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# South Georgian Bay/Muskoka Scoping Assessment Outcome Report

DRAFT – October 8, 2020

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# 1. Introduction

This Scoping Assessment Outcome Report is part of the Ontario Energy Board's (OEB or Board) regional planning process. The Board endorsed the Planning Process Working Group's Report to the Board in May 2013 and formalized the regional planning process and timelines through changes to the Transmission System Code and Distribution System Code in August 2013.

The first cycle of the regional planning process for the South Georgian Bay/Muskoka region was completed in August 2017 with the publishing of the Regional Infrastructure Plan (RIP)<sup>1</sup>. A number of needs were identified to arise in the near- and medium-term timeframes. Prior to the completion of the RIP, two Integrated Regional Resource Plans (IRRPs) were produced in December 2016, as the South Georgian Bay/Muskoka area needs were scoped into two sub-regions for further study: the summer-peaking, high-growth Barrie/Innisfil<sup>2</sup> sub-region, and the winter-peaking, slower-growing Parry Sound/Muskoka<sup>3</sup> sub-region.

The IRRPs outlined recommendations to address all near-term needs, and identified mid- to long-term needs to be confirmed in the next planning cycle. Both IRRPs also identified near-term actions to be carried out in advance of the next cycle of regional planning to gather information to better identify options for future needs. This included the completion of Local Achievable Potential Studies (LAPS) for a portion of each sub-region, to help determine the availability and cost of potential non-wires solutions.

The new cycle of the regional planning process for the South Georgian Bay/Muskoka region started on January 30, 2020. The Needs Assessment is the first step in the regional planning process and was carried out by the Study Team led by Hydro One Networks Inc. (Hydro One). This report was finalized on April 30, 2020, and recommended that a number of needs require regional coordination. This need information was an input into the Scoping Assessment to determine the nature of the planning process required.

During the Scoping Assessment, the Study Team reviewed the nature and timing of all the known needs in the region to determine the most appropriate planning approach. This process also determined the best geographic grouping of the needs to efficiently carry out the study. It also considered past or ongoing initiatives in the region, such as the findings of the two LAPS triggered in the last planning cycle. These studies, which assessed the cost and feasibility of using distributed energy resources and local demand management options, will inform and support the analysis of non-wires alternatives in the current cycle.

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<sup>1</sup> 2017 RIP:

[https://www.hydroone.com/abouthydroone/CorporateInformation/regionalplans/southgeorgianbaymuskoka/Documents/South\\_Georgian\\_Bay-Muskoka\\_RIP\\_Final.pdf](https://www.hydroone.com/abouthydroone/CorporateInformation/regionalplans/southgeorgianbaymuskoka/Documents/South_Georgian_Bay-Muskoka_RIP_Final.pdf)

<sup>2</sup> 2016 IRRP for the Barrie/Innisfil Sub-region: <http://www.ieso.ca/-/media/Files/IESO/Document-Library/regional-planning/Barrie-Innisfil/Barrie-Innisfil-IRRIP.pdf?la=en>

<sup>3</sup> 2016 IRRP for the Parry Sound/Muskoka Sub-region: <http://www.ieso.ca/-/media/Files/IESO/Document-Library/regional-planning/Parry-Sound-Muskoka/PSM-IRRIP.pdf?la=en>

The Scoping Assessment considers three potential planning approaches for the region/sub-regions, including: an IRRP – where both wires and non-wires options have potential to address needs; a RIP – which considers wires-only options; or a local plan undertaken by the transmitter and affected Local Distribution Company – where no further regional coordination is needed.

This Scoping Assessment report:

- Lists the needs requiring more comprehensive planning, as identified in the Needs Assessment report;
- Reassesses the areas that need to be studied and the geographic grouping of the needs;
- Determines the appropriate regional planning approach and scope for each sub-region where a need for regional coordination or more comprehensive planning is identified;
- Establishes a terms of reference for an IRRP if an IRRP is required; and
- Establishes the composition of the Technical Working Group for each sub-region recommended for an IRRP.

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## 2. Study Team

The Scoping Assessment was carried out with the following participants:

- Independent Electricity System Operator (IESO)
- Hydro One Networks Inc. (Hydro One Transmission)
- Hydro One Networks Inc. (Hydro One Distribution)
- Alectra Utilities
- InnPower Corporation
- Orangeville Hydro
- Elexicon Energy
- Lakeland Power
- EPCOR Electricity Distribution Ontario Inc.
- Newmarket-Tay Power Distribution Ltd.
- Wasaga Distribution Inc.

## 3. Categories of Needs, Analysis, and Results

### 3.1 Overview of the Region

The South Georgian Bay/Muskoka region is located in central Ontario and includes all or part of the following Counties and Districts: the County of Simcoe, County of Dufferin, District of Muskoka, District of Parry Sound, and County of Grey. For electricity planning purposes, the planning region is defined by electricity infrastructure boundaries, not municipal boundaries.

This region also includes the following First Nations and Métis Nation of Ontario councils:

- Henvey Inlet
- Magnetawan
- Shawanaga
- Wasauksing
- Moose Deer Point
- Beausoleil
- Wahta Mohawks
- Chippewas of Rama
- Chippewas of Georgina Island
- Mississaugas of Scugog
- MNO Barrie South Simcoe Métis Council
- MNO Moon River Métis Council
- MNO Georgian Bay Métis Council

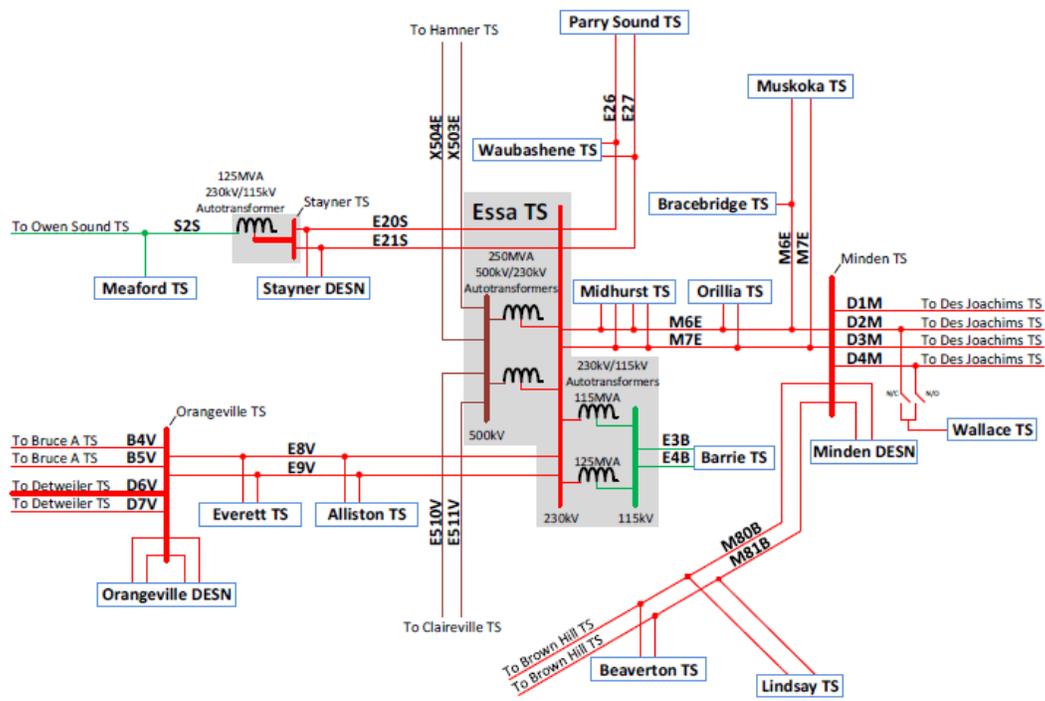
An overview of the South Georgian Bay/Muskoka region and the location of the electrical infrastructure is shown in Figure 3-1. The southern portion of this region is summer-peaking (i.e., electricity demand is highest during the summer months), and is characterized by strong forecast growth, particularly in the south Barrie and Innisfil areas. The northern part of the region is winter-peaking (i.e., electricity demand is highest during the winter months), and growth is forecast to be more gradual.

**Figure 3-0 | Overview of the South Georgian Bay/Muskoka Region**



The region is currently supplied from 115 kV and 230 kV transmission lines and stations that connect at the Essa transformer station (TS). The 500/230 kV auto-transformers at Essa TS provide the major source of supply to the area. As an outcome of the last planning cycle, the 115 kV supply in the region (from Essa TS to Barrie TS) is being converted to a 230 kV supply in 2022. An overview of the electrical infrastructure that currently supplies the region is provided in the single line diagram in Figure 3-2.

**Figure 3-2 | Electricity Infrastructure in the South Georgian Bay/Muskoka Region**



### 3.2 Background of the Previous Planning Process

The regional planning process was formalized by the OEB in August 2013. To prioritize and manage the process, Ontario was organized into 21 regions based on electricity infrastructure boundaries; each of which were assigned to one of three groups based on urgency of need, where Group 1 Regions were being reviewed first. The South Georgian Bay/Muskoka region was part of the Group 2 planning regions.

In March 2015, Hydro One Transmission published the first Needs Assessment report for the South Georgian Bay/Muskoka region. The scope of the report included a review of system capability, reliability assessments, and asset sustainment timelines for the region. The report identified a number of near- and mid-term needs. In June of 2015, the IESO published a Scoping Assessment report for the region, recommending that two IRRPs would be developed to address the identified needs: one for the Barrie/Innisfil sub-region and one for the Parry Sound/Muskoka sub-region.

Within the Terms of Reference for the IRRP for the Barrie/Innisfil sub-region, a need to proceed quickly to address near-term needs at Barrie TS was identified. While the IRRP was still underway in December 2015, the IESO provided a hand-off letter to Hydro One in support of commencing work on uprating Barrie TS to a 230 kV supply to meet the capacity and end-of-life needs identified in south Barrie and Innisfil.

Subsequently in December of 2016, the first IRRP reports for the two South Georgian Bay/Muskoka sub-regions were published. Both IRRPs used a 20-year outlook, allowing the long-term trends in the region to be considered while implementing near-term actions. To address near- and mid-term needs

in the first 10 years of the forecast, a number of recommendations were made. Section 3.3.1 documents the status of the near-term transmission reinforcements that were recommended during the first cycle of regional planning for South Georgian Bay/Muskoka.

In addition to the above recommendations, the previous IRRPs also recommended that two LAPS be undertaken in order to better understand the feasibility and cost of potential non-wires alternatives for addressing select mid- and long-term capacity needs. A LAPS was undertaken for the service area of Barrie TS, led by Alectra Utilities and supported by InnPower, and a LAPS was undertaken for the Parry Sound TS and Waubaushene TS service areas, led by Lakeland Power. These studies have now both concluded and will inform the current regional planning cycle.

Following the IRRP, a RIP was published in August 2017 to address transmission needs identified in the Needs Assessment and the IRRP. The plans to address some of these needs were further developed in the RIP. Some of the needs and recommended options that were in the medium- to longer-term time frame were to be re-confirmed in the next regional planning cycle.

This current, second regional planning cycle started with the Needs Assessment report published by Hydro One in April 2020. The needs identified in the Needs Assessment report form the basis of the analysis for this Scoping Assessment and are discussed in further detail in Section 3.3.

### 3.3 Needs Identified

Hydro One’s Needs Assessment provided an update on needs identified in the previous planning cycle and the implementation of projects recommended to address them. Furthermore, it identified a number of new needs in the South Georgian Bay/Muskoka region based on the most up-to-date sustainment plans and a new 10-year demand forecast. A summary of the current projects and plans underway to respond to existing needs, plus the new needs, are outlined below.

#### 3.3.1 Projects and Plans Underway

The Needs Assessment report lists the needs identified from the previous planning cycle, and provides an update on the status of project implementation. Table 3-1 below summarizes this. These projects provide a basis for future assessments and should be accounted for in this planning cycle.

**Table 3-1 | Needs Identified in the Previous Cycle and Implementation Plan Update**

IRRP	Specific Need	Solution and Timing
Barrie/Innisfil Sub-Region	<ul style="list-style-type: none"> <li>Insufficient capacity at Barrie TS and Barrie/Essa 115 kV system</li> <li>End-of-life Barrie TS, E3/4B circuits, Essa 230/115 kV autotransformers</li> </ul>	<ul style="list-style-type: none"> <li>BATU project (rebuild and uprate Barrie TS and E3/4B circuits to 230 kV, and retire Essa T1/T2)</li> <li>In-service in 2022</li> </ul>

IRRP	Specific Need	Solution and Timing
Parry Sound/Muskoka Sub-Region	<ul style="list-style-type: none"> <li>Insufficient capacity at Parry Sound TS</li> <li>End-of-life Parry Sound transformers</li> </ul>	<ul style="list-style-type: none"> <li>Transformer upsizing (new 230/44 kV 83 MVA)</li> <li>In-service in 2024</li> </ul>
	<ul style="list-style-type: none"> <li>Load restoration criteria violations under M6E+M7E contingency</li> </ul>	<ul style="list-style-type: none"> <li>Installation of 230 kV switches on M6E/M7E at Orillia TS</li> <li>In-service in 2021</li> </ul>
	<ul style="list-style-type: none"> <li>End-of-life 230/44 kV 42 MVA Minden TS transformers</li> </ul>	<ul style="list-style-type: none"> <li>Replacement with larger 83 MVA units to address station capacity needs</li> <li>In-service in 2021</li> </ul>

### 3.3.2 Needs to be Addressed in Current Planning Cycle

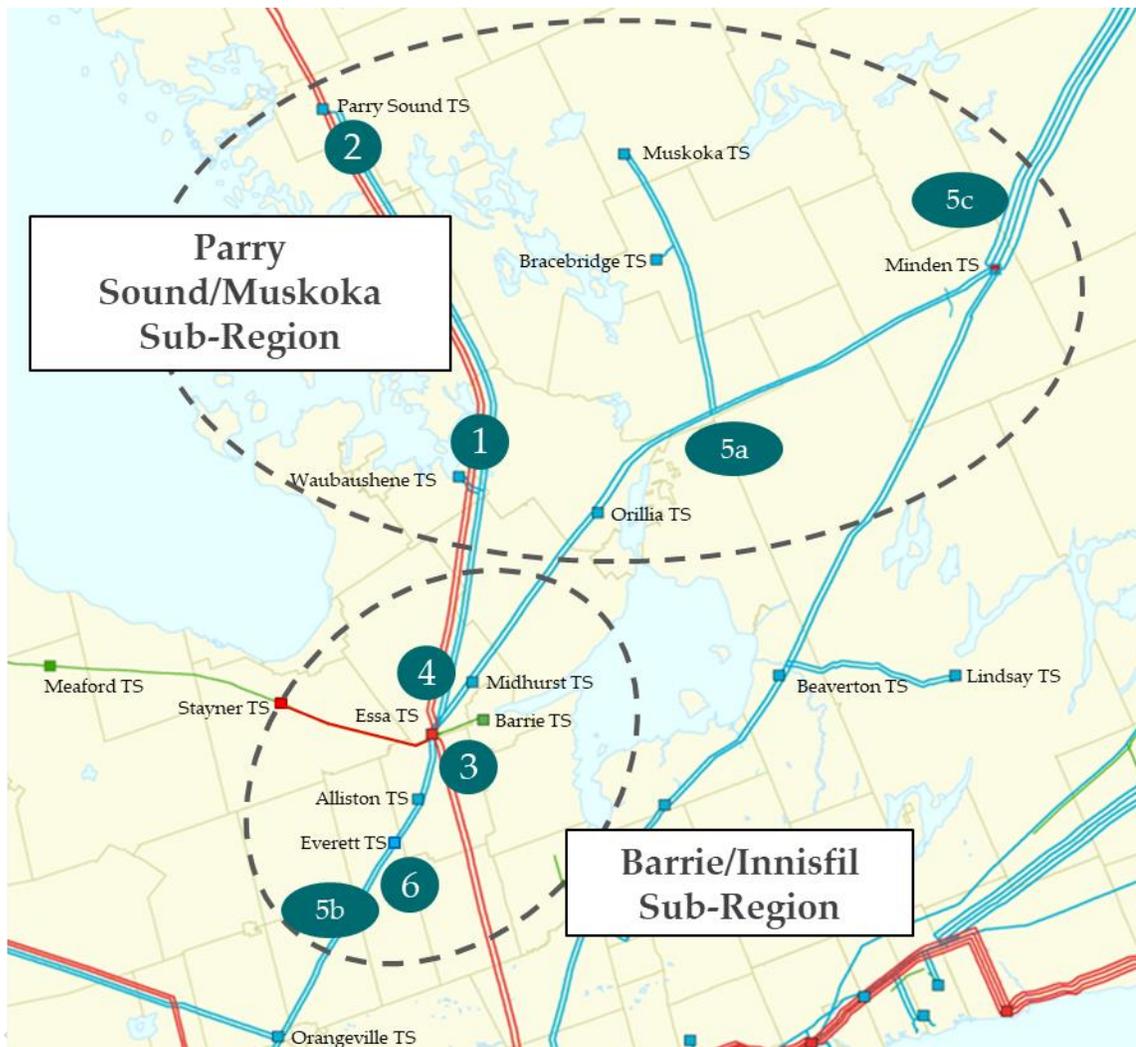
The Needs Assessment then identified new or updated needs in the South Georgian Bay/Muskoka region using the 10-year station-level demand forecast provided by the LDCs, updated end-of-life asset condition information, as well as the conservation and demand management (CDM) and distributed generation (DG) forecast provided by the IESO. Table 3-2 below lists these regional needs and their timing. Their location is shown in Figure 3-3.

**Table 3-2 | Updated Regional Needs Identified in the NA**

Need #	Station/Circuit	Description of Need
1	Waubauskene TS	<ul style="list-style-type: none"> <li>Supply capacity exceeded in 2020</li> </ul>
2	Parry Sound TS	<ul style="list-style-type: none"> <li>Existing 230/44 kV, 42 MVA transformers reach end-of-life in near-term</li> <li>Station capacity need between 2020-2024, before larger (230/44 kV, 83 MVA) replacement transformers are in-service</li> </ul>

Need #	Station/Circuit	Description of Need
3	Barrie TS/Innisfil Area	<ul style="list-style-type: none"> <li>Subsequent to BATU, InnPower has a supply capacity constraint on the 44 kV feeder level starting in 2025</li> <li>Up-sized Barrie TS will have a station capacity need arising in 2029</li> </ul>
4	M6E/M7E	<ul style="list-style-type: none"> <li>Thermal overload (exceeding Long-Term Emergency, LTE, rating) between Essa TS x Midhurst TS starting in 2023 (assuming four Des Joachims GS units are out of service)</li> </ul>
5	M6E/M7E E8V/E9V D1M/D2M	<ul style="list-style-type: none"> <li>Various sections to be refurbished due to end-of-life needs</li> <li>M6E/M7E: in-service 2026</li> <li>E8V/E9V: in-service 2026</li> <li>D1M/D2M: in-service 2028</li> </ul>
6	Everett TS	<ul style="list-style-type: none"> <li>Full utilization of the existing station supply capacity is limited due to a limiting component within the low voltage yard; need arises in 2026 (rather than 2027, as identified in the last IRRP)</li> <li>CT ratio setting on the low voltage bushing of the transformer breaker can be modified to allow full transformer limited time rating (LTR) capability</li> </ul>

**Figure 3-3 | Geographic Location of Needs Identified in the Needs Assessment**



### 3.3.3 Analysis of Needs and Identification of Sub-Regions

The Study Team has discussed the needs in the South Georgian Bay/Muskoka region and potential planning approaches to address them. Consistent with the previous planning cycle, two sub-regions, Barrie/Innisfil and Parry Sound/Muskoka, have been identified for further study in the regional planning process (geographic area of the sub-regions is identified in Figure 3-3).

In addition to discussing the planning approach for the identified needs and the division of the sub-regions, the Study Team also discussed the potential impact of the COVID-19 pandemic, as there are supply capacity needs in the region driven by forecast load growth. The Study Team noted that the pandemic may have a temporary and near-term impact on the load growth. However, there is also the potential for certain needs to materialized with greater magnitude (e.g. continued development of housing stock in the south Barrie area). Therefore, the Study Team agreed to assess the needs using the need dates from the Needs Assessments, which was based on the original demand forecast completed prior to the pandemic. Throughout the IRRP process, potential near-term impacts to demand from the COVID-19 pandemic will continue to be monitored.

## Barrie/Innisfil Sub-Region

Supplied by Alectra Utilities, InnPower Corporation, and Hydro One Distribution, this sub-region continues to exhibit strong electricity demand growth – particularly in the south Barrie and Innisfil area. The following transmission infrastructure falls within this sub-region’s boundaries:

- Transformer stations: Midhurst TS, Barrie TS, Everett TS, Alliston TS
- Transmission circuits: E8/9V, E28/29, M6/7E (Essa-Midhurst section)

Forecast growth is expected to trigger a supply capability need in the south Barrie and Innisfil area after the BATU project is in-service:

1. In the near-term, supply to InnPower’s service territory is limited by two 44 kV feeders supplied from Barrie TS, and
2. In the mid-term, the combined load growth in the Barrie area will exceed the station capacity of uprated Barrie TS.

The potential for integrated solutions to address these near- and mid-term capacity needs should be evaluated through an IRRP. Potential wires options may involve a new line, an additional transformer station, a further expansion of Barrie TS, additional feeders, or load transfers. Furthermore, the potential for non-wires alternatives to defer or meet a portion of the sub-region’s needs will also be evaluated. Findings from the Barrie TS LAPS recommended from the 2016 IRRP can support and inform this assessment.

In addition to supply capability needs at Barrie TS and in the Innisfil area, network circuits from Essa TS (M6/7E) are expected to be thermally overloaded under certain post-contingency system conditions. Various sections of other nearby circuits (E8/9V, M6/7E, and D1/2M) have also been identified in the Needs Assessment as reaching end-of-life. Needs on these circuits are sensitive to generation output and bulk power system flow assumptions (particularly flows both north and south on the transmission interface (i.e. path) through Essa TS), as well as the region’s load level. These types of needs are typically addressed through bulk planning, although coordination is required with the regional planning process to ensure system assumptions are aligned, and potential impacts of solutions from either regional or bulk planning are accounted for in the other plan.

The supply capability need at Everett TS is driven by the current setting of the station equipment, preventing utilization of the full station capacity. As this need has only been advanced by a year and has not otherwise changed since identified in the previous IRRP, the Study Team continues to support the solution recommended in 2016.

**Recommendation:** The Barrie/Innisfil sub-region has a mixture of urgent, more complex system capacity needs, and mid-term end-of-life and capacity needs. Integrated solutions should be evaluated to meet these regional needs while coordinating with any bulk system assessments. Outcomes of the regional plan are anticipated to have broader impacts and require input from multiple stakeholders (LDCs, transmitter, community members, and municipalities). The Study Team, therefore, proposes that an IRRP is conducted for the Barrie/Innisfil sub-region to identify the most cost-effective and feasible solutions.

For the supply capability need identified on the M6E/M7E circuit, the Study Team recommends that a bulk study be completed and that the results be shared with the Technical Working Group as applicable.

### **Parry Sound/Muskoka Sub-Region**

Supplied by Hydro One Distribution, Lakeland Power, Newmarket-Tay Power, Elexicon Energy, and EPCOR Electricity Distribution Ontario Inc., this winter-peaking sub-region exhibits slower electricity demand growth. The following transmission infrastructure falls within this sub-region's boundaries:

- Transformer stations: Parry Sound TS, Waubaushene TS, Orillia TS, Bracebridge TS, Muskoka TS, Minden TS
- Transmission circuits: M6/7E, E26/27

According to the Needs Assessment, Waubaushene TS will require additional supply capacity starting 2020, and a total of 10 MW will be required in 2029 when the station is expected to reach end-of-life. The end-of-life need in 2030 provides an opportunity to replace the station transformers with higher rated units, and the 10 MW capacity need prior to 2029 has the potential to be managed by non-wires solutions. In addition, non-wires options have recently been modelled for the Waubaushene area, providing a basis to explore and evaluate any non-wires potential in the area.

During the last cycle of regional planning, re-supplying loads at Waubaushene TS from nearby stations was recommended. According to the 2016 IRRP, 4 MW of load at Waubaushene TS can be supplied by Orillia TS, and another 7 MW from Waubaushene TS can be supplied by Midhurst TS. These options, not yet implemented, will be reassessed in this planning cycle as part of identifying an integrated solution to address the need. This includes coordinating with the impacted LDCs to obtain the appropriate load transfer approvals if required.

Parry Sound TS requires additional supply capacity starting 2020. The transformers at Parry Sound TS have also reached end-of-life and are scheduled to be replaced with higher rated units in 2024. During the previous cycle of the regional plan, this supply capacity need at Parry Sound TS was identified. Transferring 6 MW of load from Parry Sound TS to the nearby Muskoka TS was recommended to manage the loading at Parry Sound TS. This option will be reassessed as part of identifying an integrated solution to address the capacity and end-of-life needs.

**Recommendation:** There is a need to evaluate integrated solutions to address the sub-region's near- to mid-term capacity and end-of-life needs. Though relatively small in magnitude, these needs will involve multiple stakeholders (LDCs, transmitter, community members, and municipalities) and could trigger investments impacting local ratepayers. Therefore, an IRRP of a smaller scope is proposed to study the Parry Sound/Muskoka sub-region.

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## 4. Conclusion and Next Steps

The Scoping Assessment concludes that:

- An IRRP be undertaken to address the needs in the Barrie/Innisfil sub-region;
- An IRRP be undertaken to address the needs in the Parry Sound/Muskoka sub-region; and
- A bulk system study be undertaken to assess the need on M6E/M7E.

The Terms of Reference for the Barrie/Innisfil IRRP is attached in Appendix 2. Similarly, the Terms of Reference for the Parry Sound/Muskoka IRRP is found in Appendix 3.

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## Appendix 1 – List of Acronyms

CDM	Conservation and Demand Management
DG	Distributed Generation
FIT	Feed-in-Tariff
IESO	Independent Electricity System Operator
IRRP	Integrated Regional Resource Plan
kV	kilovolt
LDC	Local Distribution Company
MW	Megawatt
NERC	North American Electric Reliability Corporation
NPCC	Northeast Power Coordinating Council
OEB	Ontario Energy Board
ORTAC	Ontario Resource and Transmission Assessment Criteria
RIP	Regional Infrastructure Plan
TS	Transformer Station

# Appendix 2 – Barrie/Innisfil Sub-Region IRRP Terms of Reference

## 1. Introduction and Background

These Terms of Reference establish the objectives, scope, key assumptions, roles and responsibilities, activities, deliverables, and timelines for an Integrated Regional Resource Plan (IRRP) of the Barrie/Innisfil sub-region.

Based on the potential for demand growth within this sub-region, limits on the capability of the transmission capacity supplying the area, and opportunities for coordinating demand and supply options, an integrated regional resource planning approach is recommended.

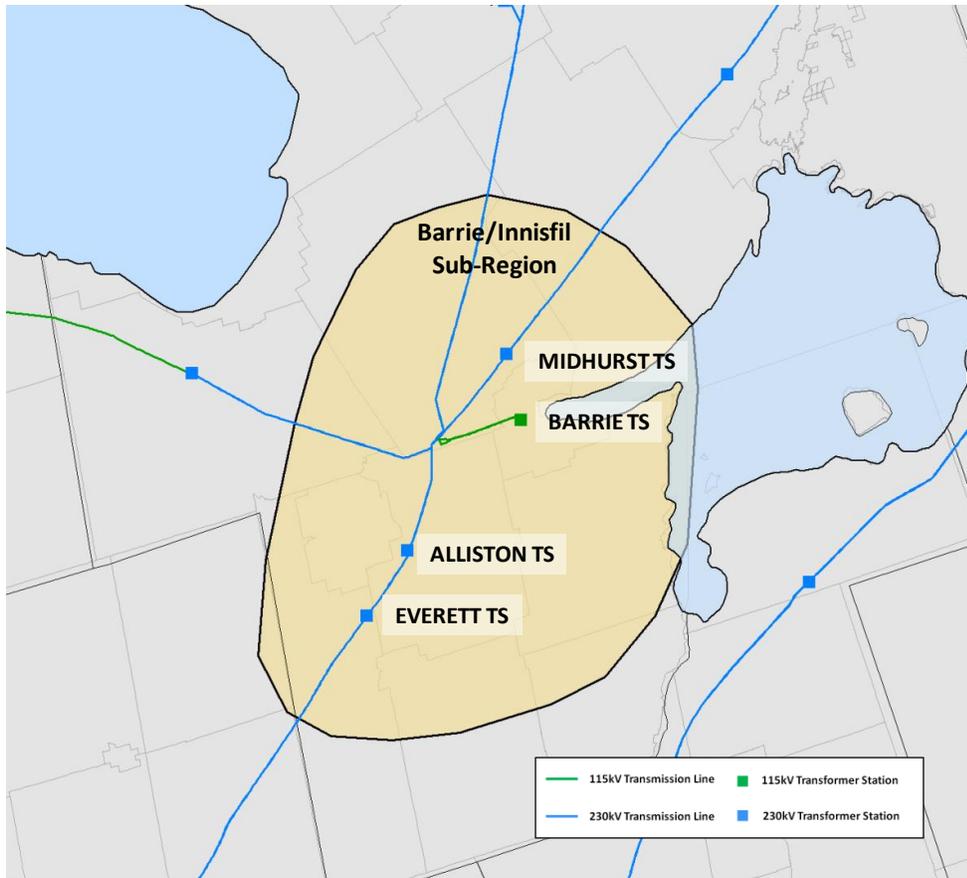
### **Barrie/Innisfil Sub-Region**

The Barrie/Innisfil sub-region is a summer-peaking region that includes the City of Barrie, the Town of Innisfil, and customers in surrounding municipalities supplied from the Barrie, Midhurst, Everett and Alliston transformer stations (TS). The approximate geographical boundaries of the sub-region are shown in Figure A-1.

The sub-region includes all or part of the following municipalities:

- City of Barrie
- Town of Innisfil
- Township of Essa
- Township of Springwater
- Township of Clearview
- Township of Mulmur
- Township of Adjala-Tosorontio
- Town of New Tecumseth
- Town of Bradford West Gwillimbury

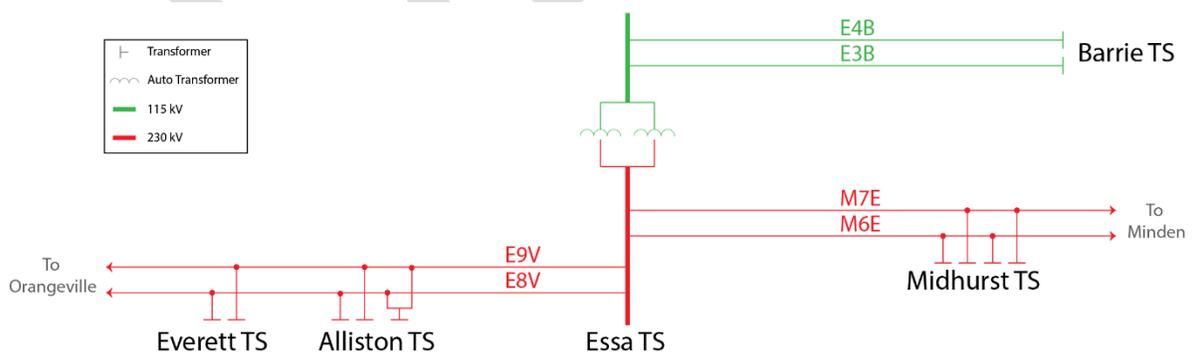
**Figure A-1 | Overview of the Barrie/Innisfil Sub-Region**



**Barrie/Innisfil Electricity System**

The electricity system supplying the Barrie/Innisfil sub-region is shown in Figure A-2.

**Figure A-2 | Barrie/Innisfil Electricity System**



## Background

In the last regional planning cycle, the Barrie/Innisfil sub-region IRRP and RIP were published in December 2016 and August 2017, respectively. Studies conducted during the development of these plans triggered a hand-off letter issued to Hydro One Transmission in December 2015. This letter recommended the implementation of the Barrie Area Transmission Upgrade (BATU) project to supply forecast growth in the Barrie and Innisfil areas.

The BATU project, to be in-service in 2022, involves rebuilding and upgrading Barrie TS and the E3/4B<sup>4</sup> circuits to 230 kV, as well as retiring Essa auto-transformers T1/T2. This recommendation also included an additional 44 kV feeder supply line to service InnPower load from the upgraded Barrie TS. The new 44 kV feeder, as well as InnPower's existing feeder at the time, would be relocated outside of the Hydro One transmission corridor and was expected to help meet InnPower's forecast demand until the mid-2020s.

Long-term recommendations from the previous planning cycle in Barrie/Innisfil included the Barrie TS LAPS (to explore the potential of local demand management resources), as well as continued monitoring of demand growth and local projects to help inform the subsequent planning cycle.

## 2. Objectives

1. To assess the adequacy of electricity supply to customers in the Barrie/Innisfil sub-region over the next 20 years.
2. To address customer-driven electricity needs by developing a flexible, comprehensive, integrated electricity plan for the Barrie/Innisfil sub-region.
3. To develop an implementation plan, while maintaining flexibility in order to accommodate changes in key assumptions over time.

## 3. Scope

This IRRP will develop and recommend an integrated plan to meet the needs of the Barrie/Innisfil sub-region. The plan is a joint initiative involving Alectra Utilities, InnPower, Hydro One Distribution, Hydro One Transmission, and the IESO, and will incorporate input from community engagement activities. The plan will integrate forecast electricity demand growth, conservation and demand management (CDM) in the area with transmission and distribution system capability, end-of-life of facilities in the area, relevant community plans, other bulk system developments, and generation uptake, and will develop an integrated plan to address needs.

This IRRP will address regional needs in the Barrie/Innisfil area. Specifically, the following existing infrastructure is included in the scope of this study:

- Stations—Midhurst TS, Barrie TS, Everett TS, Alliston TS
- Transmission circuits—E8/9V, E28/29, M6/7E (Essa-Midhurst section)

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<sup>4</sup> Now designated as E28 and E29

The adequacy of the bulk system supplying the area (i.e., the 500/230 kV auto-transformers at Essa TS and supply capacity needs of M6/7E) will be assessed by the IESO through a separate bulk system planning process, and assumptions will be coordinated between the regional and bulk plans. Results of the bulk study will be shared with the Technical Working Group as they become available.

The Barrie/Innisfil IRRP will:

- Prepare a 20-year electricity demand forecast for the appropriate stations and establish needs over this timeframe.
- Examine the Load Meeting Capability and reliability of the existing transmission system supplying the Barrie/Innisfil sub-region, taking into account system reinforcements committed during the last planning cycle, facility ratings and performance of transmission elements, transformers, local generation, and other facilities such as reactive power devices.
- Establish feasible integrated alternatives to address remaining needs, considering a mix of CDM, generation, transmission and distribution facilities, and other electricity system initiatives in order to address the needs of the Barrie/Innisfil sub-region.
- Evaluate options using decision-making criteria including but not limited to: technical feasibility, economics, reliability performance, environmental and social factors.

#### 4. Data and Assumptions

The plan will consider the following data and assumptions:

- Demand Data
  - Historical coincident peak demand information for the sub-region
  - Historical weather correction, median and extreme conditions
  - Gross peak demand forecast scenarios by sub-region, TS, etc.
  - Coincident peak demand data including transmission-connected customers
  - Identified potential future load customers
- Conservation and Demand Management
  - Conservation forecast for LDC customers, based on sub-region's share of current energy efficiency programs
  - Local Achievable Potential Studies
  - Potential for CDM at transmission-connected customers' facilities
- Local resources
  - Existing local generation, including distributed generation (DG), district energy, customer-based generation, Non-Utility Generators and hydroelectric facilities as applicable

- Existing or committed renewable generation from Feed-in-Tariff (FIT) and non-FIT procurements
- Future district energy plans, combined heat and power, energy storage, or other generation proposals
- Relevant local plans, as applicable
  - LDC Distribution System Plans
  - Community Energy Plans and Municipal Energy Plans
  - Municipal Growth Plans
  - Indigenous Community Energy Plans
- Criteria, codes and other requirements
  - Ontario Resource and Transmission Assessment Criteria (ORTAC)
  - Supply capability
  - Load security
  - Load restoration requirements
  - NERC and NPCC reliability criteria, as applicable
  - OEB Transmission System Code
  - OEB Distribution System Code
  - Reliability considerations, such as the frequency and duration of interruptions to customers
  - Other applicable requirements
- Existing system capability
  - Transmission line ratings as per transmitter records
  - System capability as per current IESO PSS/E base cases
  - Transformer station ratings (10-day LTR) as per asset owner
  - Load transfer capability
  - Technical and operating characteristics of local generation
- Bulk System considerations to be applied to the existing area network
  - Essa 500/230 kV auto-transformer capability
  - North-South Tie flow assumptions
- End-of-life asset considerations/sustainment plans

- Transmission assets, in particular end of life segments of 230 kV circuits in the sub-region
- Distribution assets
- Other considerations, as applicable

## 5. Technical Working Group

The core Technical Working Group will consist of planning representative/s from the following organizations:

- Independent Electricity System Operator (Team Lead for IRRP)
- Hydro One Transmission
- Alectra Utilities
- InnPower
- Hydro One Distribution

### Authority and Funding

Each entity involved in the study will be responsible for complying with regulatory requirements as applicable to the actions/tasks assigned to that entity under the implementation plan resulting from this IRRP. For the duration of the study process, each participant is responsible for their own funding.

## 6. Engagement

Integrating early and sustained engagement with communities and stakeholders in the planning process was recommended to and adopted by the provincial government to enhance the regional planning and siting processes in 2013. These recommendations were subsequently referenced in the 2013 Long Term Energy Plan. As such, the Technical Working Group is committed to conducting plan-level engagement throughout the development of the Barrie/Innisfil IRRP.

The first step in engagement will consist of the development of a public engagement plan, which will be made available for comment before it is finalized. The data and assumptions as outlined in Section 4.0 will help to inform the scope of community and stakeholder engagement to be considered for this IRRP.

## 7. Activities, Timeline, and Primary Accountability

Activity	Lead Responsibility	Deliverable(s)	Timeframe
<b>1 Prepare Terms of Reference considering stakeholder input</b>	<i>IESO</i>	- Finalized Terms of Reference	Q4 2020
<b>2 Develop the planning forecast, including scenarios for sensitivity analyses, as required</b>		- Long-term planning forecast scenarios	Q4 2020 – Q1 2021

Activity	Lead Responsibility	Deliverable(s)	Timeframe
- Establish historical coincident and non-coincident peak demand information	<i>IESO</i>		
- Establish historical weather correction, median and extreme conditions	<i>IESO</i>		
- Establish gross peak demand forecast for LDC service areas	<i>LDCs</i>		
- Establish existing, committed and potential DG	<i>LDCs</i>		
- Establish near- and long-term conservation forecast based on planned energy efficiency activities and codes and standards	<i>IESO</i>		
- Develop planning forecast scenarios for sensitivity analyses	<i>IESO</i>		
<b>3 Provide information on load transfer capabilities under normal and emergency conditions</b>	<i>LDCs</i>	- Load transfer capabilities under normal and emergency conditions	Q4 2020 – Q1 2021
<b>4 Provide and review relevant community plans, if applicable</b>	<i>LDCs and IESO</i>	- Relevant community plans	Q4 2020 – Q1 2021
<b>5 Complete system studies to identify needs over a twenty-year period</b>	<i>IESO, Hydro One Transmission</i>	- Summary of needs based on demand forecast scenarios for the 20-year planning horizon	Q1 – Q2 2021
- Obtain PSS/E base case Include bulk system assumptions as identified in Key Assumptions			
- Apply reliability criteria as defined in ORTAC to demand forecast scenarios			
- Confirm and refine the need(s) and timing/load levels			
<b>6 Develop options and alternatives</b>		- Develop flexible planning options for forecast scenarios	Q2 – Q3 2021
Develop energy efficiency options, with consideration for previous LAPS findings	<i>IESO and LDCs</i>		
Develop local generation options, with consideration for previous LAPS findings	<i>IESO and LDCs</i>		
Develop transmission and distribution options	<i>Hydro One Transmission, and LDCs</i>		

Activity	Lead Responsibility	Deliverable(s)	Timeframe
Develop options involving other electricity initiatives (e.g., smart grid, storage)	<i>IESO/ LDCs with support as needed</i>		
Develop portfolios of integrated alternatives	<i>All</i>		
Technical comparison and evaluation	<i>All</i>		
<b>7 Plan and undertake community &amp; stakeholder engagement</b>		- Community and Stakeholder Engagement Plan - Input from local communities	Ongoing as required
- Early engagement including with local municipalities and First Nation communities within study area, First Nation communities who may have an interest in the study area, and the Métis Nation of Ontario	<i>All</i>		
- Develop communications materials	<i>All</i>		
- Undertake community and stakeholder engagement	<i>All</i>		
- Summarize input and incorporate feedback	<i>All</i>		
<b>8 Hand-off wires component of integrated solution</b>	<i>IESO</i>	- Hand-off letter to Hydro One	Q1-Q2 2021
<b>9 Develop long-term recommendations and implementation plan based on community and stakeholder input</b>	<i>IESO</i>	- Implementation plan - Monitoring activities and identification of decision triggers - Procedures for annual review	Q3 – Q4 2021
<b>10 Prepare the IRRP report detailing the recommended near, medium and long-term plan for approval by all parties</b>	<i>IESO</i>	- IRRP report	Q1 – Q2 2022

# Appendix 3 – Parry Sound/Muskoka Sub-Region IRRP Terms of Reference

## 1. Introduction and Background

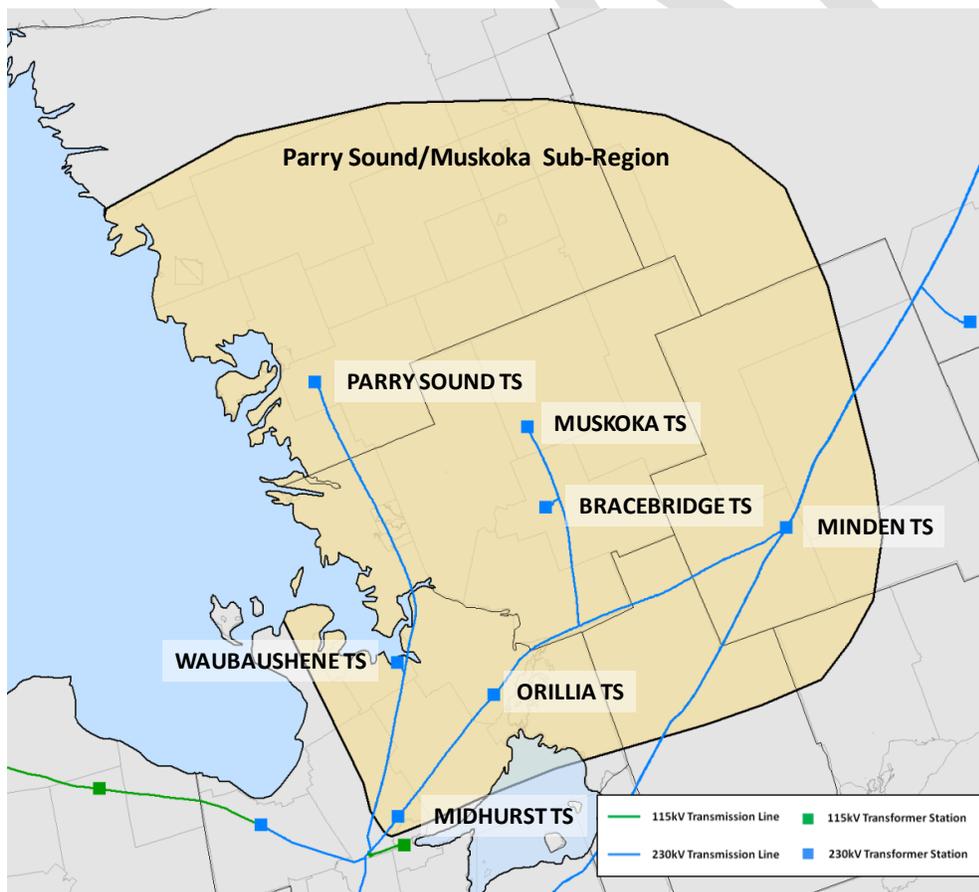
These Terms of Reference establish the objectives, scope, key assumptions, roles and responsibilities, activities, deliverables, and timelines for an Integrated Regional Resource Plan (IRRP) of the Parry Sound/Muskoka sub-region.

Based on the potential for demand growth within this sub-region, limits on the capability of the transmission capacity supplying the area, and opportunities for coordinating demand and supply options, an integrated regional resource planning approach is recommended.

### Parry Sound/Muskoka Sub-Region

The Parry Sound/Muskoka sub-region is winter-peaking and it roughly encompasses the Districts of The approximate geographical boundaries of the sub-region are shown in Figure A-3.

**Figure A-3 | Overview of the Parry Sound/Muskoka Sub-Region**



The sub-region includes all or part of the following municipalities:

- City of Orillia
- Municipality of Highlands East
- Municipality of Magnetawan
- Municipality of McDougall
- Municipality of Whitestone
- Town of Bracebridge
- Town of Gravenhurst
- Town of Huntsville
- Town of Kearney
- Town of Midland
- Town of Parry Sound
- Town of Penetanguishene
- Township of Algonquin Highlands
- Township of Armour
- Township of Carling
- Township of Georgian Bay
- Township of Joly
- Township of Lake of Bays
- Township of McKellar
- Township of McMurrich-Monteith
- Township of Minden Hills
- Township of Muskoka Lakes
- Township of Oro-Medonte
- Township of Perry
- Township of Ramara
- Township of Ryerson
- Township of Seguin
- Township of Severn
- Township of Strong

- Township of Tay
- Township of the Archipelago
- Township of Tiny
- United Townships of Dysart, Dudley, Harcourt, Guilford, Harburn, Bruton, Havelock, Eyre and Clyde
- Village of Burk's Falls
- Village of Sundridge

The Parry Sound/Muskoka sub-region also includes the following First Nations and Métis Nation of Ontario councils:

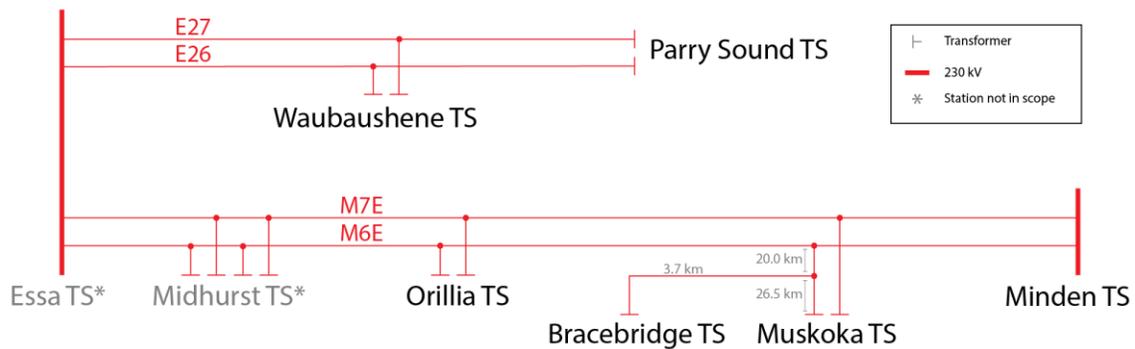
- Henvey Inlet
- Magnetawan
- Shawanaga
- Wasauksing
- Moose Deer Point
- Beausoleil
- Wahta Mohawks
- Chippewas of Rama
- MNO Barrie South Simcoe Métis Council
- MNO Moon River Métis Council
- MNO Georgian Bay Métis Council

Engagement on this regional plan may be extended to include additional communities outside of the IRRP area boundaries.

### **Parry Sound/Muskoka Electricity System**

The electricity system supplying the Parry Sound/Muskoka sub-region is shown in Figure A-4.

**Figure A-4 | Parry Sound/Muskoka Electricity System**



## Background

In the last regional planning cycle, the Parry Sound/Muskoka sub-region IRRP and RIP were published in December 2016 and August 2017, respectively. Studies conducted during the development of these plans triggered a hand-off letter issued to Hydro One Transmission in March 2017. This letter recommended the implementation of two 230 kV motorized switches on the 230 kV circuits M6/7E at Orillia TS to improve the load restoration capability to the Muskoka and Orillia areas. These switches are expected to be in-service in 2021.

The previous planning studies also recommended the replacement of end-of-life Minden TS transformers (in-service in 2021), the upsizing of the end-of-life Parry Sound TS transformers in 2024, and various distribution-level load transfers between stations (Waubashene TS to Orillia TS or Midhurst TS; Parry Sound TS to Muskoka TS) to maximize the use of the region's existing electricity system.

Long-term recommendations from the previous planning cycle in Parry Sound/Muskoka included the Parry Sound and Waubashene LAPS (to explore the potential of local demand management resources), as well as continued monitoring of demand growth and local projects to help inform the subsequent planning cycle.

## 2. Objectives

1. To assess the adequacy of electricity supply to customers in the Parry Sound/Muskoka sub-region over the next 20 years.
2. To develop a flexible, comprehensive, integrated electricity plan for the Parry Sound/Muskoka sub-region.
3. To develop an implementation plan, while maintaining flexibility in order to accommodate changes in key assumptions over time.

## 3. Scope

This IRRP will develop and recommend an integrated plan to meet the needs of the Parry Sound/Muskoka sub-region. The plan is a joint initiative involving Lakeland Power, Newmarket-Tay Power, Alectra Utilities, Elexicon, Hydro One Distribution, Hydro One Transmission, and the IESO, and will incorporate input from community engagement. The plan will integrate forecast electricity demand growth, conservation and demand management (CDM) in the area with transmission and distribution system capability, end-of-life of major facilities in the area, relevant community plans, other bulk system developments, and generation uptake, and will develop an integrated plan to address needs.

This IRRP will address regional needs in the Parry Sound/Muskoka area. Specifically, the following existing infrastructure is included in the scope of this study:

- Stations—Parry Sound TS, Waubaushene TS, Orillia TS, Bracebridge TS, Muskoka TS, Minden TS
- Transmission circuits—M6/7E, E26/27

The adequacy of the bulk system supplying the area (i.e., the 500/230 kV auto-transformers at Essa TS and supply capacity needs of M6/7E) will be assessed by the IESO through a separate bulk system planning process, and assumptions will be coordinated between the Regional and Bulk plans. Results of the bulk study will be shared with the Technical Working Group as they become available.

The Parry Sound/Muskoka IRRP will:

- Prepare a 20-year electricity demand forecast for the appropriate stations and establish needs over this timeframe
- Examine the Load Meeting Capability and reliability of the existing transmission system supplying the Parry Sound/Muskoka sub-region, taking into account facility ratings and performance of transmission elements, transformers, local generation, and other facilities such as reactive power devices
- Establish feasible integrated alternatives including a mix of CDM, generation, transmission and distribution facilities, and other electricity system initiatives in order to address the needs of the Parry Sound/Muskoka sub-region
- Evaluate options using decision-making criteria including but not limited to: technical feasibility, economics, reliability performance, environmental and social factors

## 4. Data and Assumptions

The plan will consider the following data and assumptions:

- Demand Data
  - Historical coincident peak demand information for the sub-region
  - Historical weather correction, median and extreme conditions
  - Gross peak demand forecast scenarios by sub-region, TS, etc.
  - Coincident peak demand data including transmission-connected customers

- Identified potential future load customers
- Conservation and Demand Management
  - Conservation forecast for LDC customers, based on sub-region's share of current energy efficiency programs
  - Local Achievable Potential Studies
  - Potential for CDM at transmission-connected customers' facilities
- Local resources
  - Existing local generation, including distributed generation (DG), district energy, customer-based generation, Non-Utility Generators and hydroelectric facilities as applicable
  - Existing or committed renewable generation from Feed-in-Tariff (FIT) and non-FIT procurements
  - Future district energy plans, combined heat and power, energy storage, or other generation proposals
- Relevant local plans, as applicable
  - LDC Distribution System Plans
  - Community Energy Plans and Municipal Energy Plans
  - Municipal Growth Plans
  - Indigenous Community Energy Plans
- Criteria, codes and other requirements
  - Ontario Resource and Transmission Assessment Criteria (ORTAC)
  - Supply capability
  - Load security
  - Load restoration requirements
  - NERC and NPCC reliability criteria, as applicable
  - OEB Transmission System Code
  - OEB Distribution System Code
  - Reliability considerations, such as the frequency and duration of interruptions to customers
  - Other applicable requirements
- Existing system capability
  - Transmission line ratings as per transmitter records

- System capability as per current IESO PSS/E base cases
- Transformer station ratings (10-day LTR) as per asset owner
- Load transfer capability
- Technical and operating characteristics of local generation
- Bulk System considerations to be applied to the existing area network
  - Essa 500/230 kV auto-transformer capability
  - North-South Tie flow assumptions
- End-of-life asset considerations/sustainment plans
  - Transmission assets, in particular end of life segments of 230 kV circuits in the subregion
  - Distribution assets
- Other considerations, as applicable

## 5. Technical Working Group

The core Technical Working Group will consist of planning representative/s from the following organizations:

- Independent Electricity System Operator (*Team Lead for IRRP*)
- Hydro One Transmission
- Hydro One Distribution
- Alectra Utilities
- Elexicon Energy
- Lakeland Power
- EPCOR Electricity Distribution Ontario Inc.
- Newmarket-Tay Power Distribution Ltd.

### Authority and Funding

Each entity involved in the study will be responsible for complying with regulatory requirements as applicable to the actions/tasks assigned to that entity under the implementation plan resulting from this IRRP. For the duration of the study process, each participant is responsible for their own funding.

## 6. Engagement

Integrating early and sustained engagement with communities and stakeholders in the planning process was recommended to and adopted by the provincial government to enhance the regional planning and siting processes in 2013. These recommendations were subsequently referenced in the 2013 Long Term Energy Plan. As such, the Technical Working Group is committed to conducting plan-level engagement throughout the development of the Parry Sound/Muskoka IRRP.

The first step in engagement will consist of the development of a public engagement plan, which will be made available for comment before it is finalized. The data and assumptions as outlined in Section 4.0 will help to inform the scope of community and stakeholder engagement to be considered for this IRRP.

## 7. Activities, Timeline, and Primary Accountability

Activity	Lead Responsibility	Deliverable(s)	Timeframe
<b>1 Prepare Terms of Reference considering stakeholder input</b>	<i>IESO</i>	- Finalized Terms of Reference	Q4 2020
<b>2 Develop the planning forecast for Parry Sound TS and Waubaushene TS</b>		- Long-term planning forecast scenarios	Q4 2020 – Q1 2021
- Establish historical coincident and non-coincident peak demand information	<i>IESO</i>		
- Establish historical weather correction, median and extreme conditions	<i>IESO</i>		
- Establish gross peak demand forecast	<i>LDCs</i>		
- Establish existing, committed and potential DG	<i>LDCs</i>		
- Establish near- and long-term conservation forecast based on planned energy efficiency activities and codes and standards	<i>IESO</i>		
- Develop planning forecast scenarios for sensitivity analyses	<i>IESO</i>		
<b>3 Reconfirm load transfer capabilities from Parry Sound TS and Waubaushene TS</b>	<i>LDCs</i>	- Load transfer capabilities under normal and emergency conditions	Q4 2020 – Q1 2021
<b>4 Provide and review relevant community plans, if applicable</b>	<i>LDCs, First Nations and IESO</i>	- Relevant community plans	Q4 2020 – Q1 2021

Activity	Lead Responsibility	Deliverable(s)	Timeframe
<b>5 Complete system studies to identify needs</b> <ul style="list-style-type: none"> <li>- Obtain PSS/E base case</li> <li>- Include bulk system assumptions as identified in Key Assumptions</li> <li>- Apply reliability criteria as defined in ORTAC to demand forecast scenarios</li> <li>- Confirm and refine the need(s) and timing/load levels</li> </ul>	<i>IESO, Hydro One Transmission</i>	- Summary of needs based on demand forecast scenarios for the 20-year planning horizon	Q1 – Q2 2021
<b>6 Develop options and alternatives</b> <ul style="list-style-type: none"> <li>- Develop energy efficiency options, with consideration for previous LAPS findings</li> <li>- Develop local generation/demand management options, with consideration for previous LAPS findings</li> <li>- Confirm the transmission and distribution alternatives: advancement of EOL transformer replacement plans and/or load transfers</li> <li>- Develop portfolios of integrated alternatives</li> <li>- Technical comparison and evaluation</li> </ul>	<i>IESO and LDCs</i> <i>IESO and LDCs</i> <i>IESO, Hydro One Transmission and LDCs</i> <i>A//</i> <i>A//</i>	- Develop flexible planning options for forecast scenarios	Q2 – Q3 2021
<b>7 Plan and undertake community &amp; stakeholder engagement</b> <ul style="list-style-type: none"> <li>- Early engagement including with local municipalities and First Nation communities within study area, First Nation communities who may have an interest in the study area, and the Métis Nation of Ontario</li> <li>- Develop communications materials</li> <li>- Undertake community and stakeholder engagement</li> <li>- Summarize input and incorporate feedback</li> </ul>	<i>A//</i> <i>A//</i> <i>A//</i> <i>A//</i>	<ul style="list-style-type: none"> <li>- Community and Stakeholder Engagement Plan</li> <li>- Input from local communities, First Nation communities, and Métis Nation of Ontario</li> </ul>	Ongoing as required
<b>8 Develop long-term recommendations and implementation plan based on community and stakeholder input</b>	<i>IESO</i>	<ul style="list-style-type: none"> <li>- Implementation plan</li> <li>- Monitoring activities and identification of decision triggers</li> </ul>	Q3 – Q4 2021

Activity	Lead Responsibility	Deliverable(s)	Timeframe
<b>9 Prepare the IRRP report detailing the recommended near, medium and long-term plan for approval by all parties</b>	<i>IESO</i>	<ul style="list-style-type: none"> <li>- Procedures for annual review</li> <li>- IRRP report</li> </ul>	Q1 – Q2 2022

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