Oil Springs and Point Edward.

Hydro One developed and published a RIP in August 2017. The next cycle of Regional Planning for this region is currently anticipated to commence between 2020 and 2021.

The Study Team determined that no further regional coordination is required. However, several needs that are local in nature were identified during Needs Assessment phase, and updates are provided below:

- **Chatham SS – Component Replacement**
  This investment is targeted towards EOL components at Chatham SS. Due to operational requirements, capacitor SC21 needs to be replaced. The expected completion date for replacement is Q4 2025.

- **St. Andrews TS – T3, T4 & Switchyard Refurbishment**
  This investment is targeted at EOL components due to outage constraint and considering available real estate. The investment will include a complete air insulated switchyard rebuild and transformer replacement by Q1 2023.

- **Sarnia Scott TS – T5 & Component Replacement**
  This investment includes replacing EOL Transformer T5, and the associated 115kV breaker. The expected completion date is Q4 2023.

- **Lambton TS End-of-Life**
  This investment includes replacing EOL 23lkV transformers T7/T8, selected 230kV equipment, and transformers T5/T6 and their associated LV switchyard. The expected completion date is Q4 2023.

3.17 Niagara

The Niagara Region comprises the municipalities of City of Port Colborne, City of Welland, City of Thorold, City of Niagara Falls, Town of Niagara-On-The-Lake, City of St. Catharines, Town of Fort Erie, Town of Lincoln, Township of West Lincoln, Town of Grimsby, Township of Wainfleet, and Town of Pelham. Haldimand County has been included in the Niagara Region Group 3 for Needs Assessment.

Hydro One developed and published the RIP report in March 2017, and the next cycle of Regional Planning for this region is currently anticipated to commence in Q4 2020 due to emerging needs in the region.

Below are updates to the needs identified by the Study Team:

- **Thermal Overloading on 115kV Q4N**
  Under high generation scenarios at Sir Adam Beck GS #1, the loading on Q4N (Beck #1 SS x Portal Jct) can exceed circuit ratings. The potential overloading issue will be addressed under sustainment project that is scheduled for completion in Q3 2021.

3.18 North/East Sudbury

The geographical area of the North/East of Sudbury Region is the area roughly bordered by Moosonee on the North, Hearst on the North-West, Ferris South and Kirkland Lake on the East.

Hydro One developed and published a RIP in April 2017. The Study Team at the time determined that no further regional coordination was required.

The second cycle of Regional Planning for this region is currently anticipated to commence in Q1 2021.

3.19 Renfrew

The Renfrew Region includes all of Renfrew County that is made up of 17 municipalities and City of Pembroke. The rough boundaries of this Region are Ottawa River on the North-East, Algonquin Provincial Park on the West, and Route 508 on the South.

Hydro One led Study Team developed and published a NA followed with a RIP report in July 2016. There were no needs in the region that required regional coordination.

The second cycle of Regional Planning for this region is currently anticipated to commence in Q4 2020.

3.20 St. Lawrence

The St Lawrence Region covers the southeastern part of Ontario bordering the St Lawrence River. The region starts at Gananoque on the eastern end of Lake Ontario and extends to the inter-provincial boundary with Quebec. The City of Cornwall is supplied by Fortis Ontario with transmission lines from Quebec and is not included in this Region.

Hydro One developed and published a NA report followed by RIP report in July 2016. There were no needs in the region that required regional coordination.

The next cycle of Regional Planning for this region is currently anticipated to commence in Q4 2020.

3.21 North of Moosonee

The lead transmitter for the region is Five Nations Energy Inc. The regional planning status will be provided by the lead transmitter..

4. LESSONS LEARNED

During the first cycle of the regional planning process, several lessons and opportunities for improvement were identified pertaining to the regional planning process and its deliverables following a thorough review of the regional planning process, discussions with regional Study Teams consisting of LDCs and IESO, and input from the OEB Regional Planning Process Advisory Group ("RPPAG"). Hydro One also sent formal communication and survey to LDCs in 2018 to seek their feedbacks on prioritization of regions, scheduling, and suggestions for enhancements. Based on the feedback and lessons learned, Hydro One developed and implemented several improvements in the regional planning process and reports. Some examples of these enhancements are described below:

Improvements in data gathering:

- Data gathering templates – more clarity and consistency in request for data in order to reconcile the data quicker. Advance emails are sent for LDCs to prepare the information.
- End of Life asset information – process to collect and provide end-of-life information of major High Voltage transmission assets up to 10 years as part of the Needs Assessment phase.
- Load forecast methodology and development is continuously discussed in light of CDM and Distributed Energy Resource (DER) penetration along with electric vehicle (EV) in coordination with IESO and LDCs to improve data accuracy (retrieving actual load, new technology, basis of extreme weather correction factor, forecasting methodology, applying CDM and DG).

Improvements in reporting of analysis and plans:

- Assessment, justification and discussion of major high voltage equipment reaching the end of its useful life within Needs Assessment and RIP reports. As part of this analysis different options are evaluated and discussed along with justifications to develop recommended 'right sizing' of plan based on load forecasts for growth that takes into account changing customer requirements and the impact of new technologies. The assessment includes, but not limited to: downsizing/eliminating/right sizing of equipment by transferring load to other existing facilities; replacing equipment with similar equipment of same or higher ratings; and, consideration of economic and practical implementation of incremental CDM to defer or eliminate the need while maintaining safe and reliable service to customers.
- Regional planning report templates – various updates, including new section on EOL equipment assessment and a complete RIP report for all regions.

Process Improvements:

- Hydro One has estrablished an engagement process with the LDCs prior to triggering regional planning to understand their emerging needs.
- Utilizing revised Local Planning guidelines to aid the Study Team in determining when needs can be efficiently addressed .
- Provided input to the LTEP directive to the IESO and OEB to enhance Regional Planning Process.

- Further enhancements to the scope and planning approach for EOL equipment needs over the next 10 years in regional planning reports.

5. CONCLUSION

The first regional planning cycle was completed in Aug 2017, and the second regional planning cycle is currently underway. In second cycle, Regional Planning for several regions had to be advanced duse to emerging needs. Members from the IESO, LDCs and Hydro One transmission are represented on Study Teams during the various phases of the regional planning process. Team members have been able to make decisions and undertake the appropriate level of planning based on the needs and able to make efficient and effective deicisions. For example, Needs Assessment report undertakes to assess the needs, identify options and Study Team develops recommended plan and/or further assessments as part of IRRP or RIP. In addition, the concept of Local Planning is also utilized for further assessment by smaller Study Team to address needs that are local in nature, where straight forward wires only options are the obvious and appropriate solution. Accordingly, assessments for these needs do not require further regional coordination and are directly planned for implementation by Hydro One Transmission and affected LDC(s) (or customers). Other needs are further assessed by the Study Team during the IRRP and RIP phases of the regional planning process. Frequently, 'wires' planning is also initiated in parallel with IRRP when the Study Team determines that a wires approach is the best alternative to address a need.

The sharing of information by the Study Team members and the publishing of reports and other relevant information on the Hydro One and IESO websites allows stakeholders to be aware of current and future plans that may influence their planning strategies. This transparency and stakeholder engagement was intended as one of the hallmarks of the regional planning process as envisioned by the Board.

Since the regional planning process was introduced, Hydro One, LDCs, and the IESO have been able meet mandatory timelines to complete each of the regional planning phases with the exception of one IRRP for a sub-region of Northwest Ontario IRRP.

Regional Planning reports have recommended more than 90 projects with approximately $2 billion of investments over the next 10 years across the province. Other key accomplishments since the commencement of the second cycle include the completion of:

- 10 Needs Assessment reports;
- 4 IRRP reports
- 1 RIP report
- Improvements in data gathering, reporting of analysis and plans, and regional planning process
- Timely issuance of Planning Status letters to the LDCs

From a wires infrastructure perspective, the RIP report for a region is the most important document as it provides a complete picture of the regional wire infrastructure plan. Specifically, the RIP report provides a report for the region to address all the identified needs in the regions including a consolidated account of wires infrastructure plans developed during earlier phases, i.e., Needs Assessment, Local Plan and IRRP for the region.

6. REFERENCES

[1] Ontario Energy Board. "Transmission System Code". Last Revised December 18, 2018 (Originally Issued on July 14, 2000).

[2] Hydro One Networks Inc. "Regional Planning Process – Annual Status Report". November 1, 2016.

[3] Ontario Energy Board. "Distribution System Code". Last Revised March 14, 2019 (Originally Issued on July 14, 2000).

[4] "Planning Process Working Group Report to the Board – The Process for Regional Infrastructure Planning in Ontario". March 13, 2013. Last Revised May 17, 2013.

[5] Ontario Energy Board. "Conservation and Demand Management Requirement Guidelines For Electricity Distributors". Last Revised August 11, 2016.

[6] Independent Electricity System Operator. "Ontario Resource and Transmission Assessment Criteria (ORTAC)". Issue 5.0. August 22, 2007.

APPENDIX A. CONSERVATION, DISTRIBUTED GENERATION, AND OTHER INITIATIVES

A.1 Conservation Achievement

The table below shows the most recently available estimated peak demand offsets resulting from conservation energy efficiency programs by LDCs. Peak Demand Savings which could not be mapped to the planning regions were excluded from this extimate. The peak demand saving values were estimated based on the reported 2018 conservation activities with planning regions. More granular results by sub-regions and/or transmission stations are not available due to the methodology used in monitoring and evaluating programs.

Table 3. Conservation Status Update

Sub region	LDC	Estimated 2018 Net First Year Peak Demand Savings (MW)*
Barrie/Innisfil	InnPower Corporation	**8**
	Alectra Utilities	
	Hydro One Distribution	
Brant	Former Brant County Power Inc.*	**10**
	Brantford Power Inc.	
	Energy+ Inc.	
	Hydro One Distribution	
Bronte	Burlington Hydro	**10**
	Oakville Hydro	
Central Toronto	Toronto Hydro	**31**
Greenstone-Marathon	Hydro One Distribution	**3**
Greater London	London Hydro	**9**
	Hydro One Distribution	
KWCG	Kitchener-Wilmot Hydro	**10**
	Waterloo North Hydro	
	Alectra Utilities (former Guelph Hydro Electric Systems Inc.)	
	Wellington North Power Inc.	
	Energy+ Inc.	
	Centre Wellington Hydro	
	Halton Hills Hydro	
	Milton Hydro	
	Hydro One Distribution	
North of Dryden	Hydro One Distribution	**3**
Northwest GTA	Alectra Utilities (former Hydro One Brampton*)	**24**
	Milton Hydro	
	Halton Hills Hydro	

	Hydro One Distribution	
Ottawa	Hydro Ottawa Limited	**10**
	Hydro One Distribution	
Pickering-Ajax-Whitby	Elexicon Energy Inc. (former Veridian Connections and Whitby Hydro)	**4**
	Hydro One Distribution	
Parry Sound/Muskoka	Lakeland Power Distribution Ltd.	**8**
	Midland Power Utility Corporation	
	Orillia Power Distribution Corporation	
	Alectra Utilities	
	Hydro One Distribution	
	Newmarket-Tay Power Distribution Ltd.	
	Elexicon Energy Inc. (former Veridian Connections Inc.)	
Thunder Bay	Synergy North Corporation (former Thunder Bay Hydro Electricity Distribution Inc.)	**3**
	Hydro One Distribution	
Windsor-Essex	Essex Powerlines Corporation	**5**
	E.L.K Energy Inc.	
	Enwin	
	Entegrus Inc.	
	Hydro One Distribution	
West of Thunder Bay	Fort Frances Power	**3**
	Atikokan Hydro	
	Kenora Hydro	
	Sioux Lookout Hydro	
	Hydro One Distribution	
York	Alectra Utilities	**11**
	Newmarket Tay Power Distribution Ltd (includes former Midland Power Utility Corporation)	
	Hydro One Distribution	

A.2 Distribution Generation

The table below shows the total installed and effective capacity of IESO Contracted Distributed Generation ("DG") projects which have come into service or under development since the base year of the region/sub region load forecast. This does not include net or behind the meter generation. This table does not include projects which had already been in service prior to this date, except in cases where a new contract was formed to account for incremental capacity of a facility.

The equivalent effective capacity for these new generation sources is based on capacity factors consistent with the zonal assumptions applied in the region/sub region load forecast. Data is based on the IESO contract list as of July 31, 2019.

Table 4. DG Status Update

Sub region	Station	Installed Capacity (MW)	Effective Capacity (MW)	Base Year
Barrie/Innisfil	BARRIE TS	1.3	0.4	2014 Peak
	MIDHURST TS	16.9	3.8	
	EVERETT TS	2.3	0.5	
	ALLISTON TS	2.4	0.5	
	TOTAL	**22.9**	**5.2**	
Brant	BRANT TS	10.9	4.3	2012 Peak
	BRANTFORD TS	8.0	3.2	
	POWERLINE MTS	2.9	1.2	
	TOTAL	**21.8**	**8.7**	
Bronte	BRONTE TS	2.07	0.70	2014 Peak
	CUMBERLAND TS	2.67	0.91	
	BURLINGTON DESN	1.84	0.62	
	PALERMO TS	0.00	0.00	
	TRAFALGAR DESN	0.00	0.00	
	TREMAINE TS	1.67	0.56	
	GLENORCHY MTS	1.33	0.45	
	OAKVILLE #2 TS	1.04	0.35	
	TOTAL	**10.62**	**3.59**	
Central Toronto*	AGINCOURT TS	1.58	0.54	2016
	BASIN TS	0	0	
	BATHURST TS	1.97	0.67	
	BERMONDSEY TS	0.82	0.28	
	BRIDGMAN TS	0.04	0.01	
	CARLAW TS	0.25	0.09	
	CAVANAGH MTS	0.54	0.19	
	CECIL TS	0.15	0.05	
	CHARLES TS	0.02	0.01	
	COPELAND TS	0	0	
	DUFFERIN TS	0.54	0.18	
	DUPLEX TS	0.02	0.01	
	ELLESMERE TS	1.92	0.65	
	ESPLANADE TS	0.03	0.01	
	FAIRBANK TS	0.88	0.30	
	FAIRCHILD TS	0.89	0.30	
	FINCH TS	4.77	1.62	
	GERRARD TS	0	0	
	GLENGROVE TS	0.27	0.09	
	HORNER TS	0.81	0.27	
	JOHN TS	3.85	3.85	
	LEASIDE TS	0.18	0.06	
	LESLIE TS	2.53	0.86	
	MAIN TS	0.48	0.16	
	MALVERN TS	1.17	0.40	

	MANBY TS	1.13	0.38	
	REXDALE TS	1.45	0.49	
	RICHVIEW TS	1.95	0.66	
	RUNNYMEDE TS	0.88	0.30	
	SCARBORO TS	1.25	0.43	
	SHEPPARD TS	1.77	0.93	
	STRACHAN TS	0.14	0.05	
	TERAULY TS	0.066	0.02	
	WARDEN TS	1.73	0.59	
	WILTSHIRE TS	0.01	0.00	
	WOODBRIDGE TS	0.03	0.01	
	TOTAL	**34.106**	**14.46**	
Greenstone-Marathon	LONGLAC TS	0.01	0.003	2014 Peak
	MARATHON DS	0.02	0.006	
	PIC DS	0.01	0.003	
	SCHREIBER WINNIPEG DS	0.12	0.04	
	TOTAL	**0.04**	**0.01**	
Greater London	CLARKE TS	1.975	1.002	2016 Peak
	TALBOT TS	0.535	0.182	
	BUCHANAN DESN	0.768	0.261	
	HIGHBURY TS	1.305	0.444	
	NELSON TS	0.00	0.00	
	WONDERLAND TS	1.546	0.526	
	TOTAL	**6.129**	**2.415**	
KWCG	ARLEN MTS	0.21	0.08	2010 Peak (July 7, 2010)
	CAMBRIDGE #1	5.62	2.13	
	CAMPBELL TS	8.41	3.2	
	CEDAR TS	1.92	0.73	
	DETWEILER TS	0.02	0.01	
	ELMIRA TS	5.56	4.39	
	FERGUS TS	47.32	9.19	
	GALT TS	5.62	1.75	
	HANLON TS	1.00	0.42	
	KITCHENER #1	0.54	0.20	
	KITCHENER #3	1.77	0.67	
	KITCHENER #4	1.46	0.55	
	KITCHENER #5	2.09	0.79	
	KITCHENER #6	2.58	0.98	
	KITCHENER #7	1.43	0.54	
	KITCHENER #8	1.21	0.46	
	KITCHENER #9	3.26	1.24	
	PRESTON TS	2.75	1.05	
	PUSLINCH DS	1.33	0.51	
	RUSH MTS	0.52	0.20	
	SCHEIFELE TS	4.17	1.58	
	WATERLOO #3	1.88	0.72	

	WOLVERTON DS	0.70	0.26	
	TOTAL	**101.37**	**31.65**	
North of Dryden	N/A*			
Northwest GTA	BRAMALEA TS	8.06	2.74	2012 Peak
	GOREWAY TS	13.03	4.43	
	HALTON TS	3.48	1.18	
	JIM YARROW MTS	6.26	2.13	
	KLEINBURG TS	6.20	4.24	
	PLEASANT TS	17.94	6.10	
	TREMAINE TS	1.73	0.59	
	WOODBRIDGE TS	0.78	0.27	
	TOTAL	**57.49**	**21.68**	
Ottawa	ALBION TS	1.32	0.4	2012 Peak
	BILBERRY CREEK TS	1.21	0.411	
	BRIDLEWOOD MTS	0.75	0.254	
	CARLING TS	29.894	21.025	
	CENTERPOINT MTS	0.064	0.021	
	CUMBERLAND DS	0.264	0.09	
	CYRVILLE MTS	0.31	0.09	
	ELLWOOD MTS	0.35	0.119	
	FALLOWFIELD DS	0.14	0.047	
	GREELY DS	1.37	0.41	
	HAWTHORNE TS	2.589	0.882	
	HINCHEY TS	0.128	0.043	
	KANATA MTS *	1.123	0.381	
	KING EDWARD TS	0.125	0.0416	
	LIMEBANK MTS	0.521	0.177	
	LINCOLN HEIGHTS TS	0.381	0.129	
	LISGAR TS	0.07	0.024	
	MANORDALE MTS	0.3	0.09	
	MANOTICK DS	0.543	0.513	
	MARCHWOOD MTS	0.371	0.126	
	MARIONVILLE DS	1.02	0.82	
	MERIVALE MTS	0.14	0.047	
	MOULTON MTS	0.1	0.034	
	NAVAN DS	0.511	0.173	
	NEPEAN TS	2.07	0.62	
	NEPEAN EPWORTH TS	0.04	0.01	
	OVERBROOK TS	1.041	0.354	
	RICHMOND MTS	0.28	0.095	
	RIVERDALE TS*	0.248	0.084	
	RUSSELL DS	0.027	0.009	
	RUSSELL TS	2.185	0.742	
	Slater TS	0.0278	0.00834	
	SOUTH GLOUCESTER DS	0.122	0.041	
	SOUTH MARCH TS	2.264	0.769	

	TERRY FOX MTS	0.53	0.16	
	UPLANDS MTS #2	0.221	0.075	
	WILHAVEN DS	2.084	0.708	
	WOODROFFE TS	0.431	0.146	
	TOTAL	**53.896**	**30.6861**	
Pickering-Ajax-Whitby	THORNTON TS	0.26	0.088	2016 Peak
	WHITBY TS	0.7122	0.242	
	WILSON TS	19.48	1.69	
	TOTAL	**20.45**	**2.02**	
Parry Sound/Muskoka	BRACEBRIDGE TS	0.0	0.0	2014 Peak (Winter)
	MIDHURST TS DESN1	22.3	0.0	
	MIDHURST TS DESN2	1.9	0.0	
	MINDEN TS	5.3	1.5	
	MUSKOKA TS	14.9	0.1	
	ORILLIA TS	33.3	0.5	
	PARRY SOUND TS	2.2	0.6	
	WAUBAUSHENE TS	21.2	0.0	
	TOTAL	**101.1**	**2.7**	
Thunder Bay	BIRCH TS	0.54	0.02	2014 Peak (January 20, 2014)
	FORT WILLIAM TS	0.29	0.00	
	MURILLO DS	0.34	0.084	
	NIPIGON DS	0	0	
	PORT ARTHUR TS	0	0	
	RED ROCK DS	0	0	
	TOTAL	**0.96**	**0.1**	
Windsor-Essex	BELLE RIVER TS	0	0	2018 Peak (Summer)
	CRAWFORD TS	0	0	
	ESSEX TS	0	0	
	KEITH TS	0	0	
	KINGSVILLE TS	0	0	
	LAUZON TS DESN1	0	0	
	LAUZON TS DESN2	0	0	
	MALDEN TS	0	0	
	TILBURY TS	0	0	
	TILBURY WEST TS	0	0	
	WALKER TS #1	0	0	
	WALKER TS #2	0	0	
	LEAMINGTON TS	0	0	
	TOTAL	**41.7**	**14.2**	
West of Thunder Bay	AGIMAK DS	-	-	2014 Peak (January 20, 2014)
	BARWICK TS	25	1	
	BURLEIGH DS	-	-	
	CLEARWATER BAY DS	0.01	0.0004	
	DRYDEN TS	0.03	0.0012	
	ETON DS	0.03	0.0012	
	FORT FRANCES MTS	0.06	0.002	

	FORT FRANCES TS	-	-	
	KEEWATIN DS	-	-	
	KENORA DS	-	-	
	KENORA MTS	0.045	0.0018	
	MARGACH DS	0.005	0.0002	
	MINAKI DS	-	-	
	MOOSE LAKE TS	0.01	0.0004	
	NESTOR FALLS DS	0.02	0.0008	
	SAM LAKE DS	0.02	0.0006	
	SAPAWE DS	-	-	
	SHABAQUA DS	-	-	
	SIOUX NARROWS DS	0.01	0.0004	
	VALORA DS	-	-	
	VERMILLION BAY DS	-	-	
	TOTAL	**25.1**	**1**	
York	HOLLAND TS	1.3	0.4	2017 Peak (Summer)
	ARMITAGE TS	0.6	0.2	
	BROWN HILL TS	1.0	0.3	
	BUTTONVILLE TS	0.17	0.056	
	MARKHAM 1 MTS	0.087	0.030	
	MARKHAM 2 MTS	0.54	0.18	
	MARKHAM 3 MTS	0.64	0.22	
	MARKHAM 4 MTS	0.051	0.017	
	RICHMOND HILL MTS	0.29	0.097	
	VAUGHAN 1 MTS	0.33	0.11	
	VAUGHAN 2 MTS	0.080	0.027	
	VAUGHAN 3 MTS	0.31	0.11	
	VAUGHAN 4 MTS	-	-	
	TOTAL	**5.1**	**1.6**	

Notes:

A.3 Other Initiatives

Other Electricity System Initiatives, as identified by the IESO, include:

Sub region	Other Electricity System Initiatives
Barrie/Innisfil	There is a Local Achievable Potential Study being developed in the Barrie area to explore the potential of demand side options to help address the needs identified in regional planning. These studies are a part of the continued efforts to explore non-wires options as part of the integrated solutions to manage identified needs.
Brant	No updates available
Bronte	No updates available
Central Toronto	No updates available
Greenstone-Marathon	No updates available
Greater London	No updates available
KWCG	No updates available

North of Dryden	No updates available
Northwest GTA	No updates available
Ottawa	There is a Local Achievable Potential Study being developed in the Ottawa area to explore the potential of demand side options to help address the needs identified in regional planning. These studies are a part of the continued efforts to explore non-wires options as part of the integrated solutions to manage identified needs. In addition, the City of Ottawa is developing a comprehensive community energy strategy called Energy Evolution.
Pickering-Ajax-Whitby	No updates available
Parry Sound/Muskoka	There is a Local Achievable Potential Study being developed in the Parry Sound/Muskoka area to explore the potential of demand side options to help address the needs identified in regional planning. These studies are a part of the continued efforts to explore non-wires options as part of the integrated solutions to manage identified needs.
Thunder Bay	No updates available
Windsor-Essex	No updates available
West of Thunder Bay	No updates available
York	There is a Local Achievable Potential Study being developed in the York Region to explore the potential of demand side options to help address the needs identified in regional planning. These studies are a part of the continued efforts to explore non-wires options as part of the integrated solutions to manage identified needs. The IESO is launching Ontario's first ever local electricity market in York Region, with support from Alectra Utilities and Natural Resources Canada, in an effort to save costs and find affordable alternatives to building new transmission infrastructure. The pilot project will allow resources like solar panels, energy storage, and consumers capable of reducing their electricity use to compete to be available during periods of high demand. Leveraging existing local resources, or non-wires alternatives (NWAs), could help avoid the need to invest in new transmission lines and stations, while competition will drive down costs. More information can be found at the IESO's website here.

APPENDIX B. PLANNING STATUS LETTERS

The TSC requires that letters be issued by the transmitter as per Section 3C.2.2 item (h):

> *(h) within 45 days of receipt of a request to do so, provide a letter to a licensed distributor or a licensed transmitter confirming the status of regional planning for a region, including any Regional Infrastructure Plan that is being developed for the region that includes the distributor's licensed service area or within which the requesting transmitter's transmission system is located, suitable for the purpose of supporting an application proposed to be filed with the Board by the distributor or requesting transmitter.*

In compliance with this requirement, Hydro One has provided Planning Status Letters to the following LDCs since October 2018:

- Alectra Utilities Corporation
- Algoma Power Inc.
- Kitchener-Wilmot Hydro Inc.