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BY EMAIL AND RESS

November 1, 2023

Ms. Nancy Marconi
Registrar
Ontario Energy Board
Suite 2700, 2300 Yonge Street
P.O. Box 2319
Toronto, ON M4P 1E4

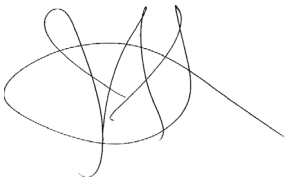
Dear Ms. Marconi,

EB-2011-0043 - 2023 Regional Planning Status Report of Hydro One Networks 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 2023 Regional Planning Process Annual Status Report, pursuant to the above noted Code section.

Sincerely,



Jeffrey Smith

Regional Planning Process

Annual Status Report

2023

November 1st, 2023

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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 Tenth 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 2022 and October 2023.

Progress to Date

The first cycle of regional planning for the 21 regions was completed in 2017 as per the process developed by the Planning Process Working Group (PPWG)[2]. The second cycle will be completed in Nov. 2023 with the publishing of the North/East Sudbury RIP. The third regional planning cycle is currently underway. During these regional planning cycles, several lessons were learned to undertake improvements to the process. For instance, improvements were made with respect to replacement of major transmission assets to include justification and documentation with respect to "right sizing" of equipment. Another area where Hydro One has improved the process is with respect to the regional planning load forecast. As part of the OEB Regional Planning Process Advisory Group (RPPAG) Hydro One significantly contributed to the development of two key documents: (1) "Load Forecast for Ontario: Guidance for the Development of Regional Planning Demand Forecasts"[3] and (2) "Improving the Electricity Planning Process in Ontario: Enhanced Coordination between Municipalities and Entities in the Electricity Sector"[4]. OEB published these guidelines in October 2022 and December 2022, respectively. These guidelines will help improve accuracy, consistency, and transparency in the development of the load forecast during the regional planning process. To align with these changes, Hydro One updated their internal load forecast template used to gather information from Local Distribution Companies (LDC). In April 2023, Hydro One also presented at the "Association of Municipalities Ontario (AMO) Webinar on Regional Planning in Ontario" to bring further awareness to municipalities on the regional planning process and the new Municipal Information Guideline. In addition to the development of the two Guidelines, Hydro One also added a new section to the Needs Assessment (NA) report related to Sensitivity Analysis to capture uncertainty in the load forecast as well as variability of drivers such as DG and growing electrification trends. These improvements, described further in Section 3, have been incorporated into the process, thereby significantly enhancing the quality of the planning process and reports. The enhancement related to replacement of major transmission assets was first introduced in the Regional Infrastructure Planning (RIP) report of the first cycle (February 2017). Subsequently, this enhancement was further refined and incorporated by Hydro One into the NA and RIP reports for all regions. The first NA report to include the Sensitivity Analysis section is the Burlington to Nanticoke Region Needs Assessment (NA) report of the third regional planning cycle (Sept. 2022).

At this time, no significant changes to the prioritization of the third regional planning cycle are proposed. The Greater Ottawa Region NA was advanced due to emerging needs in the area and was completed in Dec. 2022. That said, Hydro One is keeping abreast of the needs in the province on a regional basis and will advance regional planning for any of the regions where necessary.

Since the beginning of the second regional planning cycle, the following are the significant milestones that have been accomplished (see Table 1):

- Regional Infrastructure Planning (RIP) reports for the second cycle completed for nineteen (19) regions where Hydro One is the lead transmitter.
- Needs Assessment (NA) reports for the second cycle completed for all twenty (20) regions where Hydro One is the lead transmitter.
- For the third regional planning cycle five (5) NAs were completed.
- Integrated Regional Resource Planning (IRRP) reports for the second cycle completed for (15) regions as required. For the third regional planning cycle, four (4) IRRPs are currently underway.

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

Table 1. Regional Planning Status Summary

Region	Sub-region	2nd Cycle (2017→)				3rd Cycle (2022→)			
		NA (1)	SA (1)	IRRP (1)(3)	RIP (1)(3)	NA (1)(3)	SA (1)	IRRP (1)	RIP (1)
Burlington to Nanticoke	Brant	May, 2017	Aug, 2017	Feb, 2019	Oct, 2019	Sep, 2022	Dec,2022	TBD	TBD
	Bronte								
	Greater Hamilton								
	Caledonia-Norfolk								
Toronto Area	Central Downtown	Oct, 2017	Feb, 2018	Aug,2019	Mar, 2020	Dec, 2022	Mar, 2022	TBD	TBD
	Northern								
Windsor-Essex		Oct, 2017	Mar, 2018	Sep, 2019	Mar, 2020	Feb, 2023	May, 2023	TBD	TBD
GTA North	York	Mar, 2018	Aug, 2018	Feb, 2020	Oct, 2020	Jul, 2023	Nov, 2023	TBD	TBD
	Western								
Greater Ottawa	Ottawa	Jun, 2018	Sep, 2018	Mar, 2020	Dec, 2020	Dec, 2022	Mar, 2023	TBD	TBD
	Outer Ottawa								
Kitchener-Waterloo-Cambridge-Guelph		Dec, 2018	May, 2019	May, 2021	Dec, 2021	Apr, 2024	TBD	TBD	TBD
GTA West	Northwestern	May, 2019	Aug, 2019	Jul, 2021	Feb, 2022	Sep, 2024	TBD	TBD	TBD
	Southern								
Greater Bruce/Huron		May, 2019	Sep, 2019	Sep, 2021	Apr, 2022	Sep, 2024	TBD	TBD	TBD
East Lake Superior		Jun, 2019	Oct, 2019	Apr, 2021	Oct, 2021	Oct, 2024	TBD	TBD	TBD
GTA East	Pickering-Ajax-Whitby	Aug, 2019	*Not Required*	*Not Required*	Feb, 2020	Dec, 2024	TBD	TBD	TBD
	Oshawa-Clarington								
Peterborough to Kingston		Feb, 2020	May, 2020	Nov,2021	May, 2022	Jun, 2025	TBD	TBD	TBD
South Georgian Bay/Muskoka	Barrie/Innisfil	Apr, 2020	Nov, 2020	May, 2022	Dec, 2022	Aug, 2025	TBD	TBD	TBD
	Parry Sound/Muskoka								

Region	Sub-region	2nd Cycle (2017→)				3rd Cycle (2022→)			
		NA (1)	**SA** (1)	**IRRP** (1)(3)	**RIP** (1)(3)	**NA** (1)(3)	**SA** (1)	**IRRP** (1)	**RIP** (1)
London Area	Greater London	May, 2020	*Not Required*	*Not Required*	Aug, 2022	Sep, 2025	TBD	TBD	TBD
	Alymer-Tillsonburg								
	Strathroy								
	Woodstock								
	St. Thomas								
Sudbury/Algoma		Jun, 2020	*Not Required*	*Not Required*	Dec, 2020	Oct, 2025	TBD	TBD	TBD
Northwest Ontario	North of Dryden	Jul, 2020	Jan, 2021	Jan, 2023	Aug, 2023	Nov, 2025	TBD	TBD	TBD
	Greenstone-Marathon								
	Thunder Bay								
	West of Thunder Bay								
Chatham/Lambton/Sarnia		Sep, 2021	Dec, 2021	*Not Required*	Aug, 2022	Jan, 2027	TBD	TBD	TBD
Niagara		May, 2021	Aug, 2021	Dec, 2022	Jul, 2023	Sep, 2026	TBD	TBD	TBD
North/East of Sudbury		May, 2021	Aug, 2021	Apr, 2023	Nov. 2023	Sep, 2026	TBD	TBD	TBD
Renfrew		May, 2021	Aug, 2021	Dec, 2022	Jul, 2023	Sep, 2026	TBD	TBD	TBD
St. Lawrence (2)		Sep, 2021	*Not Required*	*Not Required*	Mar, 2022	Jan, 2027	TBD	TBD	TBD
North of Moosonee		*Hydro One Transmission is not the lead transmitter in this region. Status to be provided by lead transmitter.*							

Notes: (1): NA: Needs Assessment; SA: Scoping Assessment; IRRP: Integrated Regional Resource Plan; RIP: Regional Infrastructure Plan
(2): Note that St. Lawrence 2nd cycle NA was initiated two (2) months over the five (5) year period because of an error in oversight.
(3): These are tentative dates of completion based on Regional Planning Process timeline requirements.

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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[5] (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"[2], 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 Tenth (2023) 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 2022 to October 2023. 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 identifies lessons learned and improvements made to the regional planning process.
- Section 4 discusses the various regional planning activities, plans, and projects completed or being undertaken.
- Section 5 provides a brief summary of the status of regional planning and its accomplishments over the last year.
- Section 6 lists all reference documentation.

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 requires longer lead time 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 the transmitter 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 NA, a decision is made by the Technical Working Group (TWG) as to whether further regional coordination is necessary to address some or all 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 TWG can also recommend to the transmitter and 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 NA phase, along with additional information on potential non-wires or resource alternatives, e.g., Conservation and Demand Management (CDM), Distributed Generation (DG), etc., 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 the development of a RIP with input from the TWG 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. As a result, RIP reports are also referenced as supporting evidence in a cost of service or Leave-to-Construct approval application.

Figure 2-1 illustrates the various steps of the regional planning process that include NA, SA, LP, IRRP, and RIP.

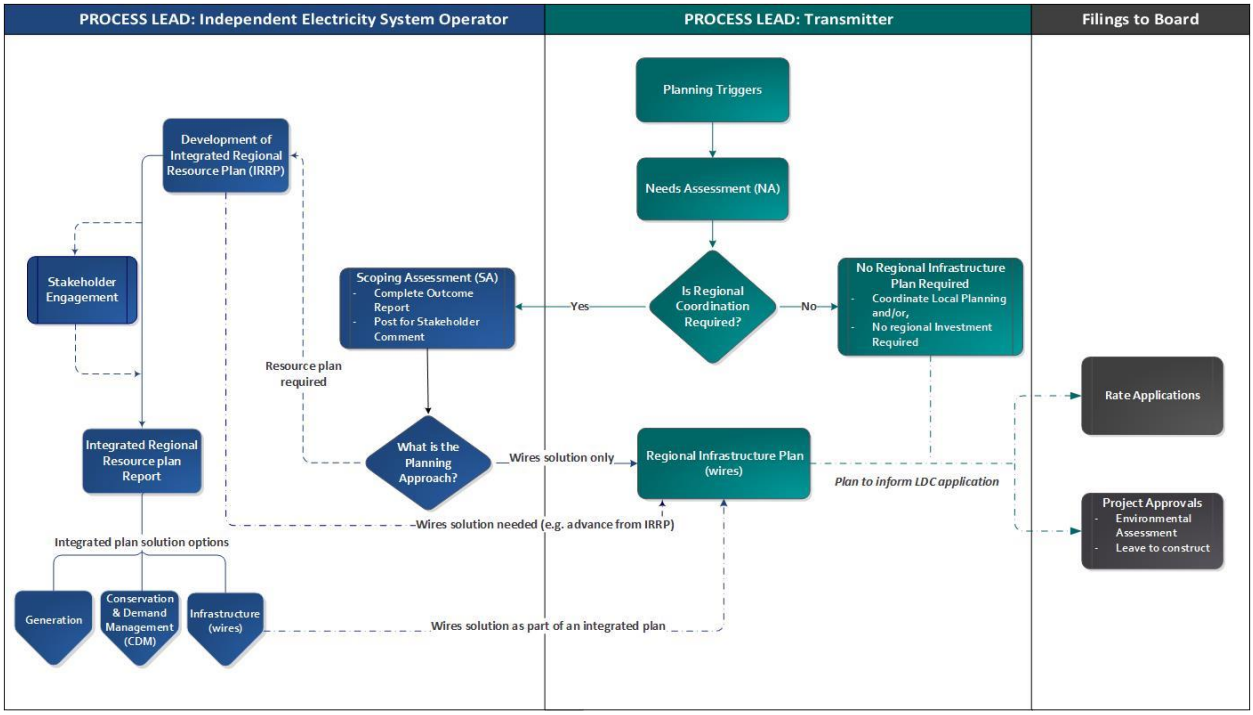

Figure 2-1. Regional Planning Process Flowchart

2.1 Regions

The province has been divided into 21 regions to undertake regional planning. In the first cycle, 21 regions were placed into 3 groups to manage and prioritize regional planning activities. Subsequently, regional planning is initiated every five (5) years or earlier if required to meet emerging needs.

Hydro One is the lead transmitter in all regions, except the **North of Moosonee** Region. For each regional planning activity at the regional or sub-regional level, a Technical Working Group (TWG) is established for each region with representatives from the IESO, Hydro One, and respective LDCs of the area. During the regional planning process, the TWG may further divide a region into two or more sub-regions based on electrical characteristics, contiguity and for efficient and effective assessment.

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

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[1]	Niagara
GTA North	London Area	**North of Moosonee**
GTA West	Peterborough to Kingston	North/East of Sudbury
KWCG	South Georgian Bay/Muskoka	Renfrew
Toronto (formerly Metro Toronto)	Sudbury/Algoma	St. Lawrence

[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.

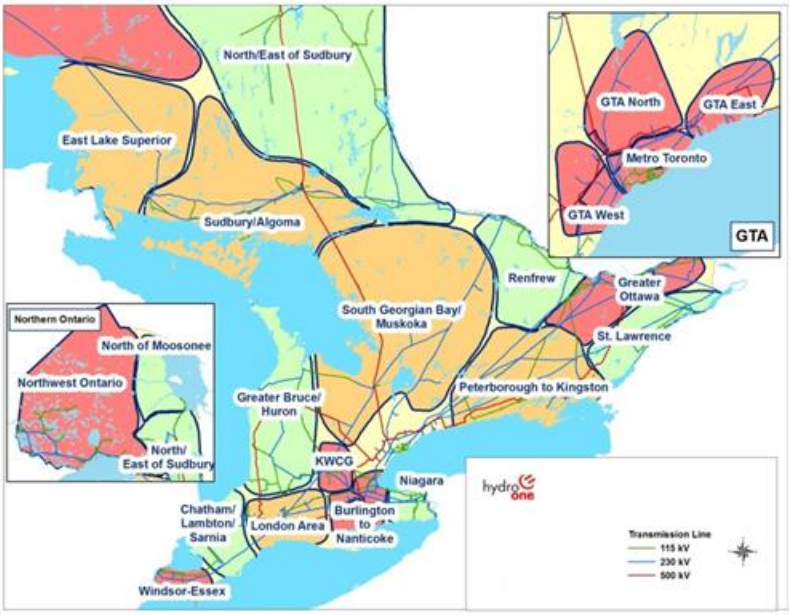

Figure 2-2. Regional Planning Regions

2.2 Conservation & Demand Management (CDM) and Distributed Energy Resources (DER)

CDM is considered 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[6]. The CDM information is provided by the IESO and prepared jointly by the LDCs for regional planning assessments.

Consistent with Section 21.2.2 (g) of the IESO License and Section 3C.3 of the TSC[1], the IESO provides peak demand offsets resulting from LDCs' CDM programs. It is worth noting that peak demand offsets resulting from LDCs' 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. The IESO also provides 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.

Both, CDM and DG information is used to develop a net forecast from the gross load forecast provided by the LDCs.

3. LESSONS LEARNED AND PROCESS IMPROVEMENTS

During the first and second 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 internal review of the regional planning process, discussions with regional Technical Working Groups (TWG) (consisting of LDCs, IESO, and Hydro One as lead transmitter), and recommendations from the OEB Regional Planning Process Advisory Group ("RPPAG"). Hydro One implemented several measures to improve the existing consultation with TWG members, planning processes, and deliverables. Some of the key improvements since our 2022 Annual Status Report include the following and are described in further detail in the sections below:

- Implemented the process to better address asset replacement needs in the regional planning process;
- Implemented the "Load Forecast Guideline for Ontario: Guidance for the Development of Regional Planning Demand Forecasts" as part of regional planning process and reports; and,
- Implemented "Improving the Electricity Planning Process in Ontario: Enhanced Coordination between Municipalities and Entities in the Electricity Sector" as part of regional planning process and reports. Hydro One has also actively participated in awareness activities for municipalities on the regional planning process and the Municipal Information Guideline. In addition, Hydro One is reaching out to municipalities along with LDCs in advance of regional planning trigger to seek any municipal input.

3.1 Better Address Asset Replacement Needs in the Regional Planning Process

Since the end of the first cycle, Hydro One implemented improvements to the planning process related to asset replacement needs by providing better rationale and documentation with respect to "right sizing" of equipment. In 2022, the RPPAG formalized the process and recommended that going forward all transmission asset owners (TAO) provide a 10-year outlook related to their major transmission assets requiring replacement during the Needs Assessment (NA) phase. Hydro One has implemented this process, and NA reports include the 10-year outlook of major transmission assets requiring replacement from all TAO's.

Managing the replacement of transmission and distribution infrastructure is the primary accountability of asset owners for its safe, secure, and reliable operation. Major assets such as transformers, breakers, and conductors/cables require specialized expertise to assess and plan replacement. However, sometimes there is a broader planning opportunity and as a result, Hydro One developed an internal process to collect and share best available information on major high voltage transmission equipment planned for replacement within the next 10 years with the Regional Planning TWG. The major high voltage equipment information shared and discussed as part of this process is listed below:

1) 230/115kV autotransformers
2) 230 and 115kV load serving step down transformers

3) 230 and 115kV breakers where:
   - Replacement of six breakers or more than 50% of station breakers, the lesser of the two
4) 230 and 115kV transmission lines requiring refurbishment where:
   - Leave to Construct (i.e., section 92) approval is required for any alternative to like-for-like
5) 230 and 115kV underground cable requiring replacement where:
   - Leave to Construct (i.e., section 92) approval is required for any alternative to like-for-like

The assessment and documentation are first undertaken in the NA phase by the TWG (i.e., Hydro One, IESO, and affected LDCs) for the applicable region. As part of this analysis, different options are evaluated, and a preferred replacement plan is recommended along with its rationale. The TWG reviews the load forecast that considers several inputs such as load growth due to changing customer requirements, CDM, and DER to determine the recommended plan for addressing the asset replacement need(s). The assessment includes but is not limited to downsizing/eliminating equipment by transferring load to other existing facilities; replacing equipment with similar equipment of same or higher ratings; and consideration of economical and practical implementation of incremental CDM/DER to defer or eliminate the need while maintaining safe and reliable service to customers. The underlying goal is to "right size" the replacement asset. Consistent with the regional planning process, all affected transmission customers (e.g., LDCs, industrial, etc.) directly connected to the asset(s) being assessed are consulted and engaged by the transmitter to obtain input regarding their expected needs before a preferred replacement plan is implemented.

Asset replacement needs that do not require further regional coordination (i.e., SA, IRRP, RIP) following the NA phase are addressed by Hydro One, as a transmitter, in coordination with the affected LDC(s). In doing so, Hydro One coordinates the replacement plan and related outages. Asset replacement needs that do require further assessment and regional coordination include those that provide an opportunity for cost effective reconfiguration (e.g., significant rebuild of a station), greater reliability, or better capacity planning to address a broader regional need(s). In such cases, further assessment of these needs will be undertaken in the next phase(s) of the regional planning process (i.e., SA, IRRP, and RIP) where the TWG will further review options and develop a preferred replacement plan.

3.2 Load Forecast Guideline

This document was developed to provide guidance to the TWG in the development of the load forecasts used in the various phases of the regional planning process with a focus on the NA and the IRRP. It is meant to enhance clarity, consistency, and transparency in the development of the load forecast and remain flexible to future evolution. The Guideline was finalized by the RPPAG in October 2022 and implemented by Hydro One for regional planning purposes. Hydro One also updated its internal load forecast template to align with the Guideline and provide further clarity to LDCs in providing their load forecast information.

3.3 Improved Coordination between Municipalities and the Electricity Sector for Regional Planning Purposes

This document was developed for municipalities to provide more specific information to LDCs that can be translated into load forecasts that are used in the regional planning process. The intent is to have better coordination between municipalities and LDCs in developing LDC load forecasts which underpin the identification of needs as well as enhance two-way communication through a better understanding among municipalities of LDC information needs. The Guideline was finalized by the RPPAG in December 2022 and implemented by Hydro One for regional planning purposes.

Over the past year, Hydro One has also engaged and promoted awareness to municipalities on their role in the regional planning process. Some of the key activities include the following:

- In April 2023, Hydro One presented at the "Association of Municipalities Ontario (AMO) Webinar on Regional Planning in Ontario" to bring further awareness to municipalities on the regional planning process and the Municipal Information Guideline. The webinar also included presentations from AMO, OEB, IESO, and Enbridge Gas. A recording of the full webinar is available on AMO's YouTube page.
- In Sept. 2023, Hydro One presented at the Ontario Professional Planner's Institute (OPPI) on "Ontario's Electricity Planning Process and the Role of Municipalities" to discuss the role and input of municipalities in electricity planning and the Municipal Information Guideline.
- Hydro One sent its first annual email to municipalities in February 2023 within regions where regional planning will be undertaken over the next twelve months to give them a heads up to prepare planning information per the Guideline and share with their respective LDCs. LDCs will also engage with municipalities for their input into their regional planning load forecast.
- In October 2023 Hydro One shared OEB's "Regional Planning Process Review (RPPR) – Overview of Outcomes" document with municipal planners. This document provides a summary of OEB and RPPAG deliverables with respect to the regional planning process.

3.4 Other Process Improvements

Some of the other process improvements made by Hydro One are listed below:

- Regional Planning Report Templates – various updates including a new section on "Sensitivity Analysis" in the NA report (beginning with third cycle Burlington to Nanticoke Region NA report).
- Utilizing revised local planning guidelines to aid the TWG in determining when specific needs that are local in nature can be more efficiently addressed by Hydro One and affected LDC(s).
- Pre-Regional Planning Input – since the second regional planning cycle, prior to start of the NA and RIP phase, Hydro One implemented one-on-one pre-Regional Planning meetings with key stakeholders such as LDCs to better understand their emerging needs and collect relevant information. These meetings have resulted in enhanced collaboration and efficiency during regional planning meetings with TWG members by having a head start in determining emerging needs, discussing specific LDC issues and concerns that may have an impact on regional planning, and overall report quality enhancements. For example, a pre-Regional Planning meeting held with a TWG member in the Peterborough to Kingston region resulted in advance information collection on emerging needs in the region, which helped deliver a

timely and quality report during the NA phase. The figures below show in detail how the pre-Regional Planning steps are integrated into the NA and RIP phases.

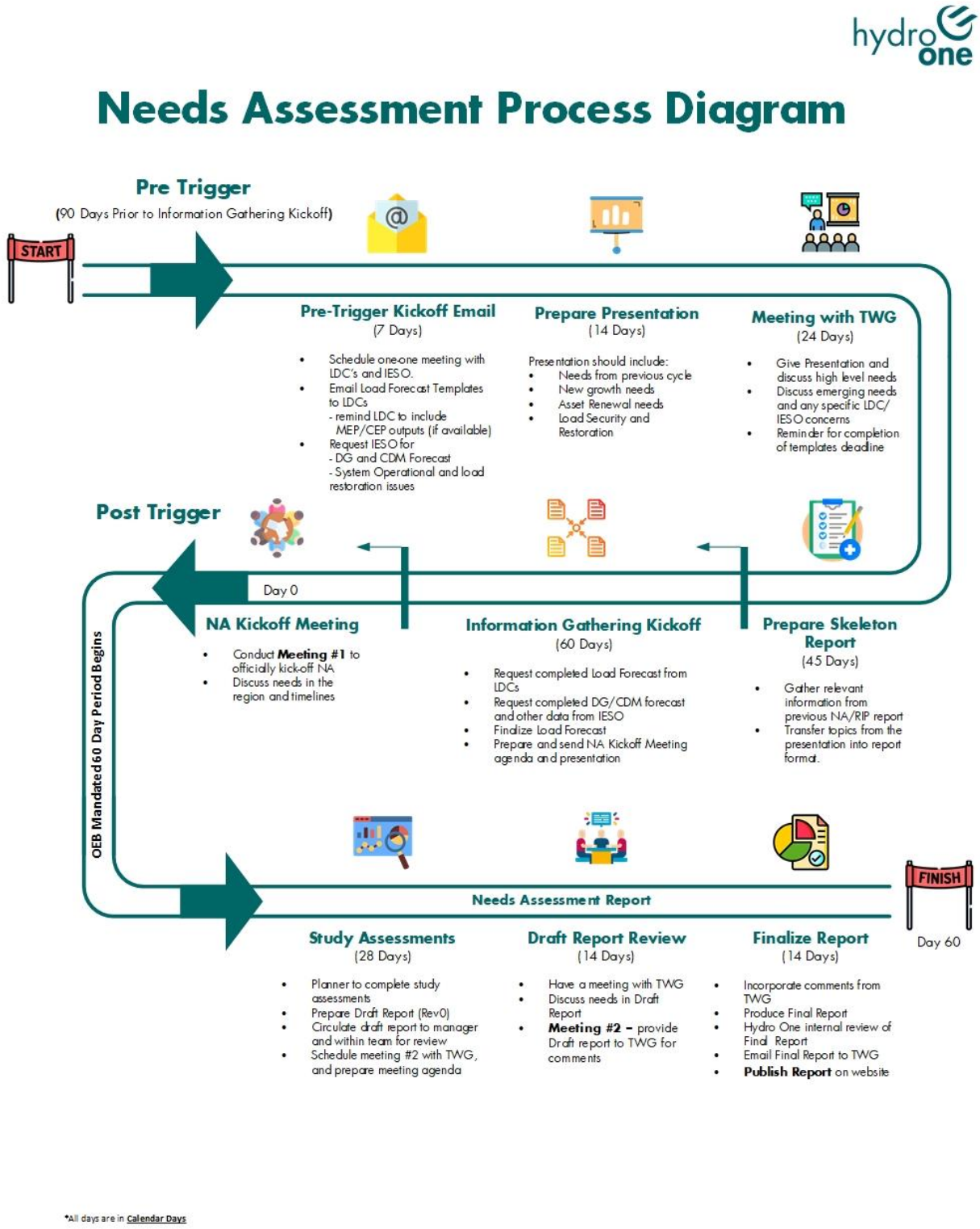

Figure 3-1. Needs Assessment (NA) Phase Diagram

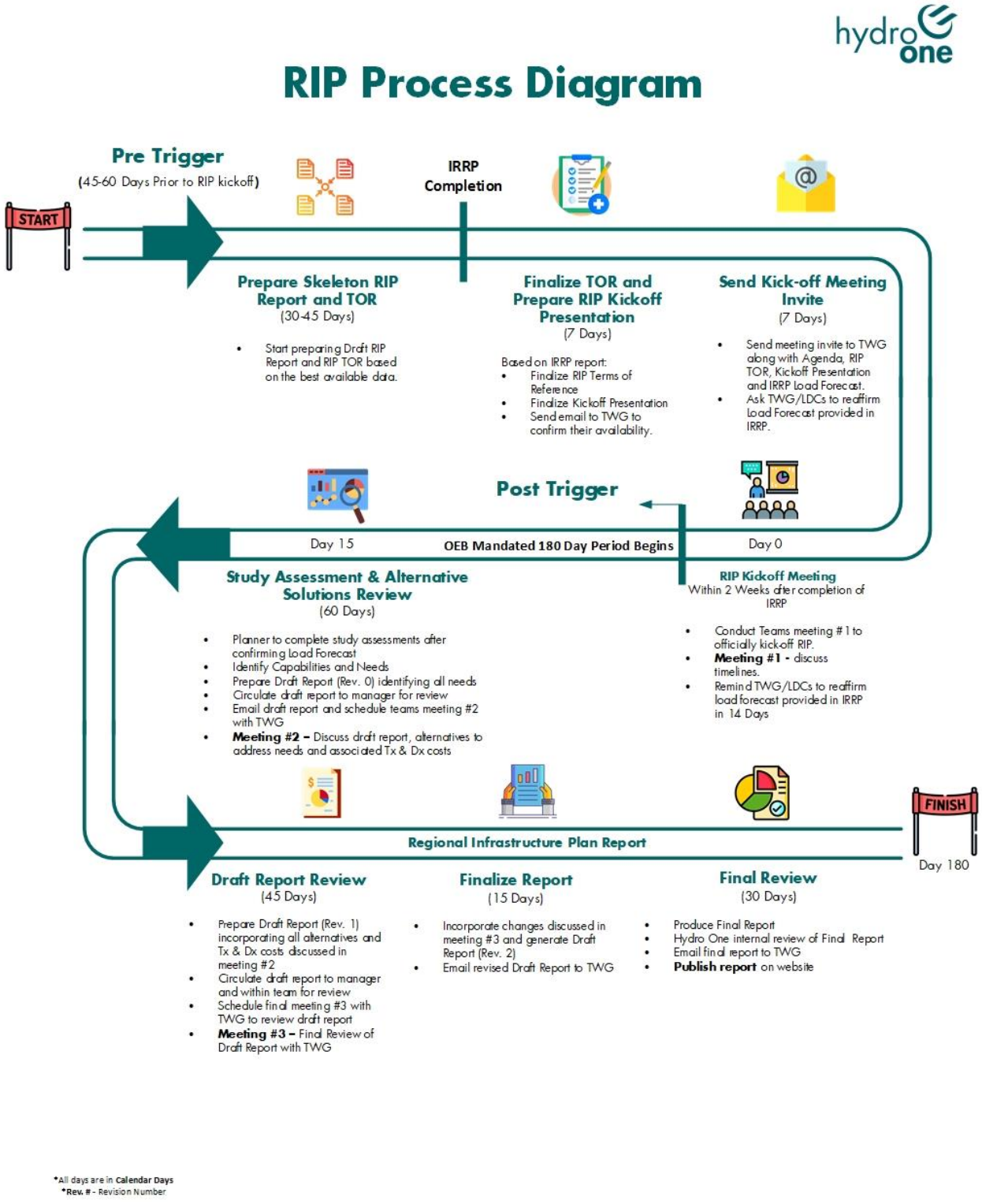

Figure 3-2. Regional Infrastructure Planning (RIP) Phase Diagram

4. STATUS OF REGIONS

Regional Infrastructure Plans (RIP) have been completed for all regions for the first cycle of the Regional Planning Process. For the second regional planning cycle, Hydro One has completed Needs Assessment reports for all twenty (20) regions where Hydro One is the lead transmitter whereas RIP reports for Nineteen (19) regions were completed and one (1) is underway. In addition, IESO has completed Sas for all the required sixteen (16) regions and IRRP reports for fifteen (15) regions respectively. Hydro One has also initiated the third regional planning cycle with Nas for five (5) regions is completed. Subsequently IESO has also completed four (4) Sas with one (1) SA currently underway and four (4) IRRPs currently underway. These reports are available on the Hydro One's Regional Planning website.

At this time, no significant changes to the prioritization to initiate the third regional planning cycle have been proposed. The Greater Ottawa Region NA was advanced due to emerging needs in the area and was completed in Dec. 2022. That said, Hydro One is keeping abreast of the needs in the province on a regional basis and will advance regional planning for any of the regions as necessary based on emerging needs in the area.

4.1 Burlington to Nanticoke

Burlington to Nanticoke Region comprises the municipalities of Burlington, Hamilton, Oakville, Brantford, and the Counties of Brant, Haldimand, and Norfolk. The second regional planning cycle was completed with publishing of the RIP report in October 2019.The third regional planning cycle for this region was kicked off in April 2022 beginning with the Needs Assessment and was completed in September 2022. This was the first NA document to include sensitivity analysis to capture uncertainty in the load forecast as well as variability of electric demand drivers to identify any emerging needs and/or advancement or deferment of recommended investments. The Scoping Assessment was also published by IESO in December 2022. Updates to the needs and plans recommended in this region are provided below.

Projects completed include:

- Cumberland TS: Power factor correction (completed in 2019).
- 115 kV B3/B4: Refurbishment of line section from Horning Mountain Jct. to Glanford Jct (completed in 2020).
- Elgin TS: Transformers & switchgear requiring replacement (replaced two DESNs with a single DESN in 2020/2021).
- Newton TS: Transformers (T1/T2) requiring replacement (completed in 2020).
- Kenilworth TS: Transformer & switchgear requiring replacement (replaced two DESNs with a single DESN, completed in 2021).

Needs and Plans underway in Burlington to Nanticoke Region:

- **Norfolk Area Supply Capacity**

Load transfers from Norfolk area to Jarvis TS was completed in 2022. Additional reactive support at Norfolk TS is planned for 2023-24 timeframe. Upgrade of Jarvis TS and building feeders to pick up Norfolk area loads is planned for 2027-32 timeframe.

- **Refurbishment of 115 kV B7/B8 line section**
  The 115kV double circuit line B7/B8 supplies around 130 MW to Burlington and Oakville area loads through Bronte TS. The line section from Burlington TS to Nelson junction (approximately 2.3 km) was built in 1920's and based on asset condition assessment it requires replacement. This project is expected to be in-service by Q4 2024.

- **Refurbishment of Gage TS (T3/T4 and T5/T6 DESNs)**
  Hydro One to reconfigure the station and reduce it from 3 DESNs to 2 DESNs due to poor condition of the existing transformers. Under this plan, the two DESNs, T3/T4 and T5/T6 made up of 56 MVA transformers, will be replaced by a single T10/T11 DESN with two 100 MVA standard units. The switchgear currently supplied by T5/T6 transformers will also be replaced. This project is expected to be in service by Q4 2024.

- **Load Transfer from Dundas TS to Dundas TS #2**
  Dundas TS has two DESNs; one of the two DESNs has loads more than its supply capacity while the other DESN has spare capacity to accommodate these excess loads. Hydro One Distribution is currently planning to build feeders required for load transfers from Dundas TS to Dundas TS #2 by Q4 2023.

- **Power Factor Correction at Kenilworth TS**
  At Kenilworth TS the historical loading data indicated that under peak load the power factor is lagging below the ORTAC[7] requirement of 0.9. TWG recommended the installation of a capacitor bank and/or for Alectra Utilities to work with load customers supplied to meet ORTAC[7] power factor requirement. The installation of capacitor bank at Kenilworth TS will be initiated after completion of refurbishment of this supply station in Q4 2023.

- **Refurbishment of 115 kV breakers at Newton TS**
  To maintain system reliability and based on asset condition assessment Hydro One has identified an asset replacement need for 115 kV breakers at Newton TS with a planned in-service of 2025.

- **Brant Area Supply**
  The 115 kV Brant area is supplied by two stations, Brant TS and Powerline MTS. A Brant Subregion IRRP was completed by the IESO in 2015 to address the electricity needs of the area over the next 20 years up to 2033. The report recommended installation of a capacitor bank at Power line MTS and building of a new switching station integrating B12 and B13 115 kV circuits from Burlington TS with a single 115 kV circuit B8W supplied from Karn TS. These two measures increased the Load Meeting Capability (LMC) of 115 kV supply system to Brant area to 165MW. The coincident load in the 115 kV Brant area system may exceed the LMC of 165 MW before the end of the study period (2032). The TWG recommends Hydro One to monitor the loading on the Brant 115 kV supply system and take remedial measures if required. This need will be reviewed during the next phases of third regional planning cycle.

- **Norfolk Area Supply**

The Norfolk area loads are supplied through Norfolk TS and Bloomsburg DS supplied through two 115 kV circuits from Caledonia autotransformers. In 2020, the IESO carried out an assessment of the supply capability in the Norfolk area, in which load transfers out of the Norfolk area and additional reactive support at Norfolk TS was recommended to increase the LMC. In the mid-term the preferred option based on the load forecast at that time was to upgrade Jarvis TS and build four (4) 27.6 kV feeders from this station to Norfolk area to pick up loads limiting the loads supplied from the existing Norfolk area system to within its supply capacity. Based on the current normal growth load forecast the loads are growing at a higher rate than anticipated before. The TWG recommends that Hydro One monitor the loading levels of Norfolk area supply system and take remedial measures if required. This need will be reviewed during the next phases of the third regional planning cycle.

- **Caledonia TS Capacity**
  Caledonia TS is currently supplying loads of 44 MW having a supply capacity of 99 MW. The load at Caledonia TS is forecasted to exceed its supply in 2030 under the normal growth load forecast scenario. The TWG recommended Hydro One to monitor the loading at Caledonia TS and this need will be reviewed during the next phases of the third regional planning cycle.

- **Nebo TS Capacity**
  The loads at T3/T4 13.8 kV DESN at Nebo TS is currently marginally overloaded supplying loads of 55 MW against its supply capacity of 51 MW. The TWG recommended that Hydro One and Alectra monitor the loading at Nebo TS T3/T4 DESN and take remedial measures if required until refurbishment of this DESN is completed. This refurbishment is currently planned to be completed in the 2027-2032 timeframe. This need will be reviewed during the next phases of the third regional planning cycle.

- **Mohawk TS Capacity**
  Mohawk TS is currently supplying 81 MW of load having a supply capacity of 90 MW. The load at this station is forecasted to exceed its supply in 2024 under normal growth scenario. The TWG recommended that Hydro One and Alectra to monitor the loading Mohawk TS and take necessary actions if required, e.g., load transfers to the neighboring stations. This need will be reviewed during the next phases of the third regional planning cycle.

4.2 Toronto

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

The second regional planning cycle RIP was completed in March 2020. The third regional planning cycle for this region was initiated with kicking off Needs assessment in August 2022 which was completed in December 2022. The Scoping Assessment was also published by IESO in March 2023. Updates to the needs and plans recommended in this region are provided below.

Projects completed include:

- Midtown Transmission Reinforcement Project (completed in 2016)
- Clare R. Copeland 115 kV Switching Station and Copeland MTS (completed in 2019)
- West Toronto Area Station and line Capacity (added new DESN at Runnymede TS site and upgraded K1W/ K3W/ K11W/ K12W 115kV circuits, completed in 2018)
- Manby SPS Load Rejection (L/R) Scheme (completed in 2019)
- Southwest Toronto Station Capacity (added new DESN at Horner TS, completed in 2022)
- John TS, transformer T1, T2, T4 were replaced in 2019-2021.

Needs and Plans underway in Toronto Region:

- **Richview TS to Manby TS 230kV Corridor – Line capacity**
  The 230 kV transmission corridor between Richview TS and Manby TS is the main supply path for the Western Sector of Central Toronto. There is a need to increase transfer capability of this transmission corridor to support the continuous load growth in this area. Phase 1: Rebuilding the existing idle 115 kV overhead line on the transmission corridor between Richview TS and Manby TS to 230 kV standards. This project is currently in estimate and public consultation phase. The planned in-service date is 2026. Phase 2: Unbundling the "supercircuits" with one new circuit connected to Manby West and one to Manby East with new termination installed at Manby TS.

- **Manby TS x Riverside Junction 115 kV Corridor – Line Capacity**
  The 7 km overhead section of the circuits K13J/K14J between Manby TS and Riverside Jct., is potentially overloaded under the contingency of the loss of the other circuits on this corridor. The new forecast has reflected the load demand increase and therefore this need is advanced to 2026. Hydro One proceed to on the development work for reconductoring the circuits K13J/K14J to higher ampacity conductors without replacing the existing towers. This need will continue to be reviewed as part of the next phases of RP cycle.

- **Fairbank TS – Station Capacity**
  The transformer replacement work at Fairbank TS (T1/T2/T3/T4) is also underway with planned in-service date of 2024. The loading will be monitored and reviewed in the next RP cycle.

- **Sheppard TS – Station Capacity**
  The station's non-coincident summer peak load is forecasted to be approximately 187 MW (net adjusted for extreme weather) or 92% of its station LTR in 2031. The Sheppard TS loading will be monitored and reviewed in the next phases of the RP cycle.

- **Strachan TS – Station Capacity**
  The transformer T12 at Strachan TS has been replaced recently with a 60/100 MVA unit. The station capacity at Strachan TS will increase after the transformer T14, and T13/T15 are also replaced with 60/100MVA units. The loading will be monitored and reviewed in the next RP cycle.

- **Basin TS – Station Capacity**

The load at Basin TS is forecasted to be over 95% in 2031 and expected to increase further in the longer term due to the development plan in the Port Lands area as well as the East Harbor area. The TWG recommends initiating the development work for replacing the transformers T3/T5 with new larger 60/100 MVA units, and that the long-term supply need in the Basin / Port Lands area be reviewed as part of the next phase in the RP process.

- **Glengrove TS – Station Capacity**
  The station's non-coincident summer peak load is forecasted to be approximately 86 MW or 98% of its LTR in 2031. The closet station Duplex TS also has two DESN units, T1/T2 and T3/T4 (45/75 MVA). Current plan is to replace these transformers with larger 60/100 MVA units to provide additional capacity in this area, and that the Glengrove TS and Duplex TS loading be monitored and reviewed in the next phases of third RP cycle.

- **Finch TS/Bathurst TS – Station Capacity**
  An emerging load growth in the Northwest Toronto area near Finch TS and Bathurst TS is identified due to re-development plan in the Downsview area located in the Keele and Sheppard area. TWG has recommended to review this need in the next phases of third RP cycle.

- **Warden TS – Station Capacity**
  The demand at Warden TS to exceed its station LTR in 2024 due to new large customer connection request in the south Toronto. THESL will manage it in the near/medium term by transferring load to its closest station Scarboro TS. TWG to review this need in the next phases of third RP cycle.

- **Manby W TS – Transformation Capacity**
  The long-term transformation capacity need at Manby West TS was identified in the second cycle RIP. The third cycle NA also affirms this transformation capacity need and the autotransformer replacement plan for T12 that is expected to provide relief to this constraint. TWG to review this need in the next phases of third RP cycle.

- **Leaside TS – Transformation Capacity**
  The long-term transformation capacity need at Leaside TS was identified in the second cycle RIP. Leaside TS 230/115 kV autotransformers are restricted by T16 unit in the fleet, and is potentially overloaded within the 2035-2040 time period, following T15 or T17 contingency. Post-contingency control action is currently available to resolve this issue by transferring Dufferin TS to Manby supply. TWG to review this need in the next phases of third RP cycle.

- **Parkway TS to Richview TS 230 kV Corridor – Line Capacity**
  With the increasing demand forecasted on this corridor, some sections of the circuits P21R/P22R are over 90% of their ratings under certain contingencies in the medium term and are overloaded in the long term. The need for this corridor upgrade may become sooner due to potential increase in customers that show interest in connecting new load near the Steeles / Hwy 404 area. TWG to review this need in the next phase of third RP cycle.

- **Leaside TS to Wiltshire TS 115 kV Corridor – Line Capacity**

The 115 kV transmission corridor between Leaside TS and Wiltshire TS comprises four circuits L13W, L14W, L18W and L15. In third cycle NA review, the contingency flow on this line section is about 80% of its limited time emergency rating in 2031. TWG to review the loading and the line capacity need on this Leaside TS x Wiltshire TS in the next phase of the RP cycle.

- **C14L/C17L and C18R/P22R – Load restoration issue**
  For the loss of 230kV circuits C14L and C17L (stations connected are Warden TS and Bermondsey TS) and C18R and P22R5 (Bathurst TS), total load needs to be restored within 30 minutes based on the load restoration criteria in the ORTAC. THESL has indicated that the current configuration will not be adequate to resupply all of the aforementioned amount of load in excess of 250 MW within 30 minutes and recommends that these load restoration scenarios and options be reviewed in the next phase of third RP cycle.

- **Asset Replacement for Major HV Transmission Equipment**
  Hydro One has identified the need for replacement of major HV transmission assets over the next ten years at a number of stations in this region as shown below. The TWG recommendations for asset replacement plans have taken "right sizing" into consideration.
  - **Strachan TS –** Based on asset condition assessment, (45/75 MVA) T14, T13 and T15 transformers will be replaced with 60/100MVA units to ensure supply reliability and safety is maintained. (Planned in-service date is 2025 for T14 and 2031 for T13/T15)
  - **Charles TS –** Based on asset condition assessment, (45/75 MVA) T3 and T4 transformers will be replaced with 60/100MVA units to ensure supply reliability and safety is maintained. (Planned in-service date is 2026)
  - **Duplex TS –** Based on asset condition assessment, the T1/T2 (45/75 MVA) and T3/ T4 (45/75 MVA) transformers will be replaced with 60/100MVA units to ensure supply reliability and safety is maintained. (Planned in-service date is 2026 for T1/T2 and 2031 for T3/T4)
  - **Basin TS –** Based on asset condition assessment, (45/75 MVA) T3 and T5 transformers will be replaced with 60/100MVA units to ensure supply reliability and safety is maintained. (Planned in-service date is 2026)
  - **Scarboro TS –** Based on asset condition assessment, (75/125 MVA) T23 transformer will be replaced with the same type and size unit to ensure supply reliability and safety is maintained. (Planned in-service date is 2027)
  - **Fairchild TS –** Based on asset condition assessment, (75/125 MVA) T1, T3 and T4 transformers will be replaced with the same type and size units to ensure supply reliability and safety is maintained. (Planned in-service date is 2028)
  - **Bermondsey TS –** Based on asset condition assessment, (75/125 MVA) T1/T2 transformers will be replaced with the same type and size units to ensure supply reliability and safety is maintained. (Planned in-service date is 2029)
  - **Malvern TS –** Based on asset condition assessment, (75/125 MVA) T3 transformer will be replaced with the same type and size unit to ensure supply reliability and safety is maintained. (Planned in-service date is 2029)
  - **Manby TS –** Based on asset condition assessment Autotransformers T7, T9 and T12 will be replaced with the similar 100MVA units (Planned in-service date is 2030). It is also recommended the transformers T13 and T14 (56/93 MVA units, non-standard size) will be replaced with the current standard size units (75/125 MVA units) to address the

replacement need and maintain reliable long-term supply to the customers in the area. (Planned in-service date is 2029)

- **Leslie TS –** Based on asset condition assessment, transformer T1 be replaced with a standard unit of same size without dual LV voltages (i.e., a 230-27.6-27.6 kV 75/125 MVA unit). When more capacity is required at Leslie TS, the companion transformer T2 can be replaced with the same 230-27.6-27.6 kV 75/125 MVA unit to provide an increase of approximately 70 MVA for the 27.6 kV supply capacity. (Planned in-service date is 2030)
- **H1L/H3L/H6LC/H8LC –** Based on asset condition assessment, conductors along the overhead section between Leaside 34 Jct. and Bloor St. Jct. (about 2 route km) are required to be replaced. (Planned in-service date is 2025)
- **L9C/L12C –** Based on asset condition assessment, overhead section of this 115 kV double-circuit line between Leaside TS and Balfour Jct. (about 3.6 route km) is over 90 years old and required to be replaced. (Planned in-service date is 2027)
- **Fairbank TS –** Based on asset condition assessment, transformer replacement for (T1/T2/T3/T4) is expected to be completed in 2024.
- **Bridgman TS –** Based on asset condition assessment, transformer replacement for (T11/T12/T13/T14) is expected to be completed in 2024.
- **Main TS –** Based on asset condition assessment, (45/75 MVA) T3 and T4 transformers will be replaced with 60/100MVA units to ensure supply reliability and safety is maintained. (Planned in-service date is 2024)
- **John TS –** Based on asset condition assessment, transformer replacement for (T5/T6) is expected to be completed in 2025.
- **C5E/C7E –** Based on asset condition assessment, underground cable replacement between Esplanade TS and Terauley TS is underway and expected to be completed in 2026. A 2.5 km tunnel between Esplanade TS and Terauley TS is to be built.

4.3 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 regional planning cycle was completed with publishing of the RIP report in March 2020. An IRRP addendum was also published by IESO in February 2022. The third regional planning cycle for this region was initiated with kicking off Needs Assessment in October 2022 which was completed in February 2023. The Scoping Assessment was also published by IESO in May 2023. Updates to the needs and plans recommended in this region are provided below.

Projects completed include:

- Crawford TS transformer T3 replacement and neutral grounding reactors installation on T3 and T4 (I/S 2017)

- Malden TS breakers replacement (I/S 2018): replacement of two 27.6 kV feeder breakers
- Supply to Essex County Transmission Reinforcement (I/S 2017): Build new 13 km double-circuit 230 kV transmission lines to Leamington area tapped to existing C21J/C22J circuits, and new 75/100/125 MVA Leamington TS and its distribution feeders.
- Reconfiguration of 230 kV and 115 kV circuits and 27.6 kV feeders at Keith TS to accommodate the construction of Gordie Howe International Bridge (I/S 2019)
- Leamington TS expansion: Build the second 75/100/125 MVA DESN at Leamington TS (I/S 2019)
- Kingsville TS transformers replacement: Transformers T2 and T4 replacement with 50/83 MVA T6 (completed in 2018). Transformers T1 and T3 replacement with 50/83 MVA T5 (completed in 2022).
- South Middle Road TS: Build two new DESNs (T3/T4 DESN completed in 2022; second DESN expected I/S 2025)
- Lakeshore TS: Build new switching station at Leamington Junction (completed in 2022)
- Keith TS (I/S 2023): Replaced T11 and T12 transformers with new 250MVA units.

Needs and Plans underway in Windsor Essex Region:

- Tilbury TS decommissioning (in progress, expected in2024): Decommissioning of station due to end-of-life and transfer serviced load to Tilbury West DS supply.
- Keith TS PSR5 (expected I/S date 2026): Based on asset condition assessment, the existing phase angle regulator, PSR5, installed in the J5D interconnection is planned to be replaced.
- Keith TS transformer T1 decommissioning (expected in 2024).

- **Lauzon TS T1/T2 Autotransformer and T5/T6/T7/T8 Transformer Replacement & Station capacity**
  Lauzon TS consists of two 230/115 kV 250 MVA autotransformers (T1/T2), and two 230/27.6 kV DESNs T5/T6 and T7/T8, rated at 83 MVA. All the transformers at this station require replacement based on asset condition assessment. It was decided in the second regional planning cycle to upsize the T5/T6 transformers to 125 MVA units to meet the increased demand forecast. This work is planned to be completed in 2026. Lauzon TS T7/T8 DESN is forecast to exceed the summer LTR by 11.3 MW in 2023, and by 45.3 MW in 2032. The current plan is to replace T1/T2/T7/T8 with units of same size. This work is planned to be completed in 2029. Upsizing the T7/T8 transformers may be considered as a solution to the capacity need of the T7/T8 DESN will be further evaluated in next steps of regional planning.

- **Kingsville TS, Leamington TS and South Middle Road TS Supply Capacity**
  As per the third cycle Needs Assessment load forecast, Kingsville TS, Leamington T1/T2 and T3/T4 DESNs and South Middle Road T1/T2 and T3/T4 DESNs are showing overload in the NA study period (2023-2032). The TWG has recommended further evaluation of these needs in the next steps of regional planning cycle to develop preferred plans.

- **Belle River TS Station Capacity**
  Belle River TS is forecast to exceed the summer LTR by 3.6 MW in 2023, and by 6.8 MW in 2032. The corresponding overload numbers are 6.4 MW and 9.8 MW at +5% sensitivity. This is a

relatively new station with transformers built in 2005. It was recommended that further evaluation will be done in next steps of regional planning to develop a preferred plan.

- **H75/H76 Load security/ Restoration need**
  Up to 120 MW of load would have to be rejection at South Middle Road TS for the loss of H75 or H76, in violation of the security criteria. Following the loss of the double-circuit H75/H76, up to 365 MW of load would be lost by configuration at South Middle Road TS (DESN1 and DESN2). The system cannot meet the requirement to restore the load as there is no capability to transfer load out of the station. All loads can be restored within 8 hours through maintenance crew work. It was recommended that further evaluation will be done in next steps of regional planning to develop a preferred plan.

4.4 GTA North

The GTA North Region is approximately bounded by the Regional Municipality of York, and includes parts of the Cities of Toronto, Brampton, and Mississauga. The second regional planning cycle was completed with publishing of the RIP report in October 2020. The third regional planning cycle for this region was initiated with kicking off Needs assessment in March 2023 which was completed in July 2023. Updates to the needs and plans recommended in this region are provided below.

Projects completed include:

- Vaughan #4 MTS (completed in 2017)
- Holland breakers, disconnect switches and special protection scheme (completed in 2017)
- Inline switches on the Parkway Belt (V71P/V75P) at Grainger Jct. (completed in 2018)

Needs and Plans underway in GTA North Region:

- **Kleinburg TS Capacity**
  In the third cycle NA, a significant new load is forecast to connect at 44kV in the 2023-2024 period. To manage loading at Kleinburg TS, Hydro One DX intends to transfer loads in the northern area served by Kleinburg TS to the new Northern York TS planned to be in-service by 2027.The new Northern York TS is planned to be a 230/44-27.6kV station. TWG to review this need in the next phase of the RP cycle.

- **Richmond Hill Area Capacity**
  Alectra plans to build a new station to meet forecast loads in the 2030s. The new station will have 2 x 75/125MVA, 230/27.6kV transformers and a 27.6kV switchyard. Alectra has requested Hydro One to connect the new station to the 230kV Claireville TS x Parkway TS double circuit line V71P/V75P. The planned in-service date is summer 2032.

- **Vaughan MTS Transformation Capacity**
  The TWG recommends building a new Vaughan #5 and Vaughn #6 MTS by 2027 to address the need for additional transformation capacity for Vaughan area stations and a new large customer.

- **Markham Area – New Toubner TS**

Hydro One has been requested to build a dedicated step-down transformer station for a direct industrial customer. The station will have 2 x 75/125 MVA, 230/27.6 kV transformers and a 27.6kV switchyard. The planned in-service date for the project is 2027.

- **Markham MTS Transformation Capacity**
  The need for additional transformation capacity is projected to be in 2028. The IESO issued a letter of support to Hydro One Transmission and Alectra to begin wires planning for a new 230/27.6kV DESN (Markham MTS#5). During the second cycle, the TWG recommended building the new station at Buttonville TS and connecting to the P45/P46 circuits. Alectra will be building the station and Hydro One will be building the line tap connection from P45/P46. The new Markham MTS#5 is expected to be built by 2025.

- **Transmission Line Uprate – P45/P46**
  The connection of the new Markham MTS#5 to the Parkway TS x Buttonville TS P45/P46 circuits will increase the loading on these circuits. The transmission capacity is thermally limited by an approximately 1.1 km long section between Parkway TS and Markham #4 Jct. Loading is expected to exceed the rating by 2029. Upgrading the supply capability P45/P46 circuits is expected to be completed by 2027.

- **Northern York Area Transformation Capacity**
  The TWG identified the need for additional transformation capacity in the Northern York Area for the areas supplied by Armitage TS and Holland TS, along with associated transmission capacity. Based on the latest load forecast the transformer stations capability (Holland TS/Armitage TS) will be needed by 2027. It is anticipated that the new station will be supplied by circuits B88H/B89H which are in the vicinity of the forecasted load growth. The station location and timing will be further discussed with the area LDCs in the next phase of third RP cycle.

- **Load Restoration for 230kV Circuits H82V/H83V**
  All loads exceeding 250 MW cannot be restored within 30 minutes per the ORTAC[7] criteria. Following the loss of H82V/H83V, the normal station service supply to YEC generation is also lost. Holland TS cannot be restored from B88H/B89H until YEC generation is restored. Transferring YEC to an alternate source of station service supply cannot be completed within 30 minutes. This will be re-visited in the next phase of third RP cycle.

- **Load Restoration for Parkway TS to Buttonville TS Circuits P45/P46**
  The line loading is expected to reach 384MW by summer 2027. Not all loads more than 250 MW and 150 MW can be restored within 30 minutes and 4 hours respectively for a double circuit outage, as per the ORTAC[7] restoration criteria. This will be reviewed in the next phase of third RP cycle.

- **Load Restoration for 230 kV Circuits V43/V44**
  The load restoration timelines as per the ORTAC[7] may not be met. During the second cycle, the TWG agreed that no further action was required. The Kleinburg to Kirby option to address the supply capacity needs in the long term would improve the load restoration capability for these circuits. This will be re-visited in the next phase of third RP cycle.

- **Improve Load Security on the Parkway to Claireville Line V71P/V75P**
  The loss of this line can result in an interruption to over the 600MW which is more than what is permitted under the ORTAC[7] criteria. While the load security criteria was not met, Hydro One has installed inline switches at Grainger Jct. – located just outside of Vaughan MTS #1 – which permits quick restoration of the loads. This will be re-visited in the next phase of third RP cycle.

- **Woodbridge TS Transformer T5 Replacement**
  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 has been identified to be in poor condition and requiring replacement. The TWG recommended to replace the transformer with a similar type and size unit as per current standard, Transformer T5 is expected to be replaced in 2027.

4.5 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.
The second regional planning cycle was completed with publishing of the RIP report in December 2020. The third regional planning cycle for this region was initiated with kicking off Needs assessment in August 2022 which was completed in December 2022. The Scoping Assessment was also published by IESO in March 2023. Updates to the needs and plans recommended in this region are provided below.

Projects completed include:

- King Edward TS – Replaced with new Transformer T3 with higher capacity 60/100 MVA in 2021.
- Hawthorne TS – Replaced T7 & T8 transformers in 2019 and T5 & T6 in 2021 with higher rated 150 MVA transformers.
- A4K supply capacity (new A6R Tap project was completed in 2019).
- Cambrian MTS and South Nepean Transmission reinforcement: The section of S7M (single circuit 115 kV line) from Hunt Club road (STR673JCT) to Manotick JCT, and from Manotick JCT to Cambrian Road was rebuilt as a double circuit 230 kV line. At STR673JCT, the new double circuit connects both S7M (to continue the supply to the area stations) and to E34M to supply the new Cambrian MTS. The two circuits were extended for about 1.3km along Cambrian road to supply the new MTS. This project was completed in 2022.
- M30A/M31 A: The 230 kV circuits between Hawthorne TS and Merivale TS were replaced with twin-bundled 1843.2 kcmil conductors in 2023.

Needs and Plans underway in Greater Ottawa Region:

- **Circuit L2M Supply Capacity**
  The circuit is thermally limited to approximately 86 MW. The decision was made to wait for the conclusion of the Gatineau Study and the Ottawa 115kV Supply study and to re-evaluate the need at the next cycle of regional planning since potential supply changes may be recommended by these reports. No supply changes for the area were recommended as part of these reports.

Re-evaluation of the circuit still identifies it reaching its limit in 2031 based on the coincident load forecast. TWG recommended that further assessment and regional coordination during the next phases of the third RP cycle.

- **Merivale TS T22 Transformation Capacity**
  The need for additional 230/115kV auto-transformation capacity at Merivale TS was assessed. It is recommended to replace autotransformer T22, six (6) 230kV circuit breakers and four (4) 115kV circuit breakers, and the installation of a new autotransformer T23 is underway and is being led by Hydro One. The in-service date is 2026-2028.

- **Bilberry Creek TS**
  Since the completion of the last RIP in 2020, the IESO, Hydro Ottawa and Hydro One met to discuss load growth in the area and other options to supply the growing load in east Ottawa. An IESO-led study has reviewed different options to address the load growth and determined that Bilberry Creek TS is no longer required and be retired. The station will now be replaced by a new Hydro Ottawa owned station to serve Hydro Ottawa's load in the area, and by the conversion of existing station Orleans TS to a full 230kV DESN with increased capacity (from its current 230kV and 115kV supply). The tentative in-service date is expected to be Q4 2027.

- **Hawkesbury MTS Capacity Upgrade**
  Hawkesbury MTS has a 15 MVA transformers and a 7.5 MVA transformer to supply their load. Hydro Hawkesbury plans to replace their 7.5 MVA transformer with a new 15 MVA transformer. This is planned to be in service in 2026.

- **Lincoln Heights TS Transformer T1/T2 Replacement**
  Lincoln Heights TS is a DESN station housing two 40-45 years old 45/60/75 MVA transformers. Since the existing transformers are at end of life, it was recommended to replace these transformers with new standard 45/60/75 MVA units. These transformers are now planned to be in service in 2024.

- **Russell TS T1/T2 and Component Replacement**
  The two 45/60/75 MVA transformers T1 and T2 were installed in 1975 and 1971 respectively and they need to be replaced. TWG suggested to replace these transformers with new standard 45/60/75 MVA or with 60/80/100 MVA following the studies and anticipated load at this station. The project is expected to in-service by late 2026-2028.

- **Overbrook TS Station Capacity**
  A review of the station's LTR indicated that the 13.8 kV cables from the transformers to the 13.8 kV switchgear are limiting the transformation capacity of the station. TWG recommended that Hydro One to review the capacity of the 13.8 kV cables to determine the cause of the limitation in 2021. Hydro One has completed its review of the LV cables and determined they are not limiting the station LTR.

- **Hawthorne TS Station Capacity**
  The DESN station at Hawthorne TS will be overloaded in 2026 by approximately 2 MW and reaches 32 MW by the end of NA study period. It is recommended to install a new station on circuit

L24A to relieve the stations in the south area of any overloads, including Hawthorne TS. Once the new station on L24A is in service it will alleviate the overloading experienced at Hawthorne TS. The expected in service date is 2026.

- **Riverdale TS 115kV breaker replacement**
  Riverdale TS is a 115/13.8kV station connected to 115kV circuits A3RM, A5RK, and A6R. The 115kV breakers are identified to be replaced and the anticipated in-service date is 2030.

- **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. It was suggested to replace conductors, wood poles, insulators, and other components. These line sections are currently planned for refurbishment in 2024. There is development anticipated in the area that could require change to the supply configuration. TWG recommended to further review this need in next phases of third RP cycle.

- **Albion TS – T1/T2, Switchgear and Circuit Breakers Replacement**
  The existing transformers T1 and T2 are rated at 75MVA each, were built in the 1970s, and have been identified for replacement with new closest standard size 60/80/100 MVA units. All existing Hydro One owned circuit breakers will be replaced with breakers of similar rating. This replacement project is scheduled to be in-service in 2031-2033.

- **Slater TS Transformers T1/T2/T3 Replacement**
  The station has three transformers T1, T2, and T3, rated at approximately 65MVA each, built in the 1960s. In 2018, T1 failed and was replaced with a 100MVA unit. Currently Hydro One is in process of replacing and upsizing the remaining T2 and T3 with new 100MVA units. The replacement of the equipment is currently expected to be completed by 2024.

- **Arnprior TS – Transformers T1/T2 Replacement and Rebuilding DESN**
  Transformers T1 and T2, built in 1960 and 1957, respectively, rated at 42MVA each, have been identified to be at the end of life. TWG recommended to replace these transformers with like-for-like units and build a new 44kV switchyard to supply the station load. The replacement of this equipment is expected to be completed by 2023.

- **Longueuil TS Transformers T3/T4 Replacement**
  Transformers T3 and T4, built in 1965 and 1964, respectively, are rated at 93MVA each. Hydro One Tx in coordination with Hydro One Distribution has decided to replace both transformers with new like-for-like 50/66.7/83MVA units which will be sufficient based on the current load forecast. The planned in-service date is 2025-2027.

- **79M1 Circuit – Voltage Regulation**
  There was low voltage observed on this circuit due to long distance and circuit loading, lower voltage can be expected at the end of the line. The previous Greater Ottawa RIP report identified that the voltage at Hawkesbury MTS will approach ORTAC limits under peak load with A2 out of service. As per the third cycle NA study, when Bilberry Creek TS is planned to be retired and the load move to stations supplied by the 230kV system, no voltage issues were found over the study period.

- **South March TS T1/T2 Transformers Replacement**
  The station has two (2) 230kV/44kV, 50/67/83MVA transformers that were in-serviced in 1971 and based on their asset condition need replacement. TWG to determine if the transformers should be replaced with similar 50/67/83MVA units or if the size should be upgraded to 75/100/125MVA units. The project is tentatively planned for in- service in 2030-2032.

- **Lisgar TS T1 Transformer Replacement**
  There are two T1/T2 115kV/13.8kV, 45/60/75MVA transformers at the station. Transformer T1 was in-serviced in 1974 and based on its asset condition it needs replacement. Based on the non-coincident forecast, the station capacity is reached in 2026. The TWG recommends the capacity need for the area be further reviewed to determine if the transformer should be replaced with a 45/60/75MVA unit or upgraded to 60/80/100MVA unit. The project is tentatively planned for in-service in 2031-2033.

- **Kanata-Stittsville Area Capacity**
  This area is supplied by multiple transformer stations, including Kanata MTS, Marchwood MTS, and Terry Fox MTS. Based on the non-coincident forecast, these three stations are expected to be loaded above their LTR over the study period with about 10MW over in 2022, increasing to 47MW in 2031. As part of third cycle of regional planning, the energy efficiency measures should be reviewed for this area in combination with available load transfers to determine the timing for wire alternatives to address this capacity need.

4.6 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 second cycle NA and SA reports were completed in Dec 2018 and May 2019 respectively. The IRRP was completed in May 2021, and the second cycle regional planning was concluded with completion of RIP report in Dec 2021. Updates to the needs and plans recommended in this region are provided below. Updates to the needs and plans recommended in this region are provided below.

Projects completed include:

- 115kV system supply capacity (GATR project): Two new 230/115kV autotransformers at Cedar TS to reinforce supply to both 115kV sub-systems in the region (completed in 2016).
- 230kV load restoration needs (GATR project): Two new 230 kV in-line switches on D6V/D7V circuits to improve restoration capability of Waterloo-Guelph 230 kV sub-system (completed in 2016). Also, two new 230kV in-line switches on M20D/M21D circuits to improve restoration capability of the Cambridge-Kitchener 230 kV sub-system (completed in 2017).
- Station short circuit (Arlen MTS): Install 13.8 kV series reactors to mitigate LV bus short circuit levels (LDC project, completed in 2016).
- Campbell TS: Replaced vintage T1 (completed in 2018) and T2 transformers (completed in 2019).
- Detweiler TS: Replaced 230 /115 kV Auto Transformers T2 (completed in 2020) and T4, AC station service and components (completed in 2021).

- Refurbished tower 157 near Freeport SS for D7F / D9F 115 kV (completed in 2020/2021).
- Hanlon TS T1/T2 Replacement: Transformers were replaced by standard 2/33/42 MVA units (Completed in 2022)

Needs and Plans underway in KWCG Region:

- **Kitchener MTS#5 Transformers T9/T10 Replacement**
  The existing 83MVA nonstandard transformers T9 and T10 are supplying 67 MW of peak load. The loads at Kitchener MTS #5 are currently forecasted to approach the supply capacity of this station by 2028. The T9/T10 transformers at this station have been identified as approaching end of life requiring replacement. Kitchener-Wilmot Hydro Inc. and Hydro One are coordinating the replacement plan of these transformers. This investment is expected to be completed by 2023-2024.

- **Scheifele MTS Transformers T1/T2 Replacement**
  Scheifele MTS has four 230/13.8 kV transformers T1 and T2 of 69 MVA, and T3 and T4 of 110 MVA supplying 145 MW of peak loads. The T1/T2 are approaching end of life and required to be replaced by 2025-2026. The TWG recommends that Waterloo North Hydro continue monitoring the condition of these T1/T2 transformers at Scheifele MTS and if required, proceed with replacement plan otherwise reassess in the next regional planning cycle.

- **B5C/B6C Circuit Refurbishment**
  About 12 km of double circuit line section from Burlington TS to Harper's Jct. and 15 km B5C 115 kV line tap from Harper's Jct. to a Westover Jct. require refurbishment. The refurbishment of the 27 km 115 kV B5C/B6C line sections from Burlington TS to a CTS is currently under execution and the work is planned to be completed by the end of year 2025.

- **Preston TS Transformers T3/T4 Replacement**
  The T3/T4 125 MVA transformers are almost 50 years old and are in poor condition requiring replacement. The TWG recommends replacing the existing 125 MVA T3/T4 transformers with 125 MVA standard units. The project is expected to be completed by 2026-2027.

- **Cedar TS Transformers T7/T8 Replacement**
  Cedar TS has two 115/13.8 kV DESN units T1/T2 and T7/T8 of 75 MVA with a LTR of 115 MVA and 37 MVA with a LTR of 44 MVA supplying 67 MW and 36 MW of peak loads respectively. The T7/T8 DESN 38 MVA nonstandard transformers were built in 1958 and have been identified for replacement due to poor condition. TWG recommends replacing these nonstandard transformers with standard units of 42 MVA in 2026-2027.

- **Fergus TS Transformers T3/T4 Replacement**
  Fergus TS has two 125MVA transformers T3 and T4 supplying 90 MW of peak loads. Condition assessment has identified that both 50 years old T3/T4 transformers as well as the feeder breakers are at their EOL requiring replacement. The TWG recommends that Hydro One continue monitoring the condition of these T3/T4 transformers and other components at Fergus TS and if

required proceed with the replacement plan by 2028-2029 or otherwise this need may be reassessed in the next regional planning cycle.

- **Galt TS Breakers and Component Replacement**
  Galt TS has two 230/ 125MVA transformers, T7 and T8, supplying 112 MW of peak loads. The T7/T8 transformers are new but the breakers and other component at the station are almost 50 years old. Condition assessment has identified that these components are at EOL, requiring replacement. The TWG recommends that Hydro One continue monitoring the condition of these EOL components at Galt TS and if required proceed with the replacement plan by 2028-2029 or otherwise this need may be reassessed in the next regional planning cycle.
- **Campbell TS Breakers and Component Replacement**
  Campbell TS has four 100 MVA transformers, T1/T2 and T3/T4. Campbell TS is supplying about 89 MW and 47 MW loads via its two DESNs. Two feeder breakers and a tie breaker for T1/T2 DESN are in poor condition and requires replacement. The TWG recommends implementing replacement plan by 2028-2029.

It is expected that the next planning cycle for this region will be initiated in 2024 or earlier, beginning with the NA phase.

4.7 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 second regional planning cycle was completed with publishing of the RIP report in February 2022. Updates to the needs and plans recommended in this region are provided below.

Projects completed include:

- Halton Hills Hydro MTS (completed in 2018)
- Tremaine TS: Add 4 x 27.6 kV feeders (completed in 2020)

Needs and Plans currently underway in GTA West Region:

- **Palermo TS T3/T4 Replacement**
  T3/T4 transformers at Palermo TS are also in poor condition and require replacement. During the second cycle RIP, Milton Hydro reviewed their load forecast and now plan to utilize the increased capacity at Palermo TS. The Palermo TS upgrade also defers the need for providing relief for Tremaine TS to 2039. The TWG recommends that Palermo TS T3/T4 transformers be replaced with larger size 230/27.6kV, 75/125MVA units, and expected completion in 2027.

- **Station Capacity – DESN stations exceeding LTR**
  As part of the discussions for second cycle RIP, Milton Hydro provided a revised load forecast with new load being supplied from Glenorchy MTS #1, Halton Hills MTS, and Palermo TS. As a result of this update, the need for the second Halton TS DESN has been deferred to 2033. The

loading on the DESN stations – Erindale TS T1/T2, Pleasant TS T1/T2, Cardiff TS T1/T2, Erindale T5/T6 – is expected to exceed their station LTR during the 2021-2031 study period.
The capacity need for Erindale TS T1/T2 was addressed in the 2019 GTA West Region NA Report where the TWG recommended that the need be managed by Alectra and no transmission upgrades are required. The loading issues at the Pleasant TS T1/T2, Cardiff TS T1/T2, and the Erindale TS T5/T6 are similar to those of Erindale T1/T2. The TWG recommends that these loading issues be managed at the distribution level in the near term and review the station loadings again in the next regional planning cycle.

- **H29/H30 Transmission Circuit Supply**
  The TWG identified a thermal capacity need for circuits H29/H30 in the medium-term and recommended that the line conductor be upgraded. Hydro One is planning to replace the existing conductor with a higher ampacity conductor to reinforce the supply to Pleasant TS by Q2 2027.

- **Section of R19TH/R21H Overloaded**
  The loads at Jim Yarrow MTS and Pleasant TS are supported by the 230 kV line V41H/V42H from Claireville and the R19TH/R21TH line. Under certain outage conditions all loads at Pleasant TS and half the load on Jim Yarrow MTS can end up on one of the R19TH or the R21TH section between Hanlan Jct. and Hurontario SS. Hydro One has implemented an operating procedure under which Jim Yarrow MTS load is transferred to R21TH if V41H or H30 are out of service pre-contingency and to R19TH if V42H or H29 are out of service pre-contingency. The TWG recommends that the loading on the R19TH/R21TH and the performance of the manual scheme be monitored. The timing and the preferred option for the LR scheme will be reviewed in the next planning cycle.

- **Load Security – 230kV circuits T38B/T39B**
  Due to the lower than expected load at Halton TS and Milton Hydro supplying some of the projected area load from the upsized Palermo TS, the loads connected to the 230 kV circuits T38B/T39B are not expected to exceed the 600 MW ORTAC[7] supply security limit until summer 2030. The need to be reviewed in the next regional planning cycle.

- **Richview X Trafalgar Transmission Circuit Capacity**
  Loading limitations on 230 kV circuits between Richview TS and Trafalgar TS was assessed as part of the IESO-led Bulk System Planning study. The work is underway on reconductoring these circuits with new conductors and is planned to be in-service by Q2 2026.

- **Northwest Greater Toronto Area (NWGTA) Electricity Corridor**
  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 Ministry of Energy and the IESO have been working on the proposal to identify and protect a corridor of land for the future transmission corridor. The TWG supports the initiative for the development of the new corridor as it will be essential to meet the future area growth. The progress of corridor development will be reviewed in the next regional planning cycle.

- **Other Asset Replacements of Major HV Transmission Equipment**

Hydro One has identified the need for replacement of major HV transmission assets over the next ten years at a number of Greater Bruce/Huron stations as shown below. The TWG recommendations for asset replacement plans have taken "right sizing" into consideration.

- **Bramalea TS:** TWG recommends replacement of the 230/44kV, 50/83MVA transformers, T3 and T4 with larger size 230/44kV, 75/125MVA units (planned in-service date is 2028).
- **Tomken TS:** TWG recommends like-for-like replacement of 230/44kV, 75/125 MVA transformers T1 and T2 (planned in-service date is 2029).
- **Lorne Park TS:** TWG recommends like-for-like replacement of 230/27.6kV, 50/83MVA transformer T2 (planned in-service date is 2030).

It is expected that the next planning cycle for this region will be initiated in 2024 or earlier, beginning with the NA phase.

4.8 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. With increased load requests in the region, the second regional planning cycle was triggered in early 2019.

The second cycle RIP report was completed in April 2022. Updates to the needs and plans recommended in this region are provided below:

Projects completed include:

- Centralia TS: Replaced three (3) existing transformers with two (2) 25/42 MVA transformer arrangement and other associated equipment (completed in 2019).
- Detweiler TS: Replaced T2 and T4 autotransformers and other associated equipment (completed in 2021).
- Stratford TS: Replaced T1 transformer and other associated equipment (completed in 2021).

Needs and Plans underway in Greater Bruce/Huron Region:

- **115kV L7S Circuit Capacity Increase**
  L7S is a single 115 kV circuit transmission line operated radial from Seaforth TS to St. Mary's TS. No capacity needs were identified during the study period, however, the connection requests at Grand Bend East DS have triggered a re-assessment of the L7S section between Seaforth TS and Kirkton JCT to address the clearances that are limiting the circuit's capacity. The TWG recommends that Hydro One proceed with the re-assessment of the limiting section of L7S, to increase the limiting spans' sag temperature from 83°C to 125°C. Addressing these clearances will result in an L7S capacity increase of more than 10 MW.

- **Customer Delivery Point Performance of L7S circuit**

The performance of delivery points supplied from circuit L7S, specifically Centralia TS, Grand Bend East DS, St. Mary's TS and the 4 industrial customer connections, were reviewed. In 2021, remotely operated switches were installed at three locations on the L7S circuit, at Kirkton JCT, Biddulph JCT, and St. Mary's TS. Hydro One's line sustainment and wood pole replacement programs will continue to assess the condition of this circuit and refurbish the sections of concern.

- **Seaforth TS T5/T6/T1/T2 and Component Replacement**
  Seaforth TS consists of two 150/200/250 MVA autotransformers supplied by 230 kV circuits B22D and B23D. Seaforth TS also consists of two 25/33/42 MVA transformers and supplies Hydro One Distribution and embedded LDCs. The TWG recommended to replace autotransformers T5, T6, transformers T1, T2, the capacitor breaker and several HV and LV switches that are at EOL. The planned in-service date for the project is 2024.

- **Hanover TS T2 and Component Replacement**
  Hanover TS consists of two 75/100/125 MVA autotransformers supplied by 230 kV circuits B4V and B5V. Hanover TS also consists of two, 50/67/83 MVA transformers supplying Hydro One Distribution and embedded LDCs. The scope of this project includes the replacement of 230 kV motorized switches, step-down transformer T2 and associated equipment, 115 kV motorized switches, surge arrestors, auto-ground switches, and potential transformers. This work was planned to be completed in 2028, however due to a recent transformer tap changer failure, T2 and its associated transformer switch are being replaced immediately and are expected in-service by the end of 2023. The remaining component replacements that were planned as part of the T2 work will be bundled with the replacement of T1 and have an expected in-service date of 2031.

- **Wingham TS T1/T2 and Component Replacement**
  Wingham TS was built in 1965 and has two 50/67/83 MVA transformers. Based on asset condition assessment, the current scope of this project is to replace transformers T1 and T2 and associated surge arrestors. This project is underway, and the planned in-service date is 2024.

- **Other Asset Replacements of Major HV Transmission Equipment**
  Hydro One has identified the need for replacement of major HV transmission assets over the next ten years at a number of Greater Bruce/Huron stations as shown below. The TWG recommendations for asset replacement plans have taken "right sizing" into consideration.
  - **Bruce A TS:** Replacement of 230 kV circuit breakers and switches, uprating of station strain buses and protection & control relay building (planned in-service date is 2030).
    Replacement of 500 kV circuit breakers and switches, 2 500/230 kV autotransformers and upgrading of protection & control equipment (planned in-service date is 2027)
  - **Bruce B SS:** Replacement of 500 kV circuit breakers and switches (planned in-service date is 2024)
  - **Bruce HWP B TS:** Replacement of T7/T8 transformers and associated switches, replacement of low voltage transformer breakers & replacement of Protection and Control systems (planned in-service date is 2028)
  - **Douglas Point TS:** Replacement of T3/T4 transformers and associated switches, low voltage circuit breakers & switches and Protection & Control systems (planned in-service date is 2028)

- **Owen Sound TS:** Replacement of T4/T5 transformers and associated switches, low voltage circuit breakers, switches, and Protection & Control systems (planned in-service date is 2028) Replacement of T3 transformer and associated switches & replacement of low voltage transformer breaker (planned in-service date is 2031)

It is expected that the next planning cycle for this region will be initiated in 2024 or earlier, beginning with the NA phase.

4.9 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 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.

The second regional planning cycle was completed with publishing of the RIP report in October 2021. Updates to the needs and plans recommended in this region are provided below.

Projects completed include:

- Wood Pole Replacements:
  Multiple wood pole replacement projects were completed on a number of 115kV and 230kV circuits. These circuits consisted of wood pole structures that were assessed at being at their end of life and in need of replacements. The following circuits have their end-of-life wood pole structures replacement completed between 2014 to 2019:
  - No.2 and No.3 Algoma (completed in 2014)
  - Northern Ave 115kV circuit (completed in 2014)
  - No.1 Gartshore (completed in 2015)
  - Hogg (completed in 2015)
  - P21G (completed in 2019)

- Hwy 101 TS: Installed a new control building completed with new protection relays, batteries, chargers, automatic transfer schemes and RTU to replace components such as electro-mechanical relays and batteries (completed in 2015).

- Anjigami TS: Performed electrical and civil upgrade, including the installation of a new 44kV breaker, redundant battery and chargers, and replacement of protection equipment and other outdated AC/DC system. It also includes ground grid improvements (completed in 2017).
- Third Line Instantaneous Load Rejection Scheme: Eliminated/Minimized manual communication between IESO and OGCC by enabling remote arming of Third Line Instantaneous Load Rejection Scheme via ICCP line between IESO's EMS and HONI's NMS (completed in 2021).

Needs and Plans underway in East Lake Superior Region:

- **Third Line TS – T2 and Protection Replacement**
  Based on an asset condition assessment, P21G's and P22G's line protections are approaching end of life. Further, due to legacy reasons, line protection does not meet standard physical separation requirement. It is recommended that the existing end-of-life protection will be replaced with new protection relay consistent with Hydro One standard and is expected to be completed by 2024.

  Among the 2 autotransformers, T2 is at end of life based on asset condition assessment. It is recommended to replace T2 with a unit that has equivalent rating and is expected to be completed by 2025.

- **Patrick St. TS 115kV Breaker Replacement**
  Upon a breaker failure of breaker, or a contingency on either Algoma No.2 or Algoma No.3 circuit, followed by another contingency on the remaining circuit, Algoma No.1 will be overloaded beyond its short term emergency (STE) rating during peak load. It is recommended to implement automatic load rejection upon the loss of Algoma No. 2 and Algoma No. 3 to reject load blocks and respect the existing long term emergency (LTE) rating of Algoma No. 1 circuit (to be completed in 2023). Based on asset condition assessment, breakers 208, 211, 214 and 217 require replacement. The TWG recommends replacing the breakers and the project is expected to be completed by 2024.

- **Echo River TS – Transmission Supply Reliability and Breaker Replacement**
  The station consists of a single 230/115/34.5kV autotransformer and a single 230kV circuit breaker (556) to supply two (2) 34.5 kV customer feeders. It has been identified that the existing back up from Northern Ave TS can no longer provide adequate voltage support at peak load during a transformer outage at Echo River TS. The TWG recommends installing "Hot" spare 230kV transformer and replacing end-of-life 230kV breaker. The spare transformer was replaced 2023, while the breaker replacement work is planned for completion in 2024.

- **115kV Sault No.3 Structure and Conductor Replacement**
  Built in 1929, Sault No.3 is a 90 km long 115kV transmission circuit that runs from MacKay TS 115kV station yard to Third Line TS 115kV station yard. Based on asset condition assessment, approximately 70km of the circuit's conductor from Goulais TS (str # 129) to MacKay TS is in poor condition. The TWG recommends that the existing conductor and wood pole to be replaced with new 115 kV rated line and structures. This alternative will also allow Sault No.3 to return to its network configuration. The project is planned to be completed in 2024.

- **Batchawana TS and Goulais TS Refurbishment**
  Based on asset condition assessment, both stations are at end-of-life with obsoleted equipment including power transformers, protections (fuse), batteries, chargers, steel structure foundations and remote terminal units. Depending on the choice of distribution voltage, there are two (2) different scenarios (12.5kV vs 25kV), evaluation of alternatives was completed by HOSSM and API as documented in the 2021 East Lake Superior Regional Local Planning Report. As per recommendation, HOSSM is proceeding to refurbish both Goulais Bay TS and Batchawana TS using a new 115kV, 3–phase power transformer, with provision for a 115kV Mobile Unit substation

(MUS) connection facility in each station. Refurbishment for both stations is expected to be completed in 2024.

- **Northern Ave TS Transformer T1 Replacement**
  Northern Ave Transformer T1 is a 115/34.5kV, 20/26.7MVA step down transformer that supplies Algoma Power Inc. via one (1) 34.5kV feeder. Transformer T1 is at end-of-life. The TWG recommends replacing T1 with a 'like for similar' unit that has a smaller MVA rating compared to existing T1 and would be adequate for Northern Ave's long-term load forecast. It is expected to be completed by 2025.

- **Anjigami/Hollingsworth TS Transformer Overload**
  Anjigami TS is a 115kV/44kV load supply station with a single transformer. Based on the load forecast, the load increase on the 44kV system by end of 2024 will exceed transformer capacity in both Anjigami TS and Hollingsworth TS when the companion station is out of service. The TWG recommends building a new 115/44kV station in the vicinity of Hollingsworth TS and tap off from 115kV Hollingsworth circuit to supply new loads as well as existing load that are presently supplied by Anjigami/Hollingsworth 44kV system. The project is expected to be completed by 2025.

- **Clergue TS Switchgear Replacement**
  Based on asset condition assessment, the existing 12 kV minimum-oil metal-clad switchgear is at end-of-life and it is recommended to replace the existing minimal oil metal clad switch gear with SF6 metal clad switch gear. The project is expected to be completed by 2026.

- **Hollingsworth TS Protection Replacement**
  Based on asset condition assessment, the existing protection relay will approach end-of-life by 2025. The TWG recommends replacing the identified items as per current standards. The project is expected to be completed by 2025.

- **Watson TS Switchgear Replacement**
  Based on an asset condition assessment, the existing minimal oil metal clad switch gear are at end of life and it is recommended to replace existing minimal oil metal clad switch gear with SF6 metal clad switchgear. The project is expected to be completed by 2026.

It is expected that the next planning cycle for this region will be initiated in 2024 or earlier, beginning with the NA phase.

4.10 GTA East

GTA East Region comprises the municipalities of Pickering, Ajax, Whitby, Oshawa, and parts of Clarington and other parts of Durham Region. The second cycle of Regional Planning was initiated by Hydro One in 2019, with the NA report published in August 2019. The second cycle NA concluded that there were no additional needs other than h asset replacement work in the region. The TWG determined that no further regional coordination was required to address the following needs. It was

recommended that the implementation and execution for the replacement of the transmission assets be coordinated by Hydro One and the affected LDCs and/or customers.
The second cycle RIP report was completed in February 2020. Updates to the needs and plans recommended in this region are provided below.

Projects completed include:

- Enfield TS: Installed a new 230kV/44kV Enfield TS with six (6) 44kV feeder breaker positions with provision for two (2) additional 44kV future feeder breaker positions (completed in 2019).
- Clarington TS: Built a new 500/230kV autotransformer station to increase transmission supply capacity to the GTA East Region, eliminate the overloading of Cherrywood TS autotransformers that may result after the retirement of Pickering NGS, and improve supply reliability to the region (completed in 2018).
- Thornton TS T3/T4: Replaced end-of-life transformers. Also installed LV neutral grounding reactors to reduce line-to-ground short circuit fault levels to facilitate DG connections (completed in 2016).
- Wilson TS T1/T2 DESN1: Installed LV neutral grounding reactors to reduce line-to ground short circuit fault levels to facilitate DG connections (completed in 2015).
- Seaton MTS: The construction of new MTS was completed in April 2023.

Needs and Plans underway in GTA East Region:

- **Cherrywood TS 230kV & 500kV Breaker Replacements**
  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 by 2027.

- **Cherrywood TS LV Switchyard Refurbishment**
  The LV DESN switchyard, except for step-down transformers T7 and T8, at Cherrywood TS is at end-of-life due to poor 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. Replacement of these assets is expected to be completed by 2024.

It is expected that the next planning cycle for this region will be initiated in 2024 or earlier, beginning with the NA phase.

4.11 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 second cycle NA was completed in May 2020. The NA determined that identified needs in the region are local in nature and can be addressed directly by Hydro One and affected LDCs, and therefore further regional coordination is not required.

The second regional planning cycle was completed with publishing of the RIP report in August 2022. Updates to the needs and plans recommended in this region are provided below.

Projects completed include:

- Aylmer TS transformers and low-voltage switchyard replacement (competed in 2017).
- Strathroy TS failed transformer T1 and low-voltage switchyard replacement (completed in 2019).
- Wonderland TS failed transformer T6 was replaced (completed in 2019).
- St. Thomas TS was decommissioned and 115 kV circuit W14 re-termination work (completed in 2020).
- Sarnia Scott TS to Buchanan TS 230 kV circuits N21W/N22W tower structures refurbishment (completed in 2021).
- Tillsonburg TS new low-voltage capacitor banks (completed in 2021) and switchyard component replacement project completed in 2022.
- **Nelson TS** station refurbishment project completed in 2022.

Needs and Plans underway in London Area Region:

- **Longwood TS** protection and control replacement project to be completed in 2026.
- **Edgeware TS** protection and control replacement project to be completed in 2024.
- **Buchanan TS Transformer Replacement**
  Two of the 3 auto transformers, T2 and T3 are 48 and 54 years old respectively, are in poor condition, and approaching end-of-life. Hydro One plans to replace two 230kV autotransformers, spill containment pits, AC and DC station service equipment, as well as some obsolete protection, control, and telecom equipment. The expected completion date is 2028.

- **Clarke TS Transformer Replacement**
  The two 230/27.6 kV 50/83 MVA transformers T3 and T4 are 55 years old, in poor condition, and approaching end-of-life. Some of the protection equipment is also found to be obsolete. TWG recommends replacing step-down transformers like-for-like, associated disconnect switches, 27.6 kV switchyard components including breakers, station services, capacitors, and protections. The expected completion date is 2028.

- **Talbot TS Transformer Replacement**
  Step-down transformers T3 and T4 have been in-service from 1979 and are in poor condition and approaching end-of-life. A number of 27.6 kV breakers and protection equipment have also been identified for replacement. Hydro One to proceed with like-for-like replacement of T3 and T4 at Talbot TS. The expected completion date is 2028. In addition, Hydro One will look for

opportunities to coordinate this project with London Hydro for the metal clad switchgear replacement.

- **Wonderland TS EOL Replacement**
  The existing air insulated 27.6 kV switchgear, majority of which are original installations have reached end-of-life due to deteriorated condition and has limited availability of parts for ongoing support and maintenance. All site protection and control equipment, consisting of first generation electro-mechanical relaying are deemed end-of-life, obsolete and require replacement. To address the end-of-life need, Hydro One plans to replace the Wonderland 27.6 kV switchyard and the expected completion date is 2026.

- **London Area East OPGW Infrastructure**

- **M31W/ M32W (Salford Junction x Ingersoll)**
  M31W and M32W are 230 kV network circuits that connect Buchanan TS and Middleport Port TS. To improve the reliability of power system telecom network, Hydro One plans to install 9km of OPGW fiber from Salford Junction to Ingersoll TS and remove the existing licensed microwave link connects Ingersoll TS to Buchanan TS. The project is expected to be completed in 2027.

- **W36/W37/W5 NL/W6NL/W2S/ N21W**
  To improve the reliability of power system telecom network, Hydro One plans to establish a geographically diverse and fully redundant fiber optic network for protection and SCADA applications. A combination of Hydro One's existing and new OPGW-based fiber and two leased third-party fiber links would be utilized. The existing metallic cable will be removed, and the project is expected to be completed in 2029.

It is expected that the next planning cycle for this region will be initiated in 2025 or earlier, beginning with the NA phase.

4.12 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, North Humber land County, Peterborough County, and Prince Edward County and related municipalities.

The second regional planning cycle was completed with publishing of the RIP report in May 2022. Updates to the needs and plans recommended in this region are provided below.

Projects completed include:

- Load transfer from Gardiner TS DESN 1 to Gardiner TS DESN 2 to provide transformation capacity relief at Gardiner TS DESN 1 (completed in 2019).
- Connect Napanee GS– A 910 MW gas turbine (Napanee GS) was connected to the 500 kV bus in the Lennox TS switchyard (completed in 2017)

Needs and Plans underway in Peterborough to Kingston Region:

- **Cataraqui TS Line Reinforcement**
  It was forecasted that in 2023 the coincidental loading of the stations in the sub region will reach the supply capacity of the Cataraqui TS auto transformers. The current limitation of the Cataraqui TS auto transformers is due to a short span of copper conductors connected the secondary side of the auto transformers within the station. Upgrading the conductors will allow the long-term emergency to increase by 35 MW and resolve this need in the near term. The work is expected to be complete by 2030.

- **Gardiner TS DESN1 Capacity**
  The Gardiner TS DESN1 has exceeded its Summer 10-Day LTR which is 125 MW. To address the situation Hydro One distribution has confirmed that a permanent additional 11 MW load transfer from Gardiner TS DESN1 to Gardiner TS DESN2 is possible by reconfiguring its distribution system which is much faster and was completed in 2022. Hydro One Transmission will address the current capacity limit at Gardiner TS DESN1 and refurbish with new standard 75/125 MVA transformers that will increase the LTR to about 160 MW and address the load growth at DESN up to 2033. It is planned to be in service by 2028.

- **Frontenac TS Capacity**
  Based on the load forecast, the Frontenac TS will be loaded more than the station LTR by year 2028. The TWG recommended Hydro One Transmission to coordinate with Hydro One Distribution and Kingston Hydro to undertake distribution load transfer between Gardiner TS and Frontenac TS over the near term.

- **Otonabee TS Capacity**
  Based on the load forecast, the loading on Otonabee TS 44kV is exceeding its Summer 10-Day LTR. Hence, there is a need for additional transformation capacity at Otonabee TS 44 kV bus in the near term. Hydro One distribution has confirmed that a total of 12MW load can be shifted to nearby station Dobbin TS which has over 50MW of remaining capacity and is not expected to reach its LTR of 160 MW in the long term. Therefore, it will provide enough capacity to address the load growth forecast at Otonabee TS 44 kV bus until 2030 and the urgent need of upgrade is eliminated.

- **Port Hope TS Transformer Replacement**
  The T3/T4 transformers were built in 1959 and have been identified as has reached the end of service life and requiring replacement. The scope of this project is to replace T3/T4 step-down transformers, associated spill containment structure and majority of assets within 44 kV switchyard with the equipment of similar ratings. The targeted in-service is in year 2025.

- **Belleville TS Load Connection Inquiries**
  In addition to normal load growth in the area, Elexicon Energy Inc. has recently received approximately 30 MW of load connection inquiries to be connected at the Belleville TS. There is insufficient existing capacity in the area to supply the potential future connections. To address

the situation Hydro One (Transmission and Distribution) and Elexicon have started development of a new DESN with two 75/125 MVA transformers with two 32 MVAR Capacitor banks with an expected in-service date of 2026. TWG will revisit the capacity need in the next regional planning cycle to re-assess whether/when a transmission line reinforcement to Belleville is required in the long term.

- **Picton TS Transformer Replacement**
  The station comprises two 50/83MVA transformers, T1/T2. Transformers T1 and T2 are currently about 60 years old and are planned for similar standard units based on their asset condition assessment and taking "right sizing" into consideration. The planned in-service date is 2026.

- **Dobbin TS Transformer Replacement**
  Dobbin TS consists of three 230/115 kV auto transformers. T1 is rated at 150/250 MVA and T5 is rated at 115 MVA. T2 is rated at 36/78 MVA and currently out of service. During the previous planning cycle, T2 and T5 were planned to be replaced with one 150/250 MVA unit. However, as T1 has also reached the end of service life, it would be more efficient and cost effective to replace all three transformers with two 150/250 MVA units. The work is expected to complete in the year 2029.

It is expected that the next planning cycle for this region will be initiated in 2025 or earlier, beginning with the NA phase.

4.13 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 Northeast, Scugog on the South, Erin on the South-West, and Grey Highlands on the West. The second regional planning cycle was completed with publishing of the RIP report in December 2022. Updates to the needs and plans recommended in this region are provided below:

Projects completed include:

- M6E and M7E circuits (at Orillia TS): installed 230 kV motorized disconnect switches in 2021.
- Minden TS: Replaced 230/44kV 42MVA (T1/T2) transformers with new 230/44kV 83MVA units in 2021.
- Parry Sound TS: Replaced 230/44kV 42MVA transformers (T1/T2) with new 230/44kV 83MVA units in 2023.

Needs and Plans underway in South Georgian Bay/Muskoka Region:

- **Everett TS Capacity**
  Everett TS peak demand forecast will exceed its rating by 2025. The recommended solution for this need is to adjust the CT ratio of the transformer breakers. This will provide the ability to

utilize the full supply capability of the transformers at Everett TS and alleviate the need. The need is expected to be addressed before Everett TS reaches its summer 10-day LTR (2025) with an approximate cost of 0.5M.

- **Barrie TS Capacity**
  Transformer supply capacity will be exceeded and consequently result in thermal violation of the radial supply circuits (E3B/E4B). Most of the equipment at Barrie TS as well as the Essa TS 115kV yard have also been assessed at being end-of-life and in need of replacement due to asset condition. This resulted in creation of the Barrie Area Transmission Reinforcement (BATU) project to address these needs. This investment in presently underway. Barrie TS is also expected to reach its summer 10-day LTR by 2027. Also, there is a supply constraint on the distribution level at the 44 kV feeder starting in 2025. For this distribution level need, minor capacity increases can be accommodated on the 44 kV system, but only on an emergency basis. The TWG recommends constructing a new 230/27.6 kV transformer substation which would connect to the upgraded circuits E28B/E29B (that will be available post BATU). The project is expected to be completed by 2023.

- **Waubaushene TS Capacity**
  Waubaushene TS presently has 230/44 83MVA transformers (T5/T6) with a summer LTR of 94MW which are approaching end-of-life in 2030. This station will exceed its normal supply capacity in 2028. Hydro One Distribution has permanently transferred 10MW of load from Waubaushene TS to Midhurst TS to help with recent summer loading concerns. TWG recommended replacing and upgrading existing T5/T6 transformers with larger 75/125MVA units. The project is expected to be completed by 2027.

- **M6E/M7E Supply Capacity**
  There is a thermal capacity need on one MxE 230 kV circuit section between Essa and Midhurst for the loss of the companion MxE circuit starting in 2034. The TWG recommended monitoring demand growth in the area; consider CDM options in next cycle of regional planning as a means of deferring transmission upgrade with a schedule to be done by 2034.

- **Alliston TS Capacity**
  Alliston TS is expected to reach summer 10-day LTR by 2037. Given the timing of the need, no firm recommendation is required at this time. The TWG recommends monitoring demand growth to ensure load supplying capability is maintained and revisit the need in the next cycle of regional planning.

- **Essa TS Thermal Capacity**
  A thermal capacity need on one of the Essa 500/230 kV autotransformers for loss of the companion autotransformer arising in 2022 is identified. This will be further studied as part of Essa Bulk Study led by IESO.

- **Minden TS Capacity**

Minden TS is expected to have station capacity need by 2038. Given the timing of the need, no firm recommendation is required at this time. The TWG recommends monitoring the load growth in the area and revisit need the next RP cycle.

- **Asset Replacement for Major HV Transmission Equipment**
  Hydro One has identified the need for replacement of major HV transmission assets over the next ten years at a number of stations in this region as shown below. The TWG recommendations for asset replacement plans have taken "right sizing" into consideration.
  - **M6E/M7E Orillia x Coopers Fls –**Based on asset condition assessment, this 50km line section requires like for like refurbishment to ensure supply reliability and safety is maintained. (Planned in-service date is 2026)
  - **E8V / E9V Orangeville TS X Essa JCT –**Based on asset condition assessment, this 112km line section requires like for like refurbishment to ensure supply reliability and safety is maintained. (Planned in-service date is 2027)
  - **D1M / D2M Otter Creek JCT x Minden TS –**Based on asset condition assessment, this 124km line section requires like for like refurbishment to ensure supply reliability and safety is maintained. (Planned in-service date is 2028)
  - **Barrie TS –** Replace and upgrade existing 115/44kV 83MVA transformers (T1/T2) with new 230kV/44kV 125MVA transformers. Remove Essa TS T1/T2 autotransformers and convert Barrie TS supply circuits (E3B/E4B) from 115kV to 230kV. This investment is also known as Barrie Area Transmission Upgrade (BATU). (Planned in-service date is 2023)
  - **Orangeville TS –** Replace and upgrade existing 230/44kV 83MVA transformers (T3/T4) with new 125MVA units. Replace and upgrade existing nonstandard three winding 230/44/27.6 125MVA transformers (T1/T2) with new dual winding 230/27.6 83MVA units. (Planned in-service date is 2024)
  - **Wallace TS –** Replace existing 230/44kV 42MVA transformers (T3/T4) with new 230/44kV 42MVA units. Replacement of Oil circuit breakers will also be part of this investment. (Planned in-service date is 2025)
  - **Midhurst TS –** Replace existing 230/44kV 125MVA T4 transformer with a new like-for-like unit. (Planned in-service date is 2026)
  - **Orillia TS –** Replace existing 230/44kV 125MVA T2 transformer with a new like-for-like 230/44kV 125MVA unit. (Planned in-service date is 2025)
  - **Bracebridge TS –** Replace existing 230/44kV 83MVA transformer (T1) with new like-for-like 230/44kV 83MVA unit. (Planned in-service date is 2026)
  - **Waubaushene TS –** Replace and upgrade existing 230/44 83MVA transformers (T5/T6) with new 125MVA units. (Planned in-service date is 2027)
  - **Alliston TS –** Replace existing 230/44kV 83MVA transformers (T3/T4) with new like-for-like 230/44kV 83MVA units. (Planned in-service date is 2030)

It is expected that the next planning cycle for this region will be initiated in 2025 or earlier, beginning with the NA phase.

4.14 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. The second cycle Needs Assessment was completed in June 2020.

The NA determined that identified needs in the region can be addressed directly by Hydro One along with relevant LDCs, and therefore the SA and IRRP were not required. The second regional planning cycle was completed with publishing of the RIP report in December 2020. Updates to the needs and plans recommended in this region are provided below.

Projects completed include:

- Espanola TS: Replaced 115/44 kV 15MVA (T1) and 42MVA (T2) transformers with new 115/44 kV 42 MVA units (completed in 2016).
- Larchwood TS: Replaced 110/44 kV 20 MVA (T2) transformer with a new 115/44kV 42MVA unit (completed in 2015).
- Martindale TS: Replaced (T21, T22 & T23) autotransformers with 125MVA 230/115kV units, five (5) 230kV breakers and disconnect switches (completed in 2022).
- Manitoulin TS: A CT ratio setting on the low voltage bushing of the transformer breaker was modified to allow full transformer LTR capability (completed in 2021).
- Algoma TS: The EOL T5 and T6 autotransformers were replaced with standard 125 MVA units (completed in 2022).
- Due to the removal of the Coniston TS its load was planned to be transferred to a newly built Hanmer TS DESN, but due to customers' changing system needs, this plan was reviewed and it evolved into the removal of the station in concurrence with the conversion of the legacy 22kV loads to 27.6kV and their transfer onto one of the feeders originating from Martindale TS (completed in 2021).

Needs and Plans underway in Sudbury/Algoma Region:

- **Hanmer TS to Martindale TS decoupling**
  With either X25S or X26S out of service, the loss of the companion circuit may result in voltage declines at Martindale 230kV and 115kV buses below acceptable ORTAC[7]. The scope of this project aims to decouple one of the two circuits (X25S or X26S) into its own position at both Hanmer TS and Martindale TS. Hydro One initiated this project as per IESO's recommendation provided via a letter dated October 19, 2018. The expected in-service date is 2024.

- **Martindale TS EOL Replacement**
  Martindale TS includes a 230kV/44kV DESN station located in Sudbury and is comprised of two (2) – 125 MVA 230/44kV power transformers. These power transformers as well as select 44 kV equipment are approaching their EOL and the TWG recommends they are replaced with Hydro One standard equipment of similar size and capabilities. The replacement is expected by 2028.

- **Clarabelle TS EOL Replacement**
  The station features two 230/44kV 125 MVA step down transformers that supply both identified LDCs in the Sudbury/Algoma region. The power transformer at Clarabelle TS as well as select station equipment are approaching their EOL and the TWG recommends they are replaced. The replacement is expected by 2027.

- **Elliot Lake TS Transformer Replacement**
  The station consists of two (2) 115/44kV 42 MVA transformers (T1 and T3) alongside one 115kv/44kV 19 MVA transformer (T2). A station asset condition assessment has identified T1 and T2 for replacement within the mid-term horizon. Concurrently, recent supply need assessment at the station has deemed T2 no longer necessary to maintain supply reliability and adequacy at the station. As such, this project will see the like-for-like replacement of T1 transformer, the removal of T2 transformer and the reconfiguration of the station to a near standard Jones DESN design.

It is expected that the next planning cycle for this region will be Initiated in 2025 or earlier, beginning with the NA phase.

4.15 Northwest Ontario

The Northwest Ontario region encompasses a large geographic area, stretching from the town of Marathon to the western and northern borders of the province, with diverse characteristics.

The second cycle Needs Assessment was completed in July 2020. The IRRP was completed in January 2023, and the second cycle regional planning was concluded with completion of RIP report in August 2023. Updates to the needs and plans recommended in this region are provided below.

Projects completed include:

- Manitouwadge TS: The 115/44kV, 5/7 MVA T1 transformer was replaced with new 115/44kV 25/33/41.7 MVA unit (Completed in 2016).
- Dryden TS: Two 115/44kV, 11/15 MVA transformers were replaced with new 25/33/42 MVA units in addition to replacement of five 115kV breakers (Completed in 2018).
- Lakehead TS: Two 230/115kV autotransformers were replaced with new 230/115kV 150/200/250MVA units (Completed in 2017).
- East West Tie Reinforcement: A 450 km, double-circuit, 230kV transmission line from Wawa TS to Lakehead TS was built with a connection approximately mid-way at Marathon TS (Completed in 2022).
- Wataynikaneyap Power Project Phase 1: A 300 km, single circuit, 230kV transmission line from Dinorwic to Pickle Lake, Ontario was built with a 230/115kV autotransformer, related switching facilities and the necessary voltage control devices (Completed in 2022).
- E1C (Ear Falls TS x Crow River DS): The new 230kV Watay connection between Pickle Lake SS and Dinorwic Jct. to provide relief to the capacity constraint on E1C (completed in 2022).
- Red Lake Sub-System: New 230kV Watay connection between Pickle Lake SS and Dinorwic Jct. which provided relief to E4D &E2R (completed in 2022).
- Birch TS: One 115/25kV transformer was replaced with a new 115/25kV 25/33/42MVA unit in 2015 and HV Breaker, Disconnect Switch, and Insulator replacement (completed in 2020).

- Alexander SS: EOL HV Breakers and Line disconnect switches replaced (completed in 2022).
- Ear Falls TS: EOL 115/13.2 kV transformer was replaced with a new 115/13.2 kV 7.5/10/12.5MVA unit in addition to HV breakers replaced (completed in 2022).

Needs and Plans underway in North-west Ontario Region:

- **Pine Portage SS:** EOL HV Breaker, Disconnect Switch and Protection & Control facilities replacement to be completed in 2024.

Wataynikaneyap Power Project Phase 2

- This investment, led by Wataynikaneyap Power, will construct approximately 1438 km of overhead 115kV, 44kV and 25 kV transmission lines and twenty substations to connect 16 First Nations in two transmission subsystems by 2024 (10 north of Pickle Lake and 6 north of Red Lake). The Red Lake subsystem is designed to connect a seventh First Nation beyond 2024.

- **Margach DS – Station Capacity**
  Margach DS presently has two 115/ 26.5kV 7.5MVA transformers (T1/T2) with a winter LTR of 10.4MW. The historical demand at Margach DS has remained stable, consistently just below 10 MW. The station will slightly exceed its normal supply capacity in 2023. Given the gradual growth in station loading, the LDC will closely monitor the station's load and take necessary actions if required before 2025.

- **Crilly DS – Station Capacity**
  Crilly DS is expected to exceed its capacity in 2027 due to incremental growth in the community. Due to the radial supply nature of M1S, reliability concerns can only be partially addressed by upgrading station assets at Crilly DS. By conducting thorough analyses and closely managing the station's loading, the LDC aims to make informed decisions and select the most suitable alternative to meet the future capacity requirements of Crilly DS.

- **Whitedog DS – Station Capacity**
  Whitedog DS is expected to exceed its capacity in 2027 due to incremental growth in the community. While the Whitedog First Nation has expressed plans for future growth, they are currently in the preliminary stage, indicating that the load demand increase might not materialize in the immediate future. TWG recommended to maintain status quo to allow the LDC to closely monitor the actual load growth and assess its sustainability before committing to significant infrastructure changes.

- **White River DS – Station Capacity**
  Based on the load forecasts, White River DS will exceed contingency capacity in 2029. The TWG to reevaluate this need and confirm if the capacity needs at White River DS still holds in 2028. Should this be the case, the study group at that moment will decide the best course of action to fill this need.

- **Sam Lake DS – Station Capacity**

A Local planning study was conducted and was published in January 2023 with a TWG recommended solution to address the need. T1 and T2 transformers at Sam Lake DS are currently equipped with unmonitored fans, and it is not reliable to load the transformers at the maximum fan-cooled rating without a fan monitoring system. Therefore, installing fan monitoring on T1 and T2 will allow Hydro One Distribution and Sioux Lookout Hydro to address the capacity need in the timeframe required (based on the winter conservative load forecast) and maintain supply reliability to the Sam Lake area customers.

- **Kenora MTS – Station Capacity**
  This station will exceed its normal supply capacity in 2030. Considering the long-term outlook of the need, the LDC intends to move forward by retaining the services of a consultant to assist in understanding the pricing of each of the proposed alternatives. The LDC does not intend to engage in any material investments prior to 2028 to mitigate the challenge of Kenora MTS reaching its thermal capacity, instead continued study and monitoring of load growth and customer connections is anticipated to trigger investment. This need will be reviewed in the next Regional Planning cycle.

- **E4D and E2R – Line Capacity**
  The load forecasts indicates that the summer peak demand of the E4D circuit to reach 67 MW in 2032, and the summer peak demand of the E2R circuit to reach 61 MW in the same year. Considering the potential combined area load growth from mining and Wataynikaneyap Power customer connections, which could increase by 50-115 MW by 2028, a few mining and industrial customers are actively engaging with IESO and Hydro One Transmission to explore potential options to accommodate this load increase. The study is currently underway.

- **M2W – Line Capacity**
  There is a possible growing capacity need on the branch that leads towards Manitouwadge DS flagged by a customer connection application after the 2023 Northwest Ontario IRRP. The section from Pic JCT to Manitouwadge JCT is the most constrained. Recently, there has been significant interest from mining customers, with an anticipated growth of 30-80 MW by 2028. Since the anticipated increase in mining sector load has not yet materialized, assessments will be undertaken in the event of a request from customers for additional load.

- **Fort Frances MTS – Customer reliability**
  Despite meeting the ORTAC criteria, the current supply configuration of the Fort Frances MTS remains highly disruptive for customers. However, considering the proximity of Fort Frances MTS to Fort Frances TS, there is potential for cost-effective improvement solutions. It was recommended to install second breaker and switch at Fort Frances MTS on the 115kV side, connecting it to 115kV circuit F2B via a drop feed. This creates a second supply for Fort Frances MTS, while tapping at a different location. The project is planned for execution in the year 2026-2027.

- **E1C Operation and High Voltage Need**
  The IRRP, identified two main operational challenges i.e., limitations on supply capacity when E1C operates in a normally closed state and high voltage issues when it operates in a normally

open state. The TWG recommended to open E1C on the Ear Falls TS Line end with reactor installations at Pickle Lake SS. Once the project is initiated, the TWG will investigate and refine the automatic reactor switching scheme. The project is planned for execution in the year 2026-2027.

- **Fort William TS – Shunt Capacitor Bank Replacements**
  Fort William TS relies on temporary capacitors on trailers, namely SC1 and SC2, which have been in service for a considerable period. However, both capacitor banks have been assessed in poor conditions and as obsolete. TWG has recommended to provide new permanent shunt capacitors which are appropriately configured. The project is planned for execution in the year 2026-2027.

- **Greenstone – Marathon Area System Needs**
  In Northwest Ontario, there continues to be interest in additional loads and generation connections in the Greenstone-Marathon sub-region. Alternatives presented in the past IRRPs, and RIPs remain valid. Further assessment of those alternatives for reinforcing the area will be conducted to determine their cost and feasibility. These assessments will be undertaken in the event of a request from customers for additional load and upon reaching an agreement with them.

- **Supply to the Ring of Fire**
  The Ring of Fire is a remote area approximately 500 km north of Thunder Bay rich in critical minerals but without grid power supply. As per the 2023 Northwest Ontario IRRP, there are a few options to energize the Ring of Fire area. With renewed interest in developing the Ring of Fire from both government and mining companies, the IESO is updating its Supply to the Ring of Fire study to help inform government policy and potential customers seeking connection. Preliminary findings were included in the 2023 Northwest IRRP. The scope and timing of the IESO's ongoing study will evolve with government policy direction.

- **Asset Replacement for Major HV Transmission Equipment**
  Hydro One has identified the need for replacement of major HV transmission assets over the next ten years at a number of stations in this region as shown below. The TWG recommendations for asset replacement plans have taken "right sizing" into consideration.
  - **A4L:** Refurbishment of Beardmore Jct x Longlac TS section (planned in-service date is 2025)
  - **E1C:** Ear Falls TS x Slate Falls DS section and Etruscan Jct x Crow River DS section have been prescribed for line refurbishment (planned in-service date is 2025)
  - **Fort Frances TS:** The two (2) 230/115 kV step-down autotransformer and 115 kV breakers at the station are reaching EOL (planned in-service date is 2029-2032)
  - **Kenora TS:** Replace station equipment identified in deterioration due to aging infrastructure and technical obsolescence with minimal spare parts and manufacturer support. The scope of work involves replacing high voltage circuit breakers, protection equipment and replacing/upgrading AC/DC station service systems. (planned in-service date is 2030-2033)
  - **Lakehead TS:** The existing HV breakers, switches, and Protection & control facilities at the station are approaching EOL (planned in-service date is 2028-2031). Replacement of condenser C8 with a +60/-40 MVAR STATCOM (Planned is service date is 2027)
  - **Mackenxie TS:** The existing 230/115 kV autotransformer as well as HV breakers and line disconnect switches are near EOL (planned in-service date is 2025-2028)

- **Marathon TS:** Replacement of the existing 230kV and 115kV HV breakers and associated equipment based on asset condition assessment (planned in-service date is 2026-2029)
- **Moose Lake TS:** The existing two (2) 115/44kV step-down transformer and LV breakers are near EOL (planned in-service date is 2024)
- **Rabbit Lake SS:** Replacement of the 115kV switchyard and its associated equipment (Planned in service date is 2024-2027).
- **Whitedog Falls SS:** Replacement of three 115kV breakers, DC station services and associated equipment (Planned in service date is 2025-2028).
- **Wawa TS:** Replacement of two 230/115kV autotransformer, associated breakers and equipment and station services (Planned in service date is 2026-2029).

It is expected that the next planning cycle for this region will be initiated in 2025 or earlier, beginning with the NA phase.

4.16 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. The second cycle NA was completed in September 2021. The NA determined that the identified needs in the region are local in nature and can be addressed directly by Hydro One and affected LDCs, and therefore no further regional coordination is required.
The second regional planning cycle was completed with publishing of the RIP report in August 2022. Updates to the needs and plans recommended in this region are provided below.

Projects completed include:

- Chatham SS: 230 kV capacitor bank replaced (completed in 2020).
- Wanstead TS: Refurbished with 50/66/83MVA transformers and its supply was upgraded from a single 115kV connection to a double 230kV connection (completed in 2018).

Needs and Plans underway in Chatham/Lambton/Sarnia Region:

- St. Andrews TS T3, T4 & Switchyard Refurbishment is planned to be completed by 2025. The current scope includes both transformers and breaker replacement.
- Sarnia Scott TS T5 & Component Replacement, which includes autotransformer T5, breaker, and other components is planned to be completed by 2024.
- New Lambton by Chatham transmission line is currently under development with a projected in-service date in 2028.
- Lambton TS switchyard is currently undergoing major station refurbishment work with a projected in-service date in 2023.

- **Circuits L28C/L29C Transmission Circuit Capacity**

The L28C/L29C double-circuit transmission line will start to experience capacity issues and voltage violations in the medium term due to significant capacity needs in the neighboring Windsor-Essex region and new connections in Dresden Area. To address the potential need for additional capacity and improved voltage performance along this corridor, Hydro One has agreed with IESO's recommendation to construct the new 230kV double-circuit transmission line which is expected to be in-serviced in 2028. The selection of the preferred route for the new double-circuit line is anticipated in 2024.

- **Wallaceburg TS and Kent TS Area (Dresden Area) Transformation Capacity**
  There is potentially a strong need for capacity in the Dresden Area which is currently supplied by Wallaceburg TS and Kent TS. Hydro One to move forward with IESO's recommendation of constructing a new station (proposed to be named Dresden TS) on the Lambton by Chatham corridor. Due to the existing limitations on the L28C/L29C circuits the construction of the new Dresden TS would be aligned with the construction of the new Lambton by Chatham transmission line with the intention of being ready to connect new customers when the new double-circuit line is completed in 2028. The immediate capacity needs of new customers can be supplied by the limited capacities available at Kent TS (T1/T2 DESN) and Wallaceburg TS until the proposed Dresden TS is placed in-service.

- **St. Andrews TS Capacity**
  St. Andrews TS will reach its LTR in 2024 from which point it will continue to grow at an average rate of less than 0.5%. Hydro One is planning to replace the older transformer unit with a new one with higher LTR, adding 20 MVA to provide sufficient capacity for the long-term. The replacement of the transformer is expected to be completed in 2025.

- **Forest Jura HVDS**
  Forest Jura HVDS is expected to reach its LTR in 2030. To address the potential capacity need at Forest Jura HVDS, the TWG recommends that Hydro One Distribution monitor the loading and determine a plan to ensure the station can meet the capacity demand.

- **Circuit N5K Voltage Performance**
  Assuming large load growth at Wallaceburg TS in the absence of the proposed Dresden TS, there would be voltage violations on the 115kV N5K circuit. This violation is mitigated with the new Dresden TS in place and Wallaceburg loaded within its LTR. It is recommended to maintain loading at Wallaceburg within its capacity limit and wait for the completion of Lambton by Chatham line anticipated in 2027, which will determine if the supply voltage to Wallaceburg TS is increased to 230kV.

- **Circuits L28C/L29C Bulk System Performance**
  Accounting for needs in neighboring Windsor-Essex Region, there is a bulk system need to reinforce the 230kV corridor between Lambton and Chatham. The IESO undertook a study to assess the bulk system adequacy for the West of London area, under different system conditions. As a result, the need to reinforce the Lambton-by-Chatham corridor was identified. Hydro One will proceed with the recommendation of IESO to construct a new double-circuit transmission

line between Lambton and Chatham to address bulk system reinforcement needs. The project is expected to be completed in 2028.

- **Asset Replacement for Major HV Transmission Equipment**
  Hydro One has identified the need for replacement of major HV transmission assets over the next ten years at a number of stations in this region as shown below. The TWG recommendations for asset replacement plans have taken "right sizing" into consideration.
  - **Lambton TS:** Replacement of T7/T8 auto-transformers and associated switches, replacement of T5/T6 DESN transformers and associated switches & replacement 27.6kV switchyard and associated equipment (planned in-service date is 2024)
  - **Scott TS:** Replacement of T5 auto-transformer, replacement of 115kV switchyard and associated equipment (planned in-service date is 2024)
  - **St. Andrews TS:** Replacement of T3/T4 DESN transformers and associated switches & replacement of 27.6kV switchyard and associated equipment (planned in-service date is 2025)
  - **Kent TS**: Replacement of T2 DESN transformers and associated switch, complete 27.6kV switchyard and associated equipment (planned in-service date is 2027)
  - **N1S/N4S:** Refurbishment of circuit section between Scott TS and Vidal JCT (planned in-service date is 2027)
  - **N6C/N7C:** Refurbishment of circuit section between Scott TS and St. Andrews TS (planned in-service date is 2027)
  - **S2N:** Refurbishment of circuit section between Scott TS and Adelaide JCT (planned in-service date is 2025)
  - **N5K:** Refurbishment of circuit section between Scott TS and Kent TS* (planned in-service date is 2027)

It is expected that the next planning cycle for this region will be initiated in 2026 or earlier, beginning with the NA phase.

4.17 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 was also included in the Niagara Region.

The second cycle NA was completed in May 2021. The IRRP was completed in December 2022, and the second cycle regional planning was concluded with completion of RIP report in July 2023. Updates to the needs and plans recommended in this region are provided below:

Projects completed include:

- Decew Falls SS– Five (5) 115kV breakers were replaced with sulfur hexafluoride (SF6) equivalent breakers to improve supply reliability (completed in 2017).

- Q4N Line Section Upgrade – Line section of 115kV Q4N circuit between Beck SS #1 x Portal Junction section (egress out from the generation station) was upgraded to meet load supply needs (completed in 2019).
- A6C Line Section Refurbishment – Based on asset condition assessment 115kV A6C circuit line conductor between Crowland TS and Port Colborne TS was replaced (completed in 2020).
- Upgrade Sir Adam Beck SS #1 x Portal Junction section of 115kV circuit Q4N (completed in 2019).
- A6C Line Section Refurbishment – Based on asset condition assessment, 115kV A6C circuit line conductor between Crowland TS and Port Colborne TS was replaced (completed in 2020).
- Stanley TS – Based on asset condition assessment, existing 40/53/67 MVA, 115/13.8 kV transformer T2 was replaced with a 45/60/75 MVA unit and some 13.8kV switchyard components and protection and control equipment were also replaced (completed in 2022).
- Port Colborne TS – Based on asset condition assessment, existing 28/37/47 MVA, 115/27.6 kV transformers T61 and T62 were replaced with 50/66.7/83.3 MVA units and 27.6kV switchyard components and protection and control equipment were also replaced (completed in 2022).

Needs and Plans underway in Niagara Region:

- **Q28A 230kV – Beck#2 TS x Abitibi Junction–- Line capacity**
  The planning forecast based on new customer load indicates that the loading will exceed the circuit 980A rating by summer 2024 for a loss of the double circuit line Q26M/Q35M. TWG has recommended to uprate the conductor by tensioning the conductors to reduce the line sag and allow the line conductor to operate at a higher temperature. Expected completion date is 2024.

- **A6C and A7C 115kV – Allanburg TS x Crowland TS–- Line capacity and Load security**
  The load connected on this line is forecast to exceed the line capacity by summer 2029. The TWG has recommended to reduce loading on circuits A6C and A7C by rebuilding Crowland TS as a 230/27.6 kV station supplied from and supplying it from a new 230kV circuit line.

- **Allanburg TS – Transformation capacity**
  The loads on the Niagara Region 115kV system exceeds the 115 kV system supply capability under certain contingency conditions. Specifically, this occurs under a 230kV outage condition followed by a double 230kV circuit line outage (N-1-2 contingency). TWG recommended to transfer Crowland TS to 230kV supply by building a 18km double circuit 230kV transmission line from Q24HM/Q29HM to connect to a new 230/27.6kV transformer station at the Crowland TS site. The new TS will replace the existing station that requires replacement. The work is planned to be in service in 2027.

- **Beamsville TS, Vineland DS and Niagara West MTS – Station Capacity**
  Beamsville TS presently has operated at or slightly over the LTR over the past few years and the forecast shows that the combined capacity of the three stations would be exceeded by summer 2024. TWG has recommended to build a new 230/27.6 kV DESN station to supply the increased load demand forecast required in the local area. The work is planned to be in service in 2028.

- **Crowland TS Capacity**
  Crowland TS presently has a 10-Day LTR of 102MW which will exceed its normal supply capacity in the year 2024 based on the summer demand forecast. The Crowland TS project to

replace the two EOL transformers T5 and T6 was underway, and even with the new units installed, additional supply capacity will be required. TWG has recommended to replace existing Crowland TS with a new 230/27.6 kV DESN station with 75/125 MVA transformers to supply the increased load demand. A new 18km double circuit 230kV transmission line will be constructed to supply this new transformer station from the double circuit 230 kV line Q24HM/Q29HM. The work is planned to be in service in 2027.

- **Murray TS T11/T12– Station Capacity**
  This station capacity issue will be addressed by replacing the existing T11/T12 transformers with larger 60/100MVA transformers, with an approximate LTR of 130MW instead of the 45/60/75MVA units specified for the asset renewal project at Murray TS. The work is planned to be in service in 2027.

- **Carlton TS–- Station Capacity**
  Loading on Carlton TS is forecast to exceed its LTR by summer 2029. TWG has recommended to monitor the loading at Carlton TS and if the actual load is approaching the forecast, the respective LDC will re-evaluate and transfer the excess load over the LTR from Carlton TS to Bunting TS.

- **Asset Replacement for Major HV Transmission Equipment**
  Hydro One has identified the need for replacement of major HV transmission assets over the next ten years at a number of stations in this region as shown below. The TWG recommendations for asset replacement plans have taken "right sizing" into consideration.
  - **Thorold TS:** Replace T1 transformer with a new 45/60/75 MVA unit and the existing low voltage (LV) E/Q and B/Y metalclad switchgear (planned in-service date is 2024)
  - **Crowland TS:** Replace transformers T5 and T6 with 50/66.7/83.3 MVA units (planned in-service date is 2027)
  - **D1A/D3A:** Line refurbishment of 2.6km route length between Gibson JCT x Thorold TS (planned in-service date is 2024)
  - **Q2AH:** Line refurbishment of 11.2km between Rosedene JCT X St. Anns JCT (planned in-service date is 2025)
  - **Bunting TS:** Replace the existing 40/53/67 MVA T1/T2 transformers, with new 45/60/75 MVA units. (planned in service date is 2029)
  - **Carlton TS:** Replace existing H/K metalclad switchgear & B/Y switchyard with current Hydro One standard indoor air insulated (AIS) metalclad switchgear (planned in-service date is 2027)
  - **Glendale TS:** Replace the existing 45/60/75 MVA T1 & T2 transformer with new 45/60/75 MVA units and replace and reconfigure the LV switching facilities with current Hydro One standard air insulated (AIS) metalclad switchgear (planned in-service date is 2027).
  - **Vansickle TS:** Replacement of the 14.2kV BY metalclad (planned in-service date is 2032)
  - **Murray TS:** Replacement of existing 45/60/75MVA T11/ T12 and T13/T14 power transformers at Murray TS with new 60/80/100 MVA transformers. (planned in-service date is 2027 for T11/T12 and 2031 for T13/T14).
  - **Allanburg TS:** Replacement of existing 150/200/250 MVA T3 Autotransformer with a new unit (planned in-service date is 2032).

It is expected that the next planning cycle for this region will be initiated in 2026 or earlier, beginning with the NA phase.

4.18 North/East of 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.
The second cycle NA and SA reports were completed in May 2021 and August 2021 respectively. The IRRP was completed in April 2022, and the RIP report will be completed in Nov. 2023. Updates to the needs and plans recommended in this region are provided below:

Projects completed include:

- Kapuskasing Area Reinforcement – H9K Circuit Upgrade (Completed in 2020)
- Kirkland Lake TS (T12/T13) transformer replacement (Completed in 2017)
- Dymond TS (T3/T4) transformer replacement (Completed in 2016)
- Timmins TS (T63/T64) replace with a single 83MVA (Completed in 2016)

Needs and Plans underway in North/East of Sudbury Region:

- **Ramore TS – Station Capacity**
  Ramore TS is a single transformer 115/27.6kV 17MVA station. The summer and winter 10-Day LTR is 15MW, and load at this station is expected to exceed the LTR in 2033. It was decided in the RIP report to operate with the existing installed capacity, and Hydro One will monitor load growth to ensure supply needs are met and discuss in next RP cycle.

- **D3K–- Thermal Limits**
  D3K is a single circuit 115kV transmission line which provides a critical network path between Dymond TS and Kirkland Lake TS. For the loss of A8K and A9K, the companion circuit will exceed its Long-Term Emergency (LTE) rating. Flows on this line and its violations are heavily influenced by area resource assumptions, and demand forecast for customers in the Kirkland Lake area. In addition, a new Kirkland Lake RAS (Remedial Action Scheme) has been installed to initiate control actions such as load rejection for system contingencies. It was decided in RIP report to explore solutions to address this in future planning cycles given the long-term nature of this need.

- **Dymond TS – Voltage control**
  IESO operations team has reported voltage violations at Dymond TS during capacitor bank switching. Dymond TS has two 115kV shunt capacitor banks (SC11/SC12) each rated at 24mVar. It was decided in RIP report, to initiate an investment to de-rate/resize and remote monitoring the existing capacitor banks to a size that is suitable for system operations. The expected completion date is 2025.

- **Asset Replacement for Major HV Transmission Equipment**

Hydro One has identified the need for replacement of major HV transmission assets over the next ten years at a number of stations in this region shown below. The TWG recommendations for asset replacement plans have taken "right sizing" into consideration.

- **Porcupine TS**: Replace 1-360MVA 500kV/230kV autotransformer (T8), and 2-225MVA 500kV/115kV autotransformers (T3/T4) with units of similar size and voltage ratings (planned in-service date is 2026)
- **Kapuskasing TS:** Replace high and low voltage circuit breakers (planned in-service date is 2030)
- **Otto Holden TS**: Replace 2 – 60MVA 230 kV/115 kV autotransformers (T3/T4) with a new 125MVA 230kV/115kV unit, high voltage breakers (planned in-service date is 2027)
- **Timmins TS:** Replace 1-83MVA 115/27.6kV transformer (T2) with a unit of similar size and voltage rating (planned in-service date is 2028)
- **Crystal Falls TS:** Replace 2-42MVA 230/44kV transformers (T5/T6) with units of similar size and voltage ratings (planned in-service date is 2031)
- **Hanmer TS:** Replacement of 500/230kV T9 Autotransformer with a new standard 750MVA unit (planned in-service is 2031)
- **Trout Lake TS:** Replace 2 – 125MVA 230/44 kV transformers (T3/T4) with units of similar size and voltage ratings (planned in-service date is 2033)
- **K4:** Conductor replacement and refurbishment of Kirkland Lake TS X Matachewan JCT (planned in-service date is 2024)
- **A8K/A9K:** Ansonville TS x Kirkland Lake TS (planned in-service date is 2023)
- **T61S:** Conductor replacement and refurbishment of Timmins TS x Shiningtree JCT (planned in-service date is 2024)
- **K1/K2:** Conductor replacement and refurbishment of Kirkland Lake TS x American Barrick JCT (planned in-service date is 2024)
- **D2H/D3H:** Conductor replacement and refurbishment of Pinard TS x Hunta SS (planned in-service date is 2029)
- **A4H/A5H*:** Conductor replacement and refurbishment of Tunis JCT x Fournier JCT (planned in-service date is 2027)

* IESO to inform by end of 2024 if an upgrade is required

It is expected that the next planning cycle for this region will be initiated in 2026 or earlier, beginning with the NA phase.

4.19 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.

The second cycle of Needs Assessment and Scoping Assessments for this region were done in May 2021 and August 2021 respectively. The IRRP was completed in December 2022, and the second cycle regional planning was concluded with completion of RIP report in July 2023. Updates to the needs and plans recommended in this region are provided below.

Projects completed include:

- Chenaux TS: T3 & T4 transformers along with regulators TR3 and TR4, 115 kV oil circuit breakers 4X6 and 4X2Y, and protection and control equipment were replaced (completed in 2021).

Needs and Plans underway in Renfrew Region:

- **Pembroke TS Line/Station Capacity**
  The 2019 summer peak loading on Pembroke TS was 48 MW, which is above its 10-day summer LTR of 47 MW. Based on the load forecast, Pembroke TS will be loaded to 52 MW by 2029. Load relief is required at Pembroke TS in the near term. There are two feasible alternatives identified in the second cycle RIP, one is to build a new TS and second is to build a new HVDS. Hydro One Dx and ORPC will further discuss and explore these two options to determine the most effective and economical solution to address the capacity need at Pembroke TS.

- **Forest Lea DS – Station Capacity**
  Forest Lea DS is a 115/13.4 kV Step down station and is radially supplied by circuit D6 it has two 7.5/11 MVA (T1/T2) transformers with a summer LTR of 8.6 MW and winter LTR of 11.1 MW. The need of station capacity at Forest Lea DS is current, but the expected load growth is very low. The load at this station is only expected to grow to slightly over 1 MW in the long-term. TWG has recommended a load transfer of 2 MW load to Craig DS. The expected completion date for this load transfer is 2026.

- **Petawawa DS – Station Capacity**
  As per the IRRP Load Forecast the station reaches its summer LTR in 2030 and hence recommended to build a new HVDS transformer station at Petawawa with in-service date of 2027. However, the RIP phase determined that the load increased abnormally due to generator refurbishment work at the customer's facility in Petawawa DS. As a result, it was recommended in the RIP to defer this need as no additional capacity is required at this station for the short to medium term.

- **Des Joachims sub-system – Long term system capacity**
  The Des Joachims sub-system refers to transmission line D6 connected to the Des Joachims TS in the west of Renfrew region and ends at Petawawa DS and Forest Lea DS in the east. The LMC of Des Joachims sub-system is approximately 80MW and under high load growth and peak load conditions with one element out and a contingency to a generator at Des Joachims TS, voltage violations are identified at the stations connected to the end of D6 circuit. The need is identified in the mid to long-term, and in light of uncertainties of the load growth in the sub-system, TWG recommended to monitor the future high load growth scenario and if required can proceed with the capacitor upgrade.

- **Asset Replacement for Major HV Transmission Equipment**

Hydro One has identified the need for replacement of major HV transmission assets over the next ten years in this region as shown below. The TWG recommendations for asset replacement plans have taken "right sizing" into consideration.

- **D6 Circuit:** Circuit D6 is a 98.2 km, 115 kV, single circuit, wood pole transmission line that provides connection between Des Joachims TS and Pembroke TS. The 76.8 km line sections between Des Joachims TS and Petawawa/Craig DS contain multiple ACSR conductor segments that have been verified to have reached end-of-life. As the other assets along this line are of original vintage and therefore beyond expected service life, between Des Joachims TS and Petawawa/Craig DS. The goal of this refurbishment project is to completely renew all end-of-life assets along circuit D6. Currently, the work is in progress and the expected in-service for this project is end of 2025.

It is expected that the next planning cycle for this region will be initiated in 2026 or earlier, beginning with the NA phase.

4.20 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.

The second cycle Needs Assessment for this region was completed in September 2021. The NA determined that the identified needs in the region are local in nature and can be addressed directly by Hydro One and affected LDCs, and therefore further regional coordination is not required. The second cycle RIP was completed in March 2022. Updates to the needs and plans recommended in this region are provided below.

Projects completed include:

- Chesterville TS: Replaced 25/33/42 MVA, 115/44 kV step down transformers with new 25/33/42 MVA, 115/44 kV (completed in 2014).
- St. Lawrence phase shifting transformer PS33/P34 replaced (completed in July 2022-2023).

Needs and Plans underway in St. Lawrence Region:

- **L22H: Replacement of Conductor, Shield wire, Insulator and Tower Work**
  A total of 65 km of 230 kV circuit L22H between Easton JCT X Hinchinbrook North JCT requires refurbishment. The work includes the replacement of conductors, shield wire, insulators, and refurbishment of lattice steel structures. The TWG recommends that refurbishment of L22H between Easton JCT X Hinchinbrook North JCT does not require further regional coordination. The implementation and execution plan for this need will be coordinated by Hydro One and affected LDCs. The work is expected to be completed in 2026. No other needs have been identified and further assessment of the St. Lawrence region will be undertaken by the TWG in the next regional planning cycle.

It is expected that the next planning cycle for this region will be initiated in 2026 or earlier, beginning with the NA phase.

4.21 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.

5. CONCLUSION

The second regional planning cycle will be completed in November 2023 and the third cycle is currently underway. The third cycle of regional planning was initiated in 2022 and five (5) Needs Assessment (NA) reports have been completed. In the third cycle to date, regional planning for the Greater Ottawa Region was advanced due to emerging needs and the NA was completed in Dec. 2022.

Representatives from Hydro One transmission, the IESO, and LDCs actively participated on regional Technical Working Groups (TWG) during the various phases of the regional planning process. The TWGs were able to undertake the appropriate level of planning based on the needs and make efficient and effective decisions. For example, during the NA phase the TWG identifies needs, assesses options to address them, and finally recommends a preferred plan and/or further assessments as part of the next phases of the regional planning process, namely, SA, IRRP, and/or RIP. In addition, the concept of Local Planning is utilized for further assessment by a smaller TWG in cases where needs are local in nature and straightforward wires-only options are the appropriate solution. Accordingly, assessments for these needs do not require further regional coordination and are directly planned and coordinated for implementation by Hydro One Transmission and affected LDC(s) (or customers). Frequently, wires planning is also initiated in parallel with the IRRP phase when the TWG determines that a wires approach is the best alternative to address a need and allows for efficiencies in the process by starting the planning prior to triggering the RIP phase.

The sharing of information by TWG members and publishing of reports and other relevant information on 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 were intended as one of the hallmarks of the regional planning process as envisioned by the Board.

Since the beginning of the second cycle of the regional planning process, Hydro One, LDCs, and the IESO have been able meet mandatory timelines to complete each of the regional planning phases. To summarize, below are significant milestones that have been accomplished in the second cycle and third cycle to date:

- The second cycle of regional planning will be completed in Nov. 2023. The Regional Infrastructure Planning (RIP) reports for nineteen (19) regions where Hydro One is lead transmitter were published (Burlington to Nanticoke, Toronto, Windsor-Essex, GTA North, Greater Ottawa, East Lake Superior, GTA East, Sudbury/Algoma, Kitchener-Waterloo-Cambridge-Guelph, GTA West, Greater Bruce/Huron, London Area, Peterborough to Kingston, Chatham/Lambton/Sarnia, St. Lawrence, Southern Georgian Bay/Muskoka, Northwest Ontario, Niagara, and Renfrew).
- Actively participated in the Integrated Regional Resource Planning (IRRP) phase during the second regional planning cycle for fifteen (15) regions where IRRP was undertaken (Burlington to Nanticoke, Toronto Area, Windsor-Essex, GTA North, Greater Ottawa, Kitchener-Waterloo-Cambridge-Guelph, GTA West, Greater Bruce/Huron, East Lake Superior, Peterborough to Kingston, South Georgian Bay/Muskoka, Northwest Ontario, Niagara, North/East of Sudbury and Renfrew).
- The third cycle of regional planning was initiated in 2022 and five (5) NA reports have been completed to date (Burlington to Nanticoke, Greater Ottawa, Toronto, Windsor-Essex, and GTA North).

- Actively participated in the third cycle's Scoping Assessment (SA) phase for five (5) regions to date (Burlington to Nanticoke, Greater Ottawa, Toronto, Windsor-Essex, and GTA North)
- Hydro One has implemented the RPPAG's documents, "Load Forecast Guideline for Ontario: Guidance for the Development of Regional Planning Demand Forecasts" and Improving the Electricity Planning Process in Ontario: Enhanced Coordination between Municipalities and Entities in the Electricity Sector", as part of the regional planning process and reports. Further Hydro One has undertaken various awareness activities with municipalities related to the regional planning process and the Municipal Information Guideline and will continue to participate in future regional planning process educational sessions and communication.

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 wires infrastructure plan. Specifically, the RIP report documents all the identified needs and wires infrastructure plans in the region including a consolidated account of needs and wires plans developed during earlier phases, i.e., NA, LP and IRRP for the region.

6. REFERENCES

[1] Ontario Energy Board "Transmission System Code". Last Revised August 02, 2023 (Originally Issued on July 14, 2000).

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

[3] Regional Planning Process Advisory Group. "Load Forecast Guideline for Ontario". October 13, 2022.

[4] Regional Planning Process Advisory Group. "Municipal Information Document – Enhanced Coordination between Municipalities and Entities in the Electricity Sector". December 2, 2022.

[5] Ontario Energy Board. "Distribution System Code". Last Revised October 1, 2022 (Originally Issued on July 14, 2000).

[6] Ontario Energy Board. "Conservation and Demand Management Guidelines For Electricity Distributors". Last Revised December 20, 2021.

[7] 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

In March 2019, IESO received the following two Ministerial directives that include changes to reduce the cost of energy-efficiency program delivery in Ontario. The first directive of March 21, 2019 directed the IESO to centrally deliver energy-efficiency programs in the province by implementing a new Interim Framework to take effect from April 1, 2019 to December 31, 2020. The second, also received March 21, 2019 directed the IESO to discontinue and wind-down the 2015-2020 Conservation First Framework (CFF) and the Industrial Accelerator Programs.

By Ministerial Directives dated June 22, 2020 and June 10, 2021, the 2015-2020 CFF wind-down period was extended until June 30, 2021 and December 31, 2021 respectively to provide IESO the ability to assist entities delivering CDM programs impacted by COVID-19.

On September 30, 2020, the IESO received a Ministerial directive to implement a new 2021-2024 CDM Framework, which follows the conclusion of the 2019-2020 Interim Framework. The new 2021-2024 CDM Framework focuses on cost-effectively meeting the needs of Ontario's electricity system, including by focusing on the achievement of provincial peak demand reductions, as well as targeted approaches to address regional and/or local electricity system needs.

On April 4, 2022, the Minister provided a letter to the IESO in response to the 2022 Annual Acquisition Report (AAR). This letter requested the IESO to develop expedited options for new and expanded CDM programming to help address the system needs identified in the 2021 APO and further discussed in the 2022 AAR. Subsequently, the IESO proposed and received a directive to proceed with four new or expanded programs, to be launched in 2023.

The table below shows the estimated 2022 peak demand offsets resulting from energy efficiency projects reported to occur within the respective regions.

Table 3. Conservation Status Update

Region	Verified 2021 Peak Demand Savings (MW)
South Georgian Bay/Muskoka	**2.10**
Burlington to Nanticoke	**2.64**
Northwest Ontario	**0.550**
London Area	**2.98**
KWCG	**3.60**
GTA West	**8.13**
Greater Ottawa	**2.47**
GTA East	**1.58**
Toronto	**9.37**
Windsor-Essex	**3.05**
GTA North	**4.53**

East Lake Superior	**0.391**
Greater Bruce Huron	**1.30**
Peterborough to Kingston	1.48
Niagara	**1.26**
North/East of Sudbury	**0.724**
Renfrew	**0.410**

Note: Results have been mapped to planning region, and more granular results by sub-region and/or TS are not available.

A.2 Distribution Energy Resources

The table below shows the total installed and effective capacity of IESO Distributed Energy Resources ("DER") 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 August 31, 2023.

Table 4. DER Status Update

Sub region	Station	Installed Capacity (MW)	Effective Capacity (MW)	Base Year
Renfrew	No new contracted Distributed Generation			2021 Peak
Barrie/Innisfil	No new contracted Distributed Generation			2020 Peak
Brant	BRANT TS	0.000	0.000	2022 Peak
	BRANTFORD TS	0.000	0.000	
	POWERLINE MTS	0.000	0.000	
	TOTAL	**0.000**	**0.000**	
Bronte	Bronte TS	0.000	0.000	2022 Peak
	Cumberland TS	0.000	0.000	
	Burlington DESN	0.000	0.000	
	TOTAL	**0.000**	**0.000**	
Caledonia – Norfolk	Norfolk TS (T1/T2)	0.000	0.000	2022 Peak
	Bloomsburg DS (T1/T2)	0.000	0.000	
	Caledonia TS (T1/T2)	0.000	0.000	
	Jarvis TS (T3/T4)	0.000	0.000	
	Total	**0.000**	**0.000**	
Niagara Region	No new contracted Distributed Generation			2022 Peak
Greater Bruce Huron	No new contracted Distributed Generation			2022 Peak

Toronto	AGINCOURT TS	0.000	0.000	2022 Peak
	BASIN TS	0.000	0.000	
	BATHURST TS	0.000	0.000	
	BERMONDSEY TS	0.000	0.000	
	BRIDGMAN TS	0.000	0.000	
	CARLAW TS	0.000	0.000	
	CAVANAGH MTS	0.000	0.000	
	CECIL TS	0.000	0.000	
	CHARLES TS	0.000	0.000	
	COPELAND TS	0.000	0.000	
	DUFFERIN TS	0.000	0.000	
	DUPLEX TS	0.000	0.000	
	ELLESMERE TS	0.000	0.000	
	ESPLANADE TS	0.000	0.000	
	FAIRBANK TS	0.000	0.000	
	FAIRCHILD TS	0.000	0.000	
	FINCH TS	0.000	0.000	
	GERRARD TS	2.730	2.730	
	GLENGROVE TS	0.000	0.000	
	HORNER TS	0.000	0.000	
	JOHN TS	0.000	0.000	
	LEASIDE TS	0.000	0.000	
	LESLIE TS	0.000	0.000	
	MAIN TS	0.000	0.000	
	MALVERN TS	0.000	0.000	
	MANBY TS	0.000	0.000	
	REXDALE TS	0.000	0.000	
	RICHVIEW TS	0.000	0.000	
	RUNNYMEDE TS	0.000	0.000	
	SCARBORO TS	0.000	0.000	
	SHEPPARD TS	0.000	0.000	
	STRACHAN TS	0.000	0.000	
	TERAULY TS	0.000	0.000	
	WARDEN TS	0.000	0.000	
	WILTSHIRE TS	0.000	0.000	
	WOODBRIDGE TS	0.000	0.000	
	TOTAL	**2.730**	**2.730**	
Greenstone-Marathon	BEARDMORE DS # 2	0.000	0.000	2022 Peak
	JELLICO DS # 3	0.000	0.000	
	Longlac TS	0.020	0.000	
	MANITOUWADGE DS	0.000	0.000	
	MANITOUWADGE TS	8.010	8.000	
	MARATHON DS	0.000	0.000	
	PIC DS	0.000	0.000	

	SCHREIBER WINNIPEG DS	0.000	0.000	
	WHITE DOG DS	0.000	0.000	
	TOTAL	**8.030**	**8.000**	
Greater London	Buchanan TS	0.120	0.040	2015 Peak
	Clarke TS	2.840	1.510	
	Edgeware TS	0.460	0.170	
	Highbury TS	0.300	0.110	
	Ingersoll TS	2.320	1.160	
	Longwood TS	0.070	0.030	
	Nelson TS	17.900	14.860	
	Strathroy TS	0.020	0.010	
	Talbot TS	0.150	0.050	
	Tillsonburg TS	0.130	0.050	
	Wonderland TS	0.160	0.060	
	Woodstock TS	1.410	0.530	
	TOTAL	**25.870**	**18.580**	
Hamilton	Dundas TS #2 (T5/T6)	0.000	0.000	2022 Peak
	Dundas TS (T1/T2)	0.000	0.000	
	Newton TS	0.000	0.000	
	Elgin TS	0.000	0.000	
	Stirton TS	0.000	0.000	
	Gage TS (T3/T4)	0.000	0.000	
	Gage TS (T5/T6)	0.000	0.000	
	Gage TS (T8/T9)	0.000	0.000	
	Birmingham TS (T1/T2)	0.000	0.000	
	Birmingham TS (T3/T4)	0.000	0.000	
	Kenilworth TS (T1/T4)	0.000	0.000	
	Kenilworth TS (T2/T3)	0.000	0.000	
	Beach TS (T3/T4)	0.000	0.000	
	Beach TS (T5/T6)	0.000	0.000	
	Lake TS (T1/T2)	0.000	0.000	
	Lake TS (T3/T4)	0.000	0.000	
	Winona TS	0.000	0.000	
	Horning TS (T1/T2)	0.000	0.000	
	Horning TS (T3/T4)	0.000	0.000	
	Mohawk TS	0.000	0.000	
	Nebo TS (T1/T2)	0.000	0.000	
	Nebo TS (T3/T4)	0.000	0.000	
	TOTAL	**0.000**	**0.000**	
KWCG	Arlen MTS	0.000	0.000	2022 Peak
	Cambridge #1	0.000	0.000	
	Campbell TS	0.000	0.000	
	Cedar TS	0.000	0.000	
	Detweiler TS	0.000	0.000	

	Elmira TS	0.000	0.000	
	Fergus TS	0.000	0.000	
	Galt TS	0.000	0.000	
	Hanlon TS	0.000	0.000	
	Kitchener #1	0.000	0.000	
	Kitchener #3	0.000	0.000	
	Kitchener #4	0.000	0.000	
	Kitchener #5	0.000	0.000	
	Kitchener #6	0.000	0.000	
	Kitchener #7	0.000	0.000	
	Kitchener #8	0.000	0.000	
	Kitchener #9	0.230	0.090	
	Preston TS	0.000	0.000	
	Puslinch DS	0.000	0.000	
	Rush MTS	0.000	0.000	
	Scheifele TS	0.010	0.000	
	Waterloo #3	0.220	0.080	
	Wolverton DS	0.500	0.190	
	TOTAL	**0.960**	**0.360**	
North of Dryden	Cat Lake MTS	0.000	0.000	2022 Peak
	Crow River DS	0.000	0.000	
	Ear Falls TS	0.010	0.000	
	Perrault Falls	0.000	0.000	
	Red Lake TS	0.019	0.000	
	Slate Falls DS	0.000	0.000	
	Total	**0.029**	**0.000**	
West GTA	Bramalea TS	108.570	102.110	2022 Peak
	Cardiff TS	0.110	0.020	
	Churchill Meadows TS	2.840	0.620	
	Cooksville TS	0.050	0.010	
	Erindale TS	15.070	7.690	
	Glenorchy MTS #1	1.330	0.290	
	Goreway TS	13.250	2.900	
	Halton TS	4.190	0.920	
	Jim Yarrow MTS	6.120	1.340	
	Lorne Park TS	0.690	0.150	
	Meadowvale TS	2.360	0.520	
	Oakville TS #2	1.670	0.370	
	Palermo TS	2.160	2.130	
	Pleasant TS	18.740	4.100	
	Tomken TS	7.620	1.670	
	Tremaine TS	1.730	0.380	
	TOTAL	**181.170**	**117.170**	
Ottawa	ALBION TS	1.600	0.300	2022 Peak
	BILBERRY CREEK TS	1.700	0.500	

	BRIDLEWOOD MTS	0.800	0.200	
	CARLING TS	30.300	18.500	
	CENTREPOINT MTS	0.100	0.000	
	CUMBERLAND DS	0.300	0.100	
	CYRVILLE MTS	0.500	0.100	
	ELLWOOD MTS	0.400	0.100	
	FALLOWFIELD DS	6.100	2.000	
	GREELY DS	1.500	0.400	
	HAWTHORNE TS	12.900	3.400	
	HINCHEY TS	27.200	16.800	
	KANATA MTS	0.900	0.200	
	KING EDWARD TS	2.300	1.300	
	LIMEBANK MTS	0.600	0.200	
	LINCOLN HEIGHTS TS	0.500	0.100	
	LISGAR TS	30.500	18.900	
	MANORDALE MTS	0.300	0.100	
	MANOTICK DS	0.200	0.100	
	MARCHWOOD MTS	0.400	0.100	
	MARIONVILLE DS	0.300	0.100	
	MERIVALE MTS	0.200	0.000	
	MOULTON MTS	0.100	0.000	
	NAVAN DS	0.800	0.200	
	NEPEAN EPWORTH MTS	0.000	0.000	
	NEPEAN TS	2.400	0.600	
	ORLEANS TS	0.000	0.000	
	OVERBROOK TS	1.100	0.300	
	RICHMOND DS	0.300	0.100	
	RIVERDALE TS	0.300	0.100	
	RUSSELL DS	0.000	0.000	
	RUSSELL TS	2.200	0.600	
	SLATER TS	0.000	0.000	
	SOUTH GLOUCESTER DS	0.100	0.000	
	SOUTH MARCH TS	8.900	2.800	
	TERRY FOX MTS	0.300	0.100	
	UPLANDS MTS	0.200	0.000	
	WILHAVEN DS	2.200	0.600	
	WOODROFFE TS	0.500	0.100	
	Total	**138.800**	**69.000**	
GTA East Pickering-Ajax-Whitby	Thornton TS	0.260	0.088	2016 Peak
	Whitby TS	0.712	0.242	
	Wilson TS	19.480	1.690	
	TOTAL	**20.450**	**2.020**	
Parry Sound/Muskoka	Parry Sound TS	0.500	0.500	2022 Peak
	Total	**0.500**	**0.500**	
Thunder Bay	Birch TS	1.044	0.001	

	Fort William TS	21.961	3.818	2014 Peak
	Murillo DS	0.578	0.001	
	Nipigon DS	0.000	0.000	
	Port Arthur TS	0.324	0.000	
	Red Rock DS	1.000	0.001	
	TOTAL	**24.900**	**3.820**	
Windsor-Essex	Leamington TS	22.600	22.200	2022 Peak
	Total	**22.600**	**22.200**	
West of Thunder Bay	Agimak DS	0.000	0.000	2022 Peak
	Barwick DS	25.000	0.025	
	Burleigh DS	0.019	0.000	
	Clearwater Bay DS	0.000	0.000	
	Crilly DS (Sturgeon Falls CGS)	0.000	0.000	
	Dryden TS	10.060	0.010	
	Eton DS	1.310	1.250	
	Fort Frances MTS	0.100	0.000	
	Keewatin DS	0.000	0.000	
	Kenora DS	0.000	0.000	
	Kenora MTS	0.340	0.000	
	Margach DS	0.000	0.000	
	Minaki DS	0.000	0.000	
	Moose Lake TS	0.081	0.000	
	Nestor Falls DS	0.000	0.000	
	Sam Lake DS	0.000	0.000	
	Sapawe DS	0.000	0.000	
	Shabaqua DS	0.000	0.000	
	Sioux Narrow DS	0.000	0.000	
	Valora DS	0.000	0.000	
	Vermillion Bay DS	3.600	3.600	
	Whiteriver DS	0.000	0.000	
	Total	**40.510**	**5.110**	
North York/ GTA North	Holland TS	4.700	1.030	2022 Peak
	Armitage TS	13.490	3.780	
	Brown Hill TS	32.470	7.110	
	Buttonville TS	3.290	0.720	
	Markham 1 MTS	2.360	0.520	
	Markham 2 MTS	5.700	4.290	
	Markham 3 MTS	9.680	8.310	
	Markham 4 MTS	1.250	0.270	
	Richmond Hill MTS	3.700	0.810	
	Vaughan 1 MTS	8.300	1.820	
	Vaughan 2 MTS	3.800	0.830	
	Vaughan 3 MTS	3.240	0.870	
	Vaughan 4 MTS	-	-	

	TOTAL	**91.970**	**30.370**	
East Lake Superior	ECHO RIVER TS	0.000	0.000	2022 Peak
	BATCHAWANA TS	0.000	0.000	
	GOULAIS BAY TS	0.000	0.000	
	PATRICK ST TS	0.000	0.000	
	ST. MARY'S MTS	0.000	0.000	
	TARENTORUS MTS	0.000	0.000	
	CHAPLEAU DS	0.000	0.000	
	DA WATSON TS	0.000	0.000	
	ANDREWS TS	0.000	0.000	
	MACKAY TS	0.000	0.000	
	NORTHERN AVE. TS	0.000	0.000	
	TOTAL	**0.000**	**0.000**	
Peterborough to Kingston	Ardoch DS	0.000	0.000	2022 peak
	Battersea DS	0.000	0.000	
	Belleville TS	0.000	0.000	
	Dobbin DS	0.000	0.000	
	Dobbin TS	0.000	0.000	
	Frontenac TS	0.500	0.005	
	Gardiner TS (T1/T2)	0.000	0.000	
	Gardiner TS (T3/T4)	0.000	0.000	
	Harrowsmith DS	0.000	0.000	
	Havelock TS	11.000	4.070	
	Hinchinbrooke DS	0.250	0.003	
	Lodgeroom DS	0.000	0.000	
	Napanee TS	0.500	0.005	
	Northbrook DS	0.000	0.000	
	Otonabee TS	2.250	0.023	
	Picton TS	2.000	0.000	
	Port Hope TS	3.600	0.036	
	Sharbot DS	0.000	0.000	
	Sidney TS	0.000	0.000	
	CTS	0.000	0.000	
	Total	**20.100**	**4.141**	
North and East of Sudbury	Crystal Falls TS	14.000	9.400	2019 Peak
	Dymond TS	16.600	7.900	
	Hearst TS	10.000	1.400	
	Kapuskasing TS	30.000	23.100	
	Kirkland Lake TS	8.400	1.200	
	North Bay TS	0.080	0.010	
	Ramore TS	8.500	1.700	
	Trout Lake TS	14.300	14.000	
	TOTAL	**2.730**	**2.730**	

A.3 Other Initiatives

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

Sub region	Other Electricity System Initiatives
Ottawa	In 2019, in consultation with IESO staff, Hydro Ottawa submitted two proposals to Save On Energy's Local Program Fund (the "Fund"), a program application stream which allows LDCs to continue to design and deliver energy efficiency programs that serve the needs of their specific customers. Programs approved through the Fund must demonstrate cost-effectiveness based on the resulting net benefit when comparing the program investment (cost) against the provincial average avoided costs of providing electricity (benefit). So while these investments will benefit ratepayers province-wide, these offerings are also expected to help reduce the reliability risk due to heavily loaded stations in Kanata-Stittsville. The IESO approved both of Hydro Ottawa's proposed programs for delivery in 2020, which include the Kanata North Retrofit+ Program and the Kanata North Smart Thermostat Program. Both of these programs leverage the existing delivery infrastructure of current electricity and natural gas province-wide programs, which reduces administrative costs, streamlines customer experiences, and avoids market duplication and confusion. These local programs are an example of using system cost-effective energy efficiency to help address local system needs, and can inform similar approaches in the future. It is forecasted that these two initiatives could combine to offset more than 3 MW or 50% of the near-term peak load growth in the Kanata North area. In doing so, these programs could help address the 60 MW of capacity need in the Kanata-Stittsville region and support reliable supply until a long-term solution for the area is implemented. The IESO has directed increased efforts and investment to the Ottawa area these past several years, to encourage the adoption of energy efficiency process and technologies in businesses and communities. As part of the 2021-2024 CDM Framework, the IESO was directed to deliver a new competitive program to address regional and/or local system needs. The Local Initiative Program, is now one tool that is available to target the delivery of additional CDM savings at specific areas of the province with identified system needs. The IESO is currently working with Hydro Ottawa to develop a local initiative program procurement in order to begin targeting the incremental savings opportunities described above and previously highlighted in the 2020 Ottawa IRRP. As part of the as part of the 2021-2024 CDM Framework Mid-Term Review, the IESO is also reviewing new opportunities for CDM to be targeted to address regional or local needs and available tools to do so. As part of this effort, the IESO should continue to explore opportunities to target savings in the Ottawa and Peterborough to Quinte regions in order to help address these emerging bulk and regional system needs.

Windsor-Essex	The IESO continued planning for the Windsor-Essex region and surrounding area, with an IRRP addendum published in February 2022 and a West of London bulk study published in September 2021. The next planning cycle began in October 2022 with Hydro One leading the Needs Assessment, with the IRRP on-going. Development work for the recommended transmission reinforcements is ongoing. The IESO's grid Innovation Fund and OEB's Innovation Sandbox issued a joint call for proposals to support research and demonstration projects that test the capabilities of distributed energy resources. One successful proponent included a proposed local electricity market in the Leamington area, proposed by Essex Powerlines, NODES, Essex Energy Corp., and Utilismart Corp. More information can be found at the IESO's website here. The IESO continues offering an incentive for LED grow lights through the Retrofit program to help greenhouses in the Windsor-Essex and Chatham-Kent areas reduce their energy use.
Greenstone-Marathon	A Leave to Construct application has been filed for the Waasigan project, which will reinforce the bulk system west of Thunder Bay. The IESO is studying supply options to the Ring of Fire to inform government policy. This study will proceed in parallel with the ongoing IRRP.
East Lake Superior	The IESO published a Need for Northeast Bulk System Reinforcement study in October 2022 to address the potential impact of high industrial load growth in this region on the bulk transmission system. Based on the conclusions of this study in relation to the impending need in the IRRP, the IESO is planning to publish an Addendum to the IRRP.
West and North GTA	The IESO and Ministry of Energy are conducting the NWGTA Transmission Corridor Identification Study to identify and protect a corridor of land for future transmission infrastructure.

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 only one Planning Status Letter to the following LDC since November 2022:

- Synergy North – Planning Status Letter for Northwest Ontario – June 2023