Third Cycle

REGIONAL INFRASTRUCTURE PLAN REPORT

Greater Bruce/Huron

April 11, 2025

Regional Infrastructure Plan Report

Greater Bruce/Huron

April 11, 2025

Lead Transmitter:

Hydro One Networks Inc.

Prepared by:

Greater Bruce/Huron Technical working group

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Disclaimer

This Regional Infrastructure Plan ("RIP") Report for Greater Bruce/Huron ("GBH") region was prepared for the purpose of developing an electricity infrastructure plan to address electrical supply needs identified in previous planning phases and any additional needs identified based on new and/or updated information provided by the RIP Technical Working Group ("TWG").

The preferred solution(s) that have been recommended in this report may be reevaluated based on the findings of further analysis. The load forecast and results reported in this RIP report are based on the information provided and assumptions made by the participants of the RIP TWG at the time.

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Executive Summary

REGION	**Greater Bruce/Huron region** (the "Region")
LEAD	Hydro One Networks Inc. ("HONI")
START DATE: October 20, 2024	**END DATE:** April 11, 2025

1. INTRODUCTION

The Regional Infrastructure Plan ("RIP") is the final step of Regional Planning ("RP") process for the Greater Bruce/Huron ("GBH") region, preceded by, the publication of Needs Assessment ("NA") report in September 2024 by Hydro One. At the end of NA phase, the Technical Working Group ("TWG") decided that there is no need for Scoping Assessment ("SA") and/or Integrated Regional Resource Plan ("IRRP") phases to meet the identified needs in this cycle; therefore, the TWG proceeded directly to the RIP phase.

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 report includes a common discussion of all the options and recommended plans, and preferred wire infrastructure investments identified in earlier phases to address the near- and medium-term needs.

2. OBJECTIVES AND SCOPE

Objectives:

- Provide a comprehensive summary of needs and wires plans to address the needs for the GBH region.
- Identify new supply needs that may have emerged since Needs Assessment phase.
- Assess and develop wires plans to address these new needs.
- Identify investments in transmission and distribution facilities or both that should be developed and implemented on a coordinated basis to meet the electricity infrastructure needs within the region.

Scope:

- A consolidated report of the needs and relevant wires plans to address near and medium-term needs 2024-2033 identified in Needs Assessment.
- Identification of any new needs over the 2024-2033 period and wires plans to address these needs based on new and/or updated information.
- Consideration of long-term needs identified in the GBH as identified by the TWG.

3. REGIONAL PLANNING PROCESS & RIP METHODOLOGY

This section provides a detailed overview of the various steps followed during different phases of the Regional Planning Process and their outcomes and details of the Regional Infrastructure plan Methodology.

4. REGIONAL DESCRIPTION AND CONNECTION CONFIGURATION

This section provides a general overview of the Geographical boundaries, Circuit connections and Stations located in the GBH region though a regional planning area map and a Single Line diagram ("SLD").

The GBH region comprises of the counties of Bruce, Huron, and Perth, as well as portions of Grey, Wellington, Waterloo, Oxford, and Middlesex counties.

Electricity supply for the GBH region is provided through a network of 230 kV and 115 kV transmission lines supplied mainly by generation from the Bruce Nuclear Generating Station and local renewable generation facilities in the region. These circuits connect the region to the adjacent South Georgian Bay/Muskoka region and the adjacent Kitchener-Waterloo-Cambridge-Guelph ("KWCG") region.

5. TRANSMISSION FACILITIES COMPLETED IN THE LAST TEN YEARS AND/OR UNDERWAY

This section provides a summary and brief description of all the projects completed in the past ten (10) years or are currently underway.

I. The following Major projects were completed during the last ten years:

1. Goderich TS – Transformers T1, T2 and T3 Removal, Transformer T5 Installation and station Reconfiguration. This project was completed in 2017.
2. Centralia TS – Transformers T1 and T2 Replacement, Transformer T3 Removal and station Reconfiguration. This project was completed in 2018.
3. Palmerston TS – Transformers T1 and T2 Replacement, Transformer T3 Removal and station Reconfiguration. This project was completed in 2019.
4. Bruce A TS – 230kV ABCB ("Air-Blast Circuit Breaker") Station Refurbishment. This project was completed in 2022.
5. Stratford TS – Transformer T1 Replacement. This project was completed in 2022.
6. Hanover TS – Transformer T2 Replacement. This project was completed in 2022.
7. 115 kV L7S Circuit – Capacity Increase and Clearance Improvement between Seaforth TS and Kirkton JCT. This project was completed between 2022 to 2023.
8. Wingham TS – Transformers T1 and T2 Replacement. This project was completed in 2024.

II. Following Major projects are underway:

1. Seaforth TS – Transformers T1, T2, T5 and T6 Replacement. This project is planned to be completed by Q1 2027.

Note: The planned in-service years for the above projects are tentative and subject to change.

6. LOAD FORECAST AND STUDY ASSUMPTIONS

During the study period, the summer *net* and *gross* coincident load in the region is expected to grow at an average rate of approximately 1.4% and the winter *net* and *gross* coincident load in the region is expected to grow at an average rate of approximately 0.8%.

The following other assumptions are made in this report.

- The study period for the RIP assessments is 2024-2033.
- LDCs reconfirmed load forecasts up to 2033 in the area are the same as their load forecasts in NA phase.
- All planned facilities for which work has been initiated and are listed in section 5 are assumed to be in-service.
- Some of the stations in this region are summer peaking and others are winter peaking, so this assessment is based on summer and winter peak loads.
- Station capacity adequacy is assessed by comparing the non-coincident peak load with the station's normal planning supply capacity, assuming a 90% lagging power factor for stations having no low-voltage capacitor banks and 95% lagging power factor for stations having low-voltage capacitor banks, or on the basis of historical power factor data.
- Normal planning supply capacity for transformer stations in the region is determined by the summer 10-day Limited Time Rating ("LTR") based on 35°C ambient temperature.
- Bulk transmission line capacity adequacy is assessed by using coincident peak loads in the area. Capacity assessment for radial lines and stepdown transformer stations use non-coincident peak loads.
- Adequacy assessment is conducted as per Ontario Resource and Transmission Assessment Criteria ("ORTAC").

7. SYSTEM ADEQUACY AND REGIONAL NEEDS

This section reviews the adequacy of the existing transmission systems and transformer station facilities supplying the GBH region and lists the facilities requiring reinforcement over the near and midterm period. The adequacy assessment assumes that all the projects that are currently underway are completed.

I. Needs identified in the region

a. Asset Renewal for Major HV Transmission Equipment

- Owen Sound TS – T5 Replacement: Like-for-Like replacement of transformer T5 to maintain supply reliability to the LDCs in the area. This project is planned to be completed by 2032.

b. Station Capacity

- During the study period, no station capacity needs were identified.

c. Transmission Line Capacity

- During the study period, no transmission system capacity needs were identified.

d. System Reliability, Operation and Load restoration

- 115 kV L7S Circuit – System reliability and performance issues due to line galloping and line component failures.
- Operational issue with supply capacity at Hanover TS under outage conditions.
- Operational issue with supply capacity on D10H when load is transferred between Detweiler TS in KWCG region and Hanover TS in the GBH region.

8. REGIONAL PLANS

This section discusses the regional electric supply needs and presents all the wires alternatives considered to address these needs and identifies the best and preferred solutions for the GBH region. The needs include those previously identified in the NA for the GBH region as well as any new needs identified during the RIP phase.

9. CONCLUSION AND RECOMMENDATIONS

The major infrastructure investments recommended by the TWG in the Greater Bruce/Huron region are given below:

Station/Circuit Name	Recommended Plan	Lead	Planned ISD	Cost ($M)
Asset Renewal Needs				
Seaforth TS	T1, T2, T5 and T6 Transformer Replacement	Hydro One Transmission	Q1 2027	$76M
Owen Sound TS	T5 Transformer Replacement	Hydro One Transmission	Q2 2032	$25M
System Reliability, Operation and Load restoration Needs				
115 kV L7S Circuit Capacity Increase	Monitoring the performance of this circuit and proceeding with corrective plan as required in the next phase of the Regional Planning cycle	Hydro One Transmission	On Going	N/A
Operational issue with supply capacity at Hanover TS, under outage conditions	Monitor and review in next regional planning cycle	Hydro One Transmission	Next Regional Planning Cycle	N/A
Operational issue with supply capacity on D10H, during load transfer between Detweiler TS and Hanover TS	Monitor and review in next regional planning cycle	Hydro One Transmission	Next Regional Planning Cycle	N/A

Notes:

a) The planned in-service dates are tentative and subject to change.
b) Costs are based on budgetary planning estimates exclude the cost for distribution infrastructure (if required)

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1. INTRODUCTION

The Regional Infrastructure Plan ("RIP") is the final step of Regional Planning Process. Hydro One as the lead transmitter undertake the development of a RIP with input from the Technical Working Group ("TWG") for the region and publishes a RIP report. The third cycle of the Regional Planning process for the Greater Bruce/Huron ("GBH") region was initiated with the publication of Needs Assessment ("NA") and the report was published in September 2024 by Hydro One.

At the end of the NA phase, the TWG decided that there is no need for Scoping Assessment ("SA") and Integrated Regional Resource Plan ("IRRP") phases to meet the identified regional needs, and all identified system operational needs in this cycle will be revisited in the next Regional Planning Cycle. The TWG decided that there is no need for integrated regional planning to meet the identified needs in this cycle and that planning can proceed directly to the RIP.

The RIP report includes a common discussion of all the options and recommended plans, and preferred wire infrastructure investments identified in NA phase to address the near- and medium-term needs.

This report was prepared by the GBH region TWG, led by Hydro One Networks Inc. The report presents the results of the assessment based on information provided by Hydro One, the Local Distribution Companies ("LDC"), the Municipalities and the IESO. Participants of the TWG are listed below in Table 1.

Table 1: **GBH** region TWG Participants

Sr. no.	Name of TWG Participants
1	Hydro One Networks Inc. (Lead Transmitter)
2	Hydro One Networks Inc. (Distribution)
3	Independent Electricity System Operator (IESO)
4	ERTH Power Corporation
5	Festival Hydro
6	Westario Power Inc.
7	Entegrus Powerline Inc.
8	Wellington North Power

2. OBJECTIVES AND SCOPE OF REGIONAL INFRASTRUCTURE PLAN

This RIP report examines the needs in the GBH region. Its objectives are to:

- Provide a comprehensive summary of needs and wires plans to address the needs for the GBH region.
- Identify new supply needs that may have emerged since the Needs Assessment ("NA") phase.
- Assess and develop wires plans to address these new needs.
- Identify investments in transmission and/or distribution facilities that should be developed and implemented on a coordinated basis to meet the electricity infrastructure needs within the region.

The RIP reviewed factors such as the load forecast, asset renewal for major High Voltage ("HV") transmission equipment, transmission and distribution system capability along with any updates with respect to local plans, electricity Demand Side Management ("eDSM") forecasts, renewable and non-renewable generation development, and other electricity system and local drivers that may impact the need and alternatives under consideration. The scope of this RIP is as follows:

- A consolidated report of the needs and relevant wires plans to address near and medium-term needs 2024-2033 identified in previous planning phase, the NA phase in this cycle.
- Identification of any new needs over the 2024-2033 period and wires plans to address these needs based on new and/or updated information.
- Consideration of long-term needs identified in the GBH region Bulk system studies or as identified by the TWG.

3. REGIONAL PLANNING PROCESS & RIP METHODOLOGY

3.1 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 looks 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 which is led by the transmitter to identify, assess, and document which of the needs that,

a) can be addressed directly between the customer and transmitter along with a recommended plan, and;

b) 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 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 IESO initiates the 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., electricity Demand Side Management ("eDSM"), supply resources, etc., in order to make a decision on the most appropriate regional planning approach including Local Plan (LP), IRRP and/or RIP.

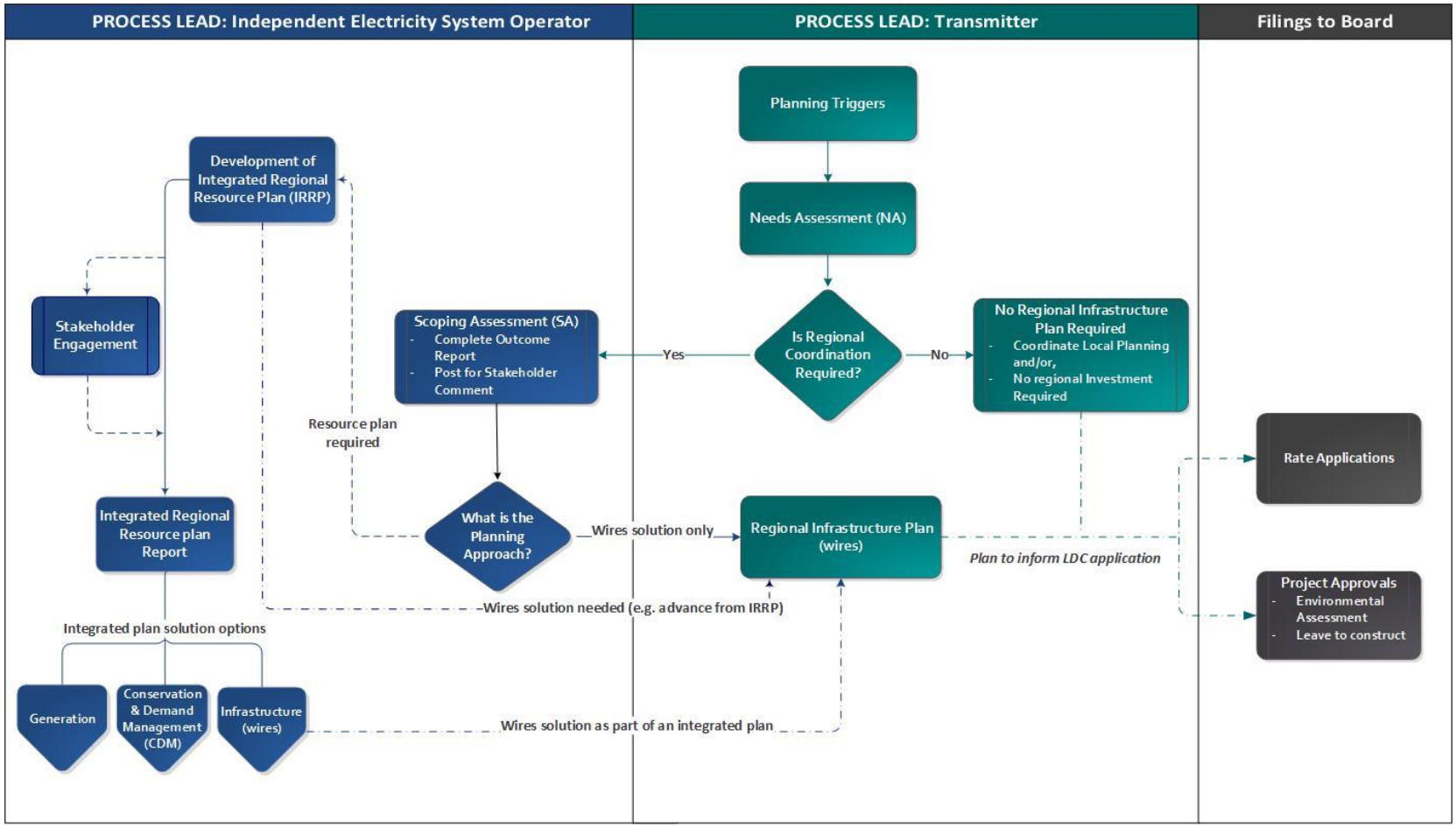
The purpose of the IRRP is to coordinate regional wires and non-wires options to create an integrated plan considering feasibility, cost, reliability, government policy directives, environmental performances, and community preferences to address the need. Worth noting, the LDCs' eDSM targets as well as contracted Supply Resource plans provided by IESO and LDCs are reviewed and considered at each step in the regional planning process.

If the IRRP phase identifies that infrastructure options may be most appropriate to meet a need, the RIP phase will conduct detailed planning to identify and assess the specific wires alternatives and recommend a preferred wires solution (planning can be initiated in parallel to IRRP). Similarly, resource options which the IRRP identifies as best suited to meet a need are then further planned in greater detail by the IESO. The IRRP phase also includes IESO led community and stakeholder engagement with municipalities in the region or sub-region.

The RIP phase is the final phase of the regional planning process and involves discussion of previously identified needs and plans; identification of any new needs that may have emerged since the start of the planning cycle; and development of a wires plan to address these needs. This phase is led and coordinated by the transmitter and the deliverable is a comprehensive and consolidated report of a wires plan for the region. Once completed, the RIP report is also referenced in transmitter's rate filing submissions and as part of LDC rate applications with a planning status letter provided by the transmitter to the LDC(s). Respecting the OEB timeline provision of the RIP, planning level stakeholder engagement is not undertaken during this phase. However, stakeholder engagement at a project specific level will be conducted as part of the project approval requirement.

The various phases of Regional Planning Process (NA, SA, IRRP, and RIP) and their respective phase trigger, lead, and outcome are shown below in Figure 1.

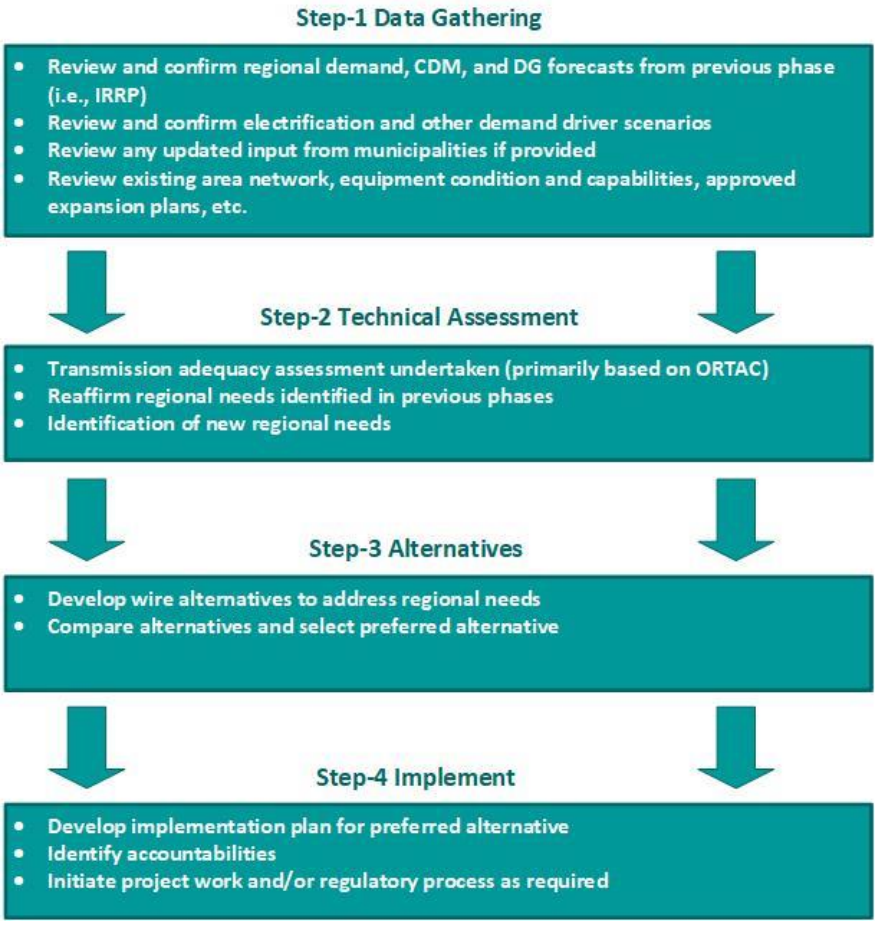
Figure 1: Regional Planning Process Flowchart



3.2 Regional Infrastructure Plan Methodology

Regional Infrastructure Plan phase is a four-step process as shown in Figure 2. These phases are described in the following sub-sections:

Figure 2: Regional Infrastructure Plan Methodology



3.2.1. Data Gathering:

The first step of the RIP process is the review of planning assessment data collected in the previous stages of the regional planning process. Hydro One collects this information and reviews it with the TWG to reconfirm or update the information as required. The data collected includes:

- Net peak demand forecast at the transformer station level. This includes the effect of any distributed generation or conservation and demand management programs. As it was confirmed by the TWG, there was no major change to the NA phase load forecast; therefore, the load forecast from the NA phase was used for this RIP.

- Review and confirm electrification and other growth scenarios which affect the projects recommended in previous stages.
- Existing area network and capabilities including any bulk system power flow assumptions.
- Other data and assumptions as applicable such as asset condition, load transfer capabilities, and previously committed transmission and distribution system plans.

3.2.2. Technical Assessment:

The second step is a technical assessment to review the adequacy of the regional system including any previously identified needs. Additional near and medium-term needs may be identified at this stage.

3.2.3. Alternative Development:

The third step is the development of wires options to address the needs and determine a preferred alternative based on an assessment of technical considerations, feasibility, environmental impact, and costs.

3.2.4. Implementation Plan:

The fourth and last step is the development of the implementation plan for the preferred alternative, identifying accountabilities and initiate project work or obtaining permissions from Regulatory Commission if any.

4. REGIONAL DESCRIPTION AND CONNECTION CONFIGURATION

The GBH region comprises of the counties of Bruce, Huron, and Perth, as well as portions of Grey, Wellington, Waterloo, Oxford, and Middlesex counties.

The geographical boundaries of the GBH region is shown in Figure 3 below.

Figure 3: Map of GBH Regional Planning Area

Electricity supply for the GBH region is provided through a network of 230 kV and 115 kV transmission lines supplied mainly by generation from the Bruce Nuclear Generating Station ("NGS") and local renewable generation facilities in the Region. Majority of the electrical supply in the region is transmitted through 230 kV circuits (B4V, B5V, B22D, B23D, B27S and B28S) radiating out from Bruce A TS.

These circuits connect the GBH region to the adjacent South Georgian Bay/Muskoka region and the adjacent Kitchener-Waterloo-Cambridge-Guelph ("KWCG") region. Within this region, electricity is delivered to the end users of LDCs and directly connected industrial customers by eleven (11) Hydro One step-down transformation stations, as well as seven (7) customer-owned transformer or distribution

stations supplied directly from the transmission system. Appendix B lists all step-down transformer and distribution stations in the Region. Appendix C lists all transmission circuits and Appendix D lists LDCs in the Region. The circuits and stations of the area are summarized in Table 2 below:

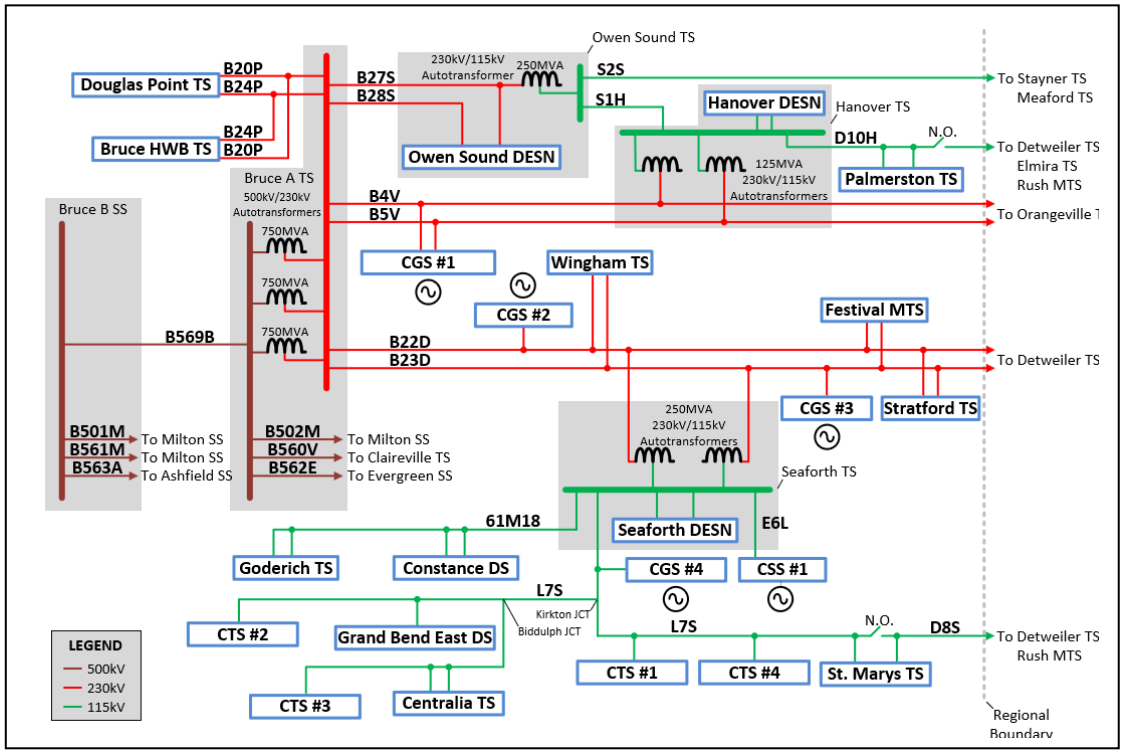
Table 2: Transmission Station and Circuits in the GBH region

115kV circuits	230kV circuits	Hydro One Transformer/Distribution Stations		Generation Stations
S2S	B4V	Bruce A TS *	Goderich TS	Bruce A NGS
S1H	B5V	Bruce B SS	Constance DS	Bruce B NGS
D10H-North	B22D	Bruce HWP B TS	St. Marys TS	CGS #1
61M18	B23D	Douglas Point TS	Centralia TS	CGS #2
L7S	B27S	Hanover TS *	Grand Bend East DS	CGS #3
E6L	B28S	Owen Sound TS *	Stratford TS	CGS #4
	B20P	Seaforth TS *	Customer CTS #1	
	B24P	Wingham TS	Customer CTS #2	
		Festival MTS #1	Customer CTS #3	
		Palmerston TS	Customer CTS #4	

*Stations with Autotransformers installed

The single line diagram of the Transmission Network of GBH region is shown in Figure 4 below.

Figure 4: GBH region Transmission Single Line Diagram



5. TRANSMISSION FACILITIES COMPLETED IN THE LAST TEN YEARS AND/OR ARE UNDERWAY

In this section a complete list of all the projects that have been completed in the past ten (10) years or are currently underway is provided and are briefly discussed in the sub-sections. As a part of this or previous Regional Planning Cycle(s), several "Major HV Transmission Projects" were recommended in the GBH region to improve the supply capability and reliability.

Hydro One, being the only Transmission Asset Owner ("TAO") in the region, has undertaken the execution of the projects recommended in the past ten years. A summary and brief description of all the projects completed or are currently underway is given below:

I. The following Major projects were completed during the last ten years:

1. Goderich TS – T1, T2, T3 Removal, T5 Installation and station Reconfiguration: Removal of 15/20/25MVA 115-27kV T1 transformer, removal of 11/15MVA 115-27kV T2 and T3 transformers, and installation of a new 50/67/83MVA 115-27kV T5 transformer to address thermal capacity issues at this station. Under this project, the station was reconfigured following DESN arrangement standards. This project was completed in 2017.

2. Centralia TS – T1 and T2 Replacement, T3 Removal and station Reconfiguration: Replacement of 11/15/19MVA 115-28kV T1 and T2 transformers with new 25/33.3/41.7MVA 115-28kV units, removal of 11/15/19MVA 115-28kV T3 transformer and reconfiguration of the station as per DESN arrangement standards. This project was completed in 2018.

3. Palmerston TS – T1 and T2 Replacement, T3 Removal and station Reconfiguration: Replacement of 42MVA 115-44kV T1 and T2 transformers with new 50/66.7/83.3MVA units, removal of 42MVA 115-44kV T3 transformer, and reconfiguration of the non-standard three (3) transformer arrangement station to two (2) transformer DESN station arrangement as per the standard. This project was completed in 2019.

4. Bruce A TS – 230kV ABCB Station Refurbishment: Replacement of sixteen (16) 230kV Air-Blast Circuit Breakers ("ABCB") with SF6 type to maintain station supply reliability to the customers in the area. This project was completed in 2022.

5. Stratford TS – T1 and Component Replacement: Replacement of 50/67/83MVA 230-27.6kV T1 transformer and associated equipment to maintain station supply reliability to Festival Hydro Inc., Hydro One Distribution as well as other embedded LDCs in the area. The project was completed in 2022.

6. Hanover TS – T2 and Component Replacement: Replacement of the 115-44kV transformer T2 with a new 50/66.7/83.3MVA 110-44kV unit to maintain station supply reliability to Hydro One Distribution and embedded LDCs in the area. The project was completed in 2022.

7. 115 kV L7S Circuit – Capacity increase and clearance Improvement: Between year 2022 to 2023, sub-standard clearances of the limiting section of L7S were addressed to increase their sag temperature from 83°C to 125°C and improve the capacity of this circuit. Furthermore, Hydro One undertook a complete condition assessment of L7S and identified a variety of deficiencies that have been addressed.

8. Wingham TS – T1 and T2 Replacement: Replacement of 50/83MVA 230-44kV T1 and T2 transformers with new 50/66.7/83MVA 230-44kV units to maintain station reliability to the customers in the area. This project was completed in 2024.

II. Following Major projects are underway:

1. Seaforth TS – T1, T2, T5 and T6 Replacement: Replacement of 25/33.3/41.7MVA 115-28kV T1 and T2 step-down transformers with 25/33.3/41.7MVA 110-28kV units and replacement of 150/200/250MVA 230-115kV T5 and T6 autotransformers with 150/200/250MVA 239-121-13.9kV units. This project will maintain station reliability and ensure continued supply reliability to Hydro One Distribution and embedded LDCs in the area. The project is planned to be completed by Q1 2027.

Note: The planned in-service years for the above projects are tentative and subject to change.

6. LOAD FORECAST AND STUDY ASSUMPTIONS

6.1. Load Forecast

After verification from the TWG participants, as no material changes were identified in the GBH region, NA Load Forecasts were used in the development of this Report. TWG participants, including representatives from LDCs, IESO and Hydro One provided information and input for the load forecast. The municipalities were contacted as part of the stakeholder engagement process to get their insight into the future load growth and was considered during the load forecast development.

As per the load forecasts for the study period from 2024 to 2033, the summer net and gross coincident load in the region is expected to grow at an average rate of approximately 1.4% annually and the winter net and gross coincident load in the region is expected to grow at an average rate of approximately 0.8% annually.

Figures 5 & 6 shows the GBH region summer and winter weather net and gross coincident load forecast from 2024 to 2033. The load forecast from the GBH region was adopted as agreed to by the TWG.

Based on historical load and the non-coincident load forecasts, the Greater Bruce/Huron region contains some stations that are summer peaking and others that are winter peaking. Equipment ratings are normally lower in the summer than in winter due to ambient temperature. Based on these factors, assessment for this region was conducted for both summer and winter peak load.

Non-coincident and coincident forecast for the individual stations in the region is available in Appendix A and is used to determine any need for station capacity relief in the region.

Figure 5: GBH Region Summer Coincident Net and Gross Load Forecast

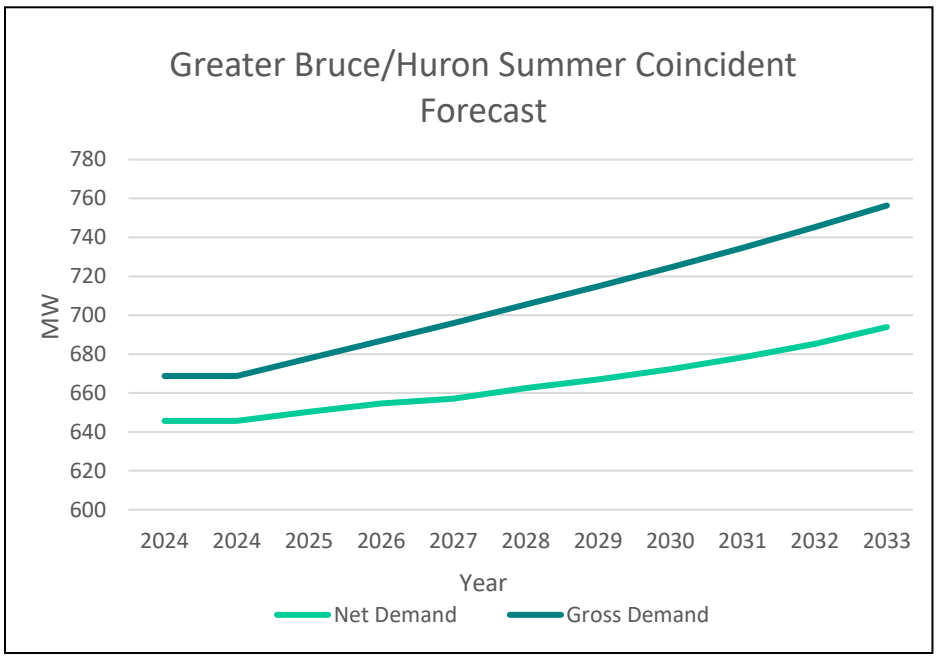
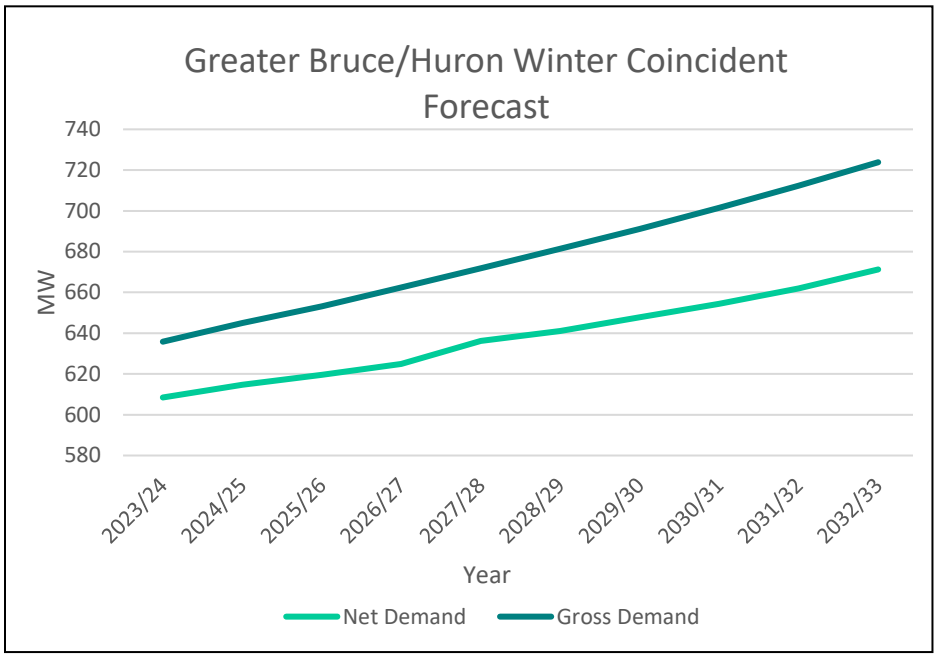


Figure 6: GBH Region Winter Coincident Net and Gross Load Forecast



6.2. Other Study Assumptions

The following other assumptions are made in this report:

- The study period for the RIP assessments is 2024-2033.
- LDCs reconfirmed load forecasts up to 2033 in the area are the same as the NA phase.
- All planned facilities for which work has been initiated and are listed in section 5 are assumed to be in-service.
- Some of the stations in this region are summer peaking and others are winter peaking, so this assessment is based on summer and winter peak loads.
- Station capacity adequacy is assessed by comparing the non-coincident peak load with the station's normal planning supply capacity, assuming a 90% lagging power factor for stations having no low-voltage capacitor banks and 95% lagging power factor for stations having low-voltage capacitor banks, or on the basis of historical power factor data.
- Normal planning supply capacity for transformer stations in the region is determined by the summer 10-day Limited Time Rating ("LTR") based on 35°C ambient temperature.
- Bulk transmission line capacity adequacy is assessed by using coincident peak loads in the area. Capacity assessment for radial lines and stepdown transformer stations use non-coincident peak loads.
- Adequacy assessment is conducted as per ORTAC.

7. SYSTEM ADEQUACY AND REGIONAL NEEDS

This section reviews the adequacy of the existing transmission systems and transformer station facilities supplying the GBH region and lists the facilities requiring reinforcement over the near and midterm period. The adequacy assessment assumes that all the projects that are currently underway, listed in section 5 are completed.

In the current regional planning cycle, the following regional assessments were completed, and their findings were used as inputs to this RIP report:

- GBH region Third cycle Needs Assessment report, Completed in September 2024 by Hydro One

The TWG identified several regional needs based on the forecasted load demand over the near to mid-term period in the reports mentioned above. The results of the Adequacy Assessment to define the needs are discussed in sub-sections 7.1 to 7.4 and a detailed description and status of plans to meet these needs are given in section 8 of this report.

7.1. Asset Renewal Needs for Major HV Transmission Equipment

In addition to the asset renewal needs identified in previous regional planning cycle, Hydro One and TWG have also identified new asset renewal needs for major high voltage transmission equipment that are expected to be replaced over the next ten (10) years in the GBH region.
The complete list of major HV transmission equipment requiring replacement in the GBH region is provided in table 3 in this sub-section. Hydro One is the only Transmission Asset Owner (“TAO”) in the GBH region.

Asset Replacement needs are determined by asset condition assessment. Asset condition assessment is based on a range of considerations such as:

- Equipment deterioration due to aging infrastructure or other factors,
- Technical obsolescence due to outdated design,
- Lack of spare parts availability or manufacturer support, and/or
- Potential health and safety hazards, etc.

The major HV equipment information shared and discussed as part of this process is listed below:

- 230/115kV autotransformers
- 230 and 115kV load serving step down transformers
- 230 and 115kV breakers where:
    - replacement of six breakers or more than 50% of station breakers, the lesser of the two
- 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

- 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

Table 3 below contains the new asset replacement needs identified during the RIP study period:

Table 3: Major HV Transmission Asset assessed for Replacement in the region

Station/Circuit	Need Description	Planned ISD
Owen Sound TS	T5 Transformer Replacement	Q2 2032

Note: The planned in-service year for the above projects is tentative and subject to change.

7.2. Station Capacity Needs

Over the study period 2024-2033 RIP reviewed the capacity of all the 230kV and 115kV transforming stations within the GBH region. The need timeframe defines the time when the peak load forecast exceeds the most limiting seasonal (summer and winter) Limited Time ratings.

The NA study previously found no station capacity needs in the GBH region. This RIP, aligned with the latest load forecast, confirms that all stations remain within their LTR limits throughout the study period, with no capacity need identified at this time.

7.3. Transmission Line Capacity Needs

Over the study period 2024-2033 RIP reviewed the capacity of all the 230kV and 115kV transmission lines within the GBH region. The need timeframe defines the time when the peak load forecast exceeds the most limiting seasonal (summer and winter) Limited Time ratings.

The NA study previously found no transmission line capacity needs in the GBH region. This RIP, aligned with the latest load forecast and assessed contingencies, confirms that all Tx lines remain within their LTR limits throughout the study period, with no capacity need identified at this time.

7.4. System Reliability, Operation and Load Restoration Needs

Load security and load restoration needs were reviewed as part of the current study. The ORTAC Section 7 requires that no more than 600 MW of load be lost as a result of a double circuit contingency. Further, loads are to be restored in the restoration times[1] specified as follows:

- All loads must be restored within 8 hours.
- Load interrupted in excess of 150 MW must be restored within 4 hours.
- Load interrupted in excess of 250 MW must be restored within 30 minutes.

Following the assessment done in GBH region, below system reliability need has been identified:

- 115kV L7S circuit:
  There have been some reports regarding system operation and performance of this circuit. Majority of issues reported were due to line galloping and line component failures.

  To increase the line capacity on this circuit, Hydro One addressed sub-standard clearances on sections on L7S between Seaforth TS and Kirkton JCT in 2022-2023. During the same time, Hydro One replaced deficient line components on various sections of this circuit to improve the delivery point performance. Hydro One will continue monitoring the performance of the remaining sections of this circuit and will proceed with corrective plans as required.

During both NA and RIP phases, TWG identified the following system operational issues in this region:

- Operational difficulties regarding transferring load between Detweiler TS in Kitchener-Waterloo-Cambridge-Guelph Region and Hanover TS in GBH. This is a concern in the operational timeframe when there are autotransformers out of service Detweiler TS and Hanover TS, due to increasing load on the 115kV circuit D10H.

- System operational issues during post-contingency load supply at Hanover TS. This is seen when there is one autotransformer out of service, and operators need to prepare for the loss of the remaining transformers.

8. REGIONAL PLANS

This section discusses the regional electric supply needs and presents all the wires alternatives considered to address these needs and identifies the best and preferred wires solutions for the GBH region. These needs include those previously identified in the NA for the GBH region as well as any new needs identified during

[1] These approximate restoration times are intended for locations that are near staffed centers. In more remote locations, restoration times should be commensurate with travel times and accessibility.

the RIP phase. All estimated costs included in the alternative analysis are considered as planning budgetary estimates and are used for comparative purposes only and may vary.

The needs in the region are summarized below in Table 4 below:

Table 4: Near/Mid-term Needs Identified in the region

Station/Circuit Name	Description of Need	Planned ISD	COST ($M)
Asset Renewal Needs			
Seaforth TS	T1, T2, T5, T6 Transformer Replacement	Q1 2027	$76M
Owen Sound TS	T5 Transformer Replacement	Q2 2032	$25M
System Reliability, Operation and Load restoration Needs			
115 kV L7S Circuit Capacity Increase	Monitoring the performance of this circuit and proceeding with corrective plan as required in the next phase of the Regional Planning cycle	On Going	N/A
Operational issue with supply capacity at Hanover TS, under outage conditions	Monitor and review in next regional planning cycle	Next Regional Planning Cycle	N/A
Operational issue with supply capacity on D10H, during load transfer between Detweiler TS and Hanover TS	Monitor and review in next regional planning cycle	Next Regional Planning Cycle	N/A

Note: The planned in-service year for the above projects is tentative and subject to change.

8.1 Asset Renewal Needs for Major HV Transmission Equipment

The asset renewal assessment considers the following options for “right sizing” the equipment:

- Maintaining the status quo;
- Replacing equipment with similar equipment with *lower* ratings and built to current standards;
- Replacing equipment with similar equipment with *lower* ratings and built to current standards by transferring some load to other existing facilities;
- Eliminating equipment by transferring all the load to other existing facilities;
- Replacing equipment with similar equipment and built to current standards (i.e., “like-for-like” replacement);
- Replacing equipment with higher ratings and built to current standards.

From Hydro One's perspective as a facility owner and operator of its transmission equipment, do nothing is generally not an option for major HV equipment due to safety and reliability risk of equipment failure. This also results in increased maintenance costs and longer duration of customer outages.

8.1.1. Seaforth TS – T1, T2, T5 and T6 Transformers Replacement

Seaforth TS is a major station and consists of two (2) 150/200/250MVA 115-27.6kV autotransformers supplied by 230kV circuits B22D and B23D (Bruce x Detweiler). The 115kV yard from Seaforth TS supplies nearly 200km of single circuit supply along the circuits L7S,61M18 and E6L. Seaforth TS also consists of two (2) 25/33/42MVA 115-27.6kV step-down transformers and supplies Hydro One Distribution and embedded LDCs via four 27.6kV feeders.

Following the asset condition assessment, the current scope of this project is to replace 230-115kV autotransformers T5 and T6, and step-down transformers T1 and T2 with like-for-like units which will be sufficient units based on the current load forecast.

Operations has identified the need for refined voltage control on the 115kV system. Therefore, the new autotransformers T5 and T6 at Seaforth TS will be equipped with Under Load Tap Changers ("ULTC") to meet this need. The planned in-service date for the project is Q1 2027.

8.1.2. Owen Sound TS – T5 Transformer Replacement

Owen Sound TS is supplied by two (2) 230kV circuits B27S and B28S and consists of two (2) 75/100/125MVA 230-44kV transformers T3 and T4 feeding its 44kV Dual Element Spot Network ("DESN"). This station also consists of a 150/200/250MVA 230-115kV autotransformer T5 which feeds 115kV circuits S2S and S1H.

Based on asset condition assessment, autotransformer T5 is expected to reach its end of life during the study period. It is planned to replace T5 with a like-for-like unit. The planned in-service date for the project is Q2 2032.

8.2 Station Capacity Needs

A Station Capacity assessment was performed over the study period 2024-2033 for the 230kV and 115kV transforming stations in the GBH region using the summer and winter peak load forecasts that were provided by the study team. Based on the results, all stations are within their LTR limits and there is no need for station capacity upgrades at this time.

8.3 Transmission Lines Capacity Needs

All line and equipment loads shall be within their continuous ratings with all elements in service and within their long-term emergency ratings with any one element out of service. Immediately following contingencies, lines may be loaded up to their short-term emergency ratings where control actions such as re-dispatch, switching, etc. are available to reduce the loading to the long-term emergency ratings.

A Transmission Lines Capacity Assessment was performed over the study period 2024-2033 for the 230kV and 115kV Transmission line circuits in the GBH region by assessing thermal limits of the circuit and the voltage range as per ORTAC to cater for this need. Based on the results, no new transmission system capacity needs were identified.

8.4 System Reliability, Operation and Restoration Needs

The transmission system must be planned to satisfy demand levels up to the extreme weather, median-economic forecast for an extended period with any one transmission element out of service. A study has been performed, considering the net coincident load forecast and the loss of one element over the study period 2024-2033 to cater to this need**.**

Following the assessment done, below need have been identified for this Region:

- 115kV L7S circuit:
  There have been some reports regarding system reliability and the performance of this circuit. Majority of issues reported were due to line galloping and line component failures.

  To address the line capacity on this circuit, Hydro One increased sub-standard clearances on sections on L7S between Seaforth TS and Kirkton JCT in 2022-2023. During the same time, Hydro One replaced deficient line components on various sections of this circuit to improve the delivery point performance. Hydro One will continue monitoring the performance of the remaining sections of this circuit and will proceed with corrective plans as required.

The TWG has identified below system operational issues related to current load supply concerns under certain operational conditions:

- Operational issue with supply capacity at Hanover TS under outage conditions:
  There have been reports of operational difficulties transferring load between Detweiler TS in KWCG region and Hanover TS in GBH region. This is a concern in the operational timeframe when there are autotransformers out of service at Detweiler TS and Hanover TS, due to increasing load on the 115kV circuit D10H.
- Operational issue with supply capacity on D10H when load is transferred between Detweiler TS in KWCG region and Hanover TS in the GBH region:
  Thia issue is regarding post-contingency load supply concerns at Hanover TS when there is one autotransformer out of service, and operators need to prepare for the loss of the remaining transformer.

The TWG recognizes that the operational conditions experienced in real-time may not always align with the planning timeframe considerations applied in this RIP but are indicative of potential concerns as load continues to grow. Thus, TWG agrees that no further action is required at this time. However, the TWG will monitor these concerns and investigate this need further in the next cycle of regional planning.

9. CONCLUSION AND RECOMMENDATION

This section concludes the Regional Infrastructure Plan ("RIP") report for GBH region. The Major Infrastructure investments recommended by the TWG in the near and mid-term planning horizon 2024-2033 are provided in Table 5 below, along with their planned in-service dates ("ISD") and budgetary estimates for planning purposes.

Table 5: Recommended Plans over the next 10 Years/Long Term

Station/Circuit Name	Recommended Plan	Lead	Planned ISD	Cost ($M)
Asset Renewal Needs				
Seaforth TS	T1, T2, T5 and T6 Transformer Replacement	Hydro One Transmission	Q1 2027	$76M
Owen Sound TS	T5 Transformer Replacement	Hydro One Transmission	Q2 2032	$27M
System Reliability, Operation and Load restoration Needs				
115 kV L7S Circuit Capacity Increase	Monitoring the performance of this circuit and proceeding with corrective plan as required in the next phase of the Regional Planning cycle	Hydro One Transmission	On Going	N/A
Operational issue with supply capacity at Hanover TS, under outage conditions	Monitor and review in next regional planning cycle	Hydro One Transmission	Next Regional Planning Cycle	N/A
Operational issue with supply capacity on D10H, during load transfer between Detweiler TS and Hanover TS	Monitor and review in next regional planning cycle	Hydro One Transmission	Next Regional Planning Cycle	N/A

Note:

a) The planned in-service dates are tentative and subject to change.
b) Costs are based on budgetary planning estimates and excludes the cost for distribution infrastructure (if required).

10. REFERENCES

[1] Independent Electricity System Operator, Ontario Resource and Transmission Assessment Criteria (issue 5.0 August 22, 2007)

[2] Ontario Energy Board, Transmission System Code (issue July 14, 2000 rev. August 2, 2023)

[3] Ontario Energy Board, Distribution system Code (issue July 14, 2000 rev. March 27, 2024)

[4] Ontario Energy Board, Load Forecast Guideline for Ontario (issue October 13, 2022)

[5] Greater Bruce/Huron Second Cycle Regional Infrastructure Planning, (issue April 2022)

[6] Greater Bruce/Huron Third Cycle Needs Assessment, (issue September 2024)

Appendix A: Extreme Summer Weather Adjusted Net Load Forecast

Table A.1: GBH region – Summer Non-Coincident - Net Load Forecast

Station/DESN	Summer LTR (MVA)	Summer LTR (MW)	2023 (Historical) (MW)	Summer Non-Coincident NET Forecast (MW)									
				2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Douglas Point TS	97.20	87.48	56.18	57.69	58.11	58.51	58.61	61.09	61.47	61.89	62.28	62.72	63.26
Hanover TS	125.90	119.61	84.99	84.88	85.66	86.40	86.42	86.65	87.09	87.63	88.54	89.35	90.70
Owen Sound TS	208.50	198.08	98.17	104.09	105.10	106.08	107.50	108.29	109.33	110.46	111.68	112.88	114.18
Seaforth TS	45.10	42.85	29.87	29.08	29.26	29.43	29.46	29.57	29.75	29.98	30.16	30.44	30.68
Stratford TS	125.10	118.85	80.23	85.22	85.58	85.91	86.12	86.54	87.16	87.88	88.60	89.56	91.45
Wingham TS	97.00	87.30	50.76	51.50	51.88	52.25	52.37	52.63	53.02	53.44	53.85	54.32	54.83
Palmerston TS	132.20	125.59	66.09	70.42	70.85	71.24	71.27	71.68	71.99	72.35	72.78	73.17	73.62
Goderich TS	126.50	120.18	40.68	43.55	43.73	43.89	43.95	44.00	44.14	44.33	44.53	44.84	45.18
Constance DS	28.80	25.92	18.91	20.26	20.45	20.63	20.71	20.84	21.01	21.22	21.45	21.73	22.07
St. Marys TS	52.80	47.52	23.64	25.31	25.41	25.50	25.57	25.70	25.88	26.10	26.37	26.64	26.95
Centralia TS	61.10	58.05	38.10	40.14	40.62	41.09	41.37	41.77	42.28	42.88	43.71	44.86	45.86
Grand Bend East DS	31.25	28.13	19.58	20.39	20.50	20.60	20.60	20.65	20.75	21.02	21.18	21.39	21.71
Bruce HWP B TS	113.20	101.88	8.83	8.83	8.77	8.70	8.59	8.50	8.43	8.37	8.29	8.22	8.16
Festival MTS #1	N/A	N/A	34.47	37.21	37.44	37.61	37.63	37.73	37.91	38.15	38.44	38.83	39.34
Customer CTS #1	N/A	N/A	3.63	3.44	3.46	3.47	3.48	3.49	3.51	3.52	3.53	3.55	3.56
Customer CTS #2	N/A	N/A	5.92	5.96	6.02	6.07	6.12	6.17	6.23	6.28	6.34	6.39	6.45
Customer CTS #3	N/A	N/A	4.54	4.63	4.67	4.72	4.76	4.81	4.85	4.90	4.94	4.99	5.04
Customer CTS #4	N/A	N/A	15.57	15.75	15.94	16.13	16.33	16.52	16.72	16.92	17.13	17.33	17.54

Table A.2: GBH region – Summer Coincident - Net Load Forecast

Station/DESN	Summer LTR (MVA)	Summer LTR (MW)	2023 (Historical) (MW)	Summer Coincident NET Forecast (MW)									
				2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Douglas Point TS	97.20	87.48	52.73	53.96	54.36	54.72	54.82	57.28	57.64	58.04	58.40	58.82	59.33
Hanover TS	125.90	119.61	84.99	84.88	85.66	86.40	86.42	86.65	87.09	87.63	88.54	89.35	90.70
Owen Sound TS	208.50	198.08	91.35	96.72	97.65	98.56	99.94	100.68	101.65	102.70	103.84	104.97	106.18
Seaforth TS	45.10	42.85	28.55	27.65	27.83	27.99	28.02	28.12	28.29	28.51	28.68	28.96	29.19
Stratford TS	125.10	118.85	78.90	83.79	84.15	84.47	84.67	85.09	85.70	86.40	87.12	88.06	89.94
Wingham TS	97.00	87.30	50.76	45.17	45.51	45.84	45.95	46.18	46.52	46.89	47.26	47.68	48.13
Palmerston TS	132.20	125.59	64.08	68.26	68.68	69.06	69.08	69.48	69.78	70.13	70.55	70.94	71.37
Goderich TS	126.50	120.18	40.68	37.34	37.50	37.63	37.70	37.75	37.87	38.03	38.20	38.48	38.77
Constance DS	28.80	25.92	18.67	19.99	20.18	20.36	20.44	20.57	20.74	20.95	21.18	21.46	21.79
St. Marys TS	52.80	47.52	23.64	25.14	25.24	25.33	25.39	25.52	25.71	25.92	26.19	26.46	26.76
Centralia TS	61.10	58.05	37.53	39.52	39.99	40.46	40.73	41.12	41.62	42.22	43.04	44.18	45.16
Grand Bend East DS	31.25	28.13	17.09	17.69	17.79	17.88	17.88	17.92	18.01	18.26	18.40	18.59	18.88
Bruce HWP B TS	113.20	101.88	5.66	6.03	5.99	5.94	5.87	5.81	5.76	5.71	5.66	5.62	5.57
Festival MTS #1	N/A	N/A	27.53	29.72	29.90	30.04	30.05	30.13	30.27	30.47	30.70	31.01	31.42
Customer CTS #1	N/A	N/A	1.38	1.39	1.39	1.40	1.40	1.41	1.41	1.42	1.42	1.43	1.44
Customer CTS #2	N/A	N/A	3.21	3.24	3.26	3.29	3.32	3.35	3.38	3.41	3.44	3.47	3.50
Customer CTS #3	N/A	N/A	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Customer CTS #4	N/A	N/A	5.07	5.13	5.19	5.26	5.32	5.38	5.45	5.51	5.58	5.65	5.72

Table A.3: GBH region – Winter Non-Coincident - Net Load Forecast

Station/DESN	Winter LTR (MVA)	Winter LTR (MW)	2022/23 (Historical) (MW)	Winter Non-Coincident Net Forecast (MW)									
				2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	2030/31	2031/32	2032/33
Douglas Point TS	109.80	98.82	58.70	55.11	55.71	56.26	56.61	62.80	63.25	63.80	64.33	64.88	65.66
Hanover TS	138.80	131.86	83.83	80.13	81.12	82.04	82.42	82.99	83.55	84.67	85.27	86.57	87.52
Owen Sound TS	232.50	220.88	108.11	112.61	114.06	115.50	117.94	119.29	120.57	122.07	123.62	125.14	126.79
Seaforth TS	55.40	52.63	28.44	25.86	26.07	26.25	26.37	26.57	26.73	26.97	27.22	27.52	27.87
Stratford TS	137.50	130.63	67.97	70.44	70.88	71.30	71.69	72.26	72.77	73.45	74.14	74.90	76.73
Wingham TS	107.90	97.11	55.48	53.56	54.10	54.59	54.89	55.32	55.70	56.23	56.82	57.54	58.42
Palmerston TS	147.20	139.84	67.75	71.04	71.67	72.24	72.58	73.28	73.67	74.20	74.68	75.18	75.75
Goderich TS	132.00	125.40	38.86	40.59	40.85	41.09	41.37	41.57	41.73	41.97	42.22	42.52	42.88
Constance DS	35.00	31.50	17.20	18.15	18.39	18.62	18.79	19.01	19.22	19.46	19.69	19.94	20.20
St. Marys TS	59.00	53.10	21.79	22.92	23.07	23.21	23.35	23.54	23.72	23.96	24.19	24.46	24.76
Centralia TS	65.40	62.13	32.57	34.18	34.80	35.42	35.97	36.63	37.31	38.12	39.24	40.25	41.40
Grand Bend East DS	40.00	36.00	16.92	17.11	17.26	17.39	17.47	17.59	17.70	18.06	18.24	18.46	18.74
Bruce HWP B TS	114.80	103.32	11.37	11.79	11.73	11.67	11.57	11.49	11.40	11.32	11.24	11.17	11.10
Festival MTS #1	N/A	N/A	27.50	28.91	29.15	29.35	29.46	29.63	29.77	29.99	30.26	30.61	31.05
Customer CTS #1	N/A	N/A	3.57	3.46	3.43	3.40	3.37	3.34	3.31	3.28	3.25	3.22	3.19
Customer CTS #2	N/A	N/A	5.54	5.71	5.75	5.80	5.84	5.89	5.93	5.98	6.03	6.07	6.12
Customer CTS #3	N/A	N/A	4.51	4.62	4.66	4.70	4.75	4.79	4.84	4.89	4.93	4.98	5.03
Customer CTS #4	N/A	N/A	15.81	16.00	16.19	16.39	16.59	16.79	16.99	17.19	17.40	17.61	17.82

Table A.4: GBH region – Winter Coincident - Net Load Forecast

Station/DESN	Winter LTR (MVA)	Winter LTR (MW)	2022/23 (Historical) (MW)	Winter Coincident Net Forecast (MW)									
				2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	2030/31	2031/32	2032/33
Douglas Point TS	109.80	98.82	56.27	52.55	53.13	53.65	53.99	60.16	60.59	61.12	61.63	62.16	62.91
Hanover TS	138.80	131.86	75.33	71.20	72.09	72.92	73.25	73.77	74.27	75.33	75.87	77.11	77.98
Owen Sound TS	232.50	220.88	93.56	97.26	98.61	99.86	102.16	103.34	104.43	105.72	107.05	108.34	109.73
Seaforth TS	55.40	52.63	26.81	24.15	24.35	24.52	24.64	24.82	24.97	25.20	25.44	25.71	26.05
Stratford TS	137.50	130.63	66.42	68.81	69.25	69.65	70.04	70.59	71.09	71.75	72.42	73.17	74.98
Wingham TS	107.90	97.11	52.88	50.83	51.35	51.05	51.33	51.72	52.08	52.57	53.13	53.80	54.62
Palmerston TS	147.20	139.84	63.28	66.34	66.93	67.47	67.78	68.44	68.81	69.29	69.74	70.22	70.75
Goderich TS	132.00	125.40	36.06	37.65	37.90	38.12	38.39	38.57	38.72	38.95	39.18	39.46	39.79
Constance DS	35.00	31.50	16.72	17.64	17.86	18.05	18.20	18.38	18.56	18.78	19.02	19.30	19.63
St. Marys TS	59.00	53.10	19.79	20.82	20.95	21.08	21.21	21.39	21.55	21.76	21.97	22.21	22.49
Centralia TS	65.40	62.13	31.57	33.11	33.71	34.31	34.85	35.49	36.15	36.93	38.03	39.01	40.12
Grand Bend East DS	40.00	36.00	12.58	12.55	12.66	12.76	12.82	12.91	12.99	13.32	13.45	13.61	13.82
Bruce HWP B TS	114.80	103.32	9.65	10.01	9.96	9.91	9.82	9.75	9.68	9.62	9.55	9.48	9.42
Festival MTS #1	N/A	N/A	24.07	25.31	25.52	25.70	25.79	25.94	26.07	26.26	26.50	26.80	27.18
Customer CTS #1	N/A	N/A	3.32	3.29	3.26	3.23	3.21	3.18	3.15	3.12	3.09	3.06	3.04
Customer CTS #2	N/A	N/A	2.17	2.19	2.20	2.22	2.24	2.26	2.27	2.29	2.31	2.33	2.35
Customer CTS #3	N/A	N/A	0.14	0.14	0.14	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.16
Customer CTS #4	N/A	N/A	14.42	14.59	14.77	14.94	15.12	15.31	15.49	15.68	15.86	16.06	16.25

Appendix B: Lists of Step-Down Transformer/Distribution Stations

Sr. No.	Transformer Station	Voltage (kV)	Supply Circuits
1	Bruce HWP B TS	230 kV	B20P/B24P
2	Douglas Point TS	230 kV	B20P/B24P
3	Hanover TS	115 kV	B4V/B5V
4	Owen Sound TS	230 kV	B27S/B28S
5	Seaforth TS	115 kV	B22D/B23D
6	Stratford TS	230 kV	B22D/B23D
7	Wingham TS	230 kV	B22D/B23D
8	Festival MTS #1	230 kV	B22D/B23D
9	Palmerston TS	115 kV	D10H
10	Goderich TS	115 kV	61M18
11	Constance DS	115 kV	61M18
12	St. Marys TS	115 kV	L7S
13	Customer CTS #1	115 kV	L7S
14	Centralia TS	115 kV	L7S
15	Grand Bend East DS	115 kV	L7S
16	Customer CTS #2	115 kV	L7S
17	Customer CTS #3	115 kV	L7S
18	Customer CTS #4	115 kV	L7S

Appendix C: Lists of Transmission Circuits

Sr. No.	Connecting Stations	Circuit ID	Voltage (kV)
1	Bruce A TS – Orangeville TS	B4V/B5V	230 kV
2	Bruce A TS – Detweiler TS	B22D/ B23D	230 kV
3	Bruce A TS – Owen Sound TS	B27S/B28S	230 kV
4	Bruce A TS – Douglas Point TS	B20P/B24P	230 kV
5	Hanover TS – Palmerston TS	D10H-North	115 kV
6	Seaforth TS – Goderich TS	61M18	115 kV
7	Seaforth TS – St. Marys TS	L7S	115 kV
8	Owen Sound TS – Hanover TS	S1H	115 kV
9	Seaforth TS – Edmondville CSS	E6L	115 kV

Appendix D: List of LDC's

Sr. no.	Name of LDC
1	Hydro One Networks Inc. (Distribution)
2	ERTH Power Corporation
3	Festival Hydro
4	Westario Power Inc.
5	Entegrus Powerline Inc.
6	Wellington North Power

Appendix E: List of Municipalities in the region

Sr. no.	Name of Municipality
1	Bruce county
2	Huron county
3	Perth county
4	Portion of Grey county
5	Portion of Wellington county
6	Portion of Waterloo county
7	Portion of Oxford county
8	Portion of Middlesex county

Appendix E: Acronyms

Acronym	Description
A	Ampere
BES	Bulk Electric System
BPS	Bulk Power System
CEP	Community Energy Plan
CIA	Customer Impact Assessment
CGS	Customer Generating Station
CSS	Customer Switching Station
CTS	Customer Transformer Station
DESN	Dual Element Spot Network
DS	Distribution Station
eDSM	electricity Demand Side Management
GBH	Greater Bruce/Huron
GS	Generating Station
HV	High Voltage
IESO	Independent Electricity System Operator
IRRP	Integrated Regional Resource Plan
kV	Kilovolt
KWCG	Kitchener-Waterloo-Cambridge-Guelph
LDC	Local Distribution Company
LP	Local Plan
LTE	Long Term Emergency
LTR	Limited Time Rating
LV	Low Voltage
MEP	Municipal Energy Plan
MTS	Municipal Transformer Station
MW	Megawatt
MVA	Mega Volt-Ampere
MVAR	Mega Volt-Ampere Reactive
NA	Needs Assessment
NERC	North American Electric Reliability Corporation
NGS	Nuclear Generating Station
NPCC	Northeast Power Coordinating Council Inc.
NUG	Non-Utility Generator
OEB	Ontario Energy Board

ORTAC	Ontario Resource and Transmission Assessment Criteria
PF	Power Factor
RIP	Regional Infrastructure Plan
SA	Scoping Assessment
SIA	System Impact Assessment
SPS	Special Protection Scheme
SS	Switching Station
STG	Steam Turbine Generator
TS	Transformer Station
TWG	Technical Working Group
ULTC	Under Load Tap Changers