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NEEDS ASSESSMENT REPORT

South Georgian Bay - Muskoka

Date: April 30, 2020

Prepared by: South Georgian Bay - Muskoka Region Study Team

Transmission & Distribution

Newmarket-Tay Power Distribution Ltd.

Disclaimer

This Needs Assessment Report was prepared for the purpose of identifying potential needs in the South Georgian Bay - Muskoka Region and to recommend which need may be a) directly addressed by developing a preferred plan as part of NA phase and b) identify needs requiring further assessment and/or regional coordination. The results reported in this Needs Assessment are based on the input and information provided by the Study Team for this region.

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Executive Summary

REGION South Georgian Bay (SGB) – Muskoka (the "Region")

LEAD Hydro One Networks Inc. ("HONI")

START DATE: January 30, 2020 **END DATE:** April 30, 2020

1. INTRODUCTION

The first cycle of the Regional Planning process for the South Georgian Bay (SGB) - Muskoka Region was completed in July 2016 with the publication of the Regional Infrastructure Plan ("RIP") which provided a description of needs and recommendations of preferred wires plans to address near-term needs.

This is the second cycle of regional planning starting with a Needs Assessment ("NA"). The purpose of this NA is a) to identify any new needs and/or to reaffirm needs identified in the previous SGB-Muskoka Regional Planning cycle and b) recommend which need may be a) met more directly by distributors or other customers and their respective transmitter b) identify needs requiring further assessment and/or regional coordination.

2. REGIONAL ISSUE/TRIGGER

In accordance with the Regional Planning process, the regional planning cycle should be triggered at least every five years. In light of these timelines, the 2nd Regional Planning cycle was triggered for SGB-Muskoka Region.

3. SCOPE OF NEEDS ASSESSMENT

This assessment's primary objective is to identify the electrical infrastructure needs over the study period, develop options and recommend which needs require further regional coordination.

The scope of this NA includes:

- Review and reaffirm needs/plans identified in the previous RIP; and
- Identification and assessment of system capacity, reliability, operation, and aging infrastructure needs in the region: and
- Identification and assessment of system capacity, reliability, operation, and aging infrastructure needs in the region.
- Identify needs that will require further coordination at the regional level and those which can be met more directly by distributors and other customers as their respective transmitter.

The Study Team may also identify additional needs during the next phases of the planning process, namely Scoping Assessment ("SA"), IRRP and RIP, based on updated information available at that time.

As per the PPWG Regional Planning Report to the Board (May 2013), the planning horizons of regional facilities are typically considered over 1-20 years; however, in most situations focus is over the 1 – 10-year timeframe.

4. INPUTS/DATA

The Study Team representatives from Local Distribution Companies ("LDC"), the Independent Electricity System Operator ("IESO"), and Hydro One provided input and relevant information for this Region regarding capacity needs, reliability needs, operational issues, and major assets/facilities approaching end-of-life ("EOL").

5. ASSESSMENT METHODOLOGY

The assessment methodology includes review of planning information such as load forecast, conservation and demand management ("CDM") forecast and available distributed generation ("DG") information, any system reliability and operation issues, and major high voltage equipment identified to be at or near the end of their life.

A technical assessment of needs was undertaken based on:

- Current and future station capacity and transmission adequacy;
- Reliability needs and operational concerns; and
- Any major high voltage equipment reaching the end of its life.

6. NEEDS

I. Needs Identified from Previous Cycle – Implementation Plan Update

i. Barrie TS transformer supply capacity will be exceeded, and consequently result in thermal violation of the radial supply circuits (E3B/E4B). The majority of equipment at Barrie TS as well as the Essa TS 115kV yard have also been assessed at being end of life and in need of replacement due to asset condition. This resulted in creation of the Barrie Area Transmission Reinforcement (BATU) project to address these needs. This investment in presently underway with an in-service date scheduled for 2022.

ii. Parry Sound TS transformer supply capacity has been exceeded, and transformers have also been assessed at being end of life and in need of replacement due to asset condition. Hydro One will be installing new 230/44kV 83MVA transformers to address both end of life and supply capacity needs. The In-service is scheduled for 2024.

iii. Loss of M6E and M7E will result in violation of ORTAC load restoration criteria based on the peak load forecast. To adhere to the criteria, Hydro One will be installing 230kV motorized disconnect switches on the M6E and M7E circuits (at Orillia TS) to improve load restoration time. The In-service is scheduled for 2021.

iv. Minden TS – Replace 230/44kV 42MVA (T1/T2) transformers with new 230/44kV 83MVA units. These transformers have been assessed at being end of life and in need of replacement due to asset condition. The In-service scheduled is for 2021.

v. Orangeville TS – Replace and upgrade existing 230/44kV 83MVA transformers (T3/T4) with new 125MVA units. Replace and upgrade existing non standard three winding 230/44/27.6 125MVA transformers (T1/T2) with new dual winding 230/27.6 83MVA units. Reconfigure low voltage equipment and transfer existing 44kV feeders from T1/T2 DESN to the T3/T4 DESN. These transformers and associated low voltage equipment has been assessed at being end of life and in need of replacement due to asset condition. This is presently underway with an In-Service scheduled for 2023.

II. Newly Identified Needs in the region

i. Waubaushene TS - This station will exceed its normal supply capacity at the end of 2020 based on the summer demand forecast. An immediate solution is required to address the summer loading concern and shall be coordinated with a permanent solution to address long term supply capacity needs. As well, the transformers are expected to be at the end of the study period and require replacement by 2030.

ii. Everett TS – Load growth at this station is restricted due to a limiting component within the low votage yard. This will be need to be corrected by 2026 to allow load to continue growing as per demand forecast.

iii. Barrie TS - This station will exceed its normal summer and winter supply capacity in 2024 and 2026 respectively, based on the existing 115/44kV transformers installed. The Barrie Area Transmission Project (BATU) will be completed in 2022, and help to address existing capacity, and end of life issues that have been identified in the first RP cycle. Although supply capacity appears to be available post-BATU, Hydro One Distribution and its embedded LDC (InnPower) will be constrained at the 44kV feeder supply level in 2025. A plan is required to address the supply capacity need from InnPower beyond what Barrie TS can provide.

iv. Parry Sound TS - This station will exceed supply in 2020 based on the winter demand forecast. Hydro One will be upgrading the transformers with two new 230/44kV 83MVA units in 2024. A solution is required to address the immediate station capacity need.

v. Sections of M6E/M7E are at end of life and in need of replacement – Refurbish 25km of 230kV transmission line from Orillia TS x Coopers Falls JCT – In-Service 2024

Sections of E8V / E9V are at end of life and in need of replacement – Refurbish 56km of 230kV transmission line from Orangeville TS x Essa JCT – In-Service 2027

Sections of D1M / D2M are at end of life and in need of replacement – Refurbish 62km of 230kV transmission line from Minden TS x Otter Creek JCT - In-Service 2028

vi. M6E/M7E (Essa TS x Midhurst TS) thermal overloading - With four Des Joachims GS units out of service the subsequent loss of either M6E or M7E will result in the companion circuit to exceed its LTE (Long

Term Emergency) rating on the line section from Essa TS x Midhurst TS. This overload occurs as early as 2023.

7. RECOMMENDATIONS

i. Waubaushene TS – Hydro One will coordinate with the connected LDC and their embedded customers (as needed) to address the immediate supply capacity constraints that may appear within the next year. Permanent solution(s) will require further regional coordination to verify if non-wires options would be beneficial. Further regional coordination is required.

ii. Everett TS – Full utilization of the station transformer capacity is restricted by a series limiting component. A CT ratio setting on the low voltage bushing of the transformer breaker can be modified to allow full transformer LTR capability. Hydro One will initiate a project directly in collaboration with the LDCs as soon as practical. Further regional coordination is not required.

iii. Barrie TS – The Barrie Area Transmission Upgrade (BATU) project is presently underway with a planned in service of 2022. No further coordination is required for the BATU project.

The working group will continue to develop supply capacity solution(s) for Innisfil area load growth. Further regional coordination is required.

iv. Parry Sound TS – The station transformer upgrade is presently underway and scheduled to be in service in 2024. Hydro One will try to expedite the replacement as quickly as possible and manage overloading risk to the existing transformers. No further regional coordination is required.

v. M6E/M7E (Essa x Midhurst) Overloading – Further regional coordination is required.

vi. Replacement of end of life assets (section 8.1 e.f.g) require further regional coordination.

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2 INTRODUCTION

The first cycle of the Regional Planning process for the South Georgian Bay - Muskoka Region was completed in July 2016 with the publication of the Regional Infrastructure Plan ("RIP"). The RIP provided a description of needs and recommendations of preferred wires plans to address near- and medium-term needs.

The purpose of this Needs Assessment ("NA") is to identify new needs and to reconfirm needs identified in the previous SGB-Muskoka regional planning cycle. Since the previous regional planning cycle, some new needs in the region have been identified.

This report was prepared by the South Georgian Bay - Muskoka Region Study Team ("Study Team"), led by Hydro One Networks Inc. Participants of the Study Team are listed below in Table 1. The report presents the results of the assessment based on information provided by the Hydro One, the Local Distribution Companies ("LDC") and the Independent Electricity System Operator ("IESO").

Table 1: SGB-Muskoka Region Study Team Participants

Company
Hydro One Networks Inc. (Lead Transmitter)
Independent Electricity System Operator ("IESO")
Hydro One Networks Inc. (Distribution)
Alectra Utilities
InnPower
Orangeville Hydro
Elexicon Energy
Lakeland Power
EPCOR Electricity Distribution Ontario Inc.
Newmarket-Tay Power Distribution Ltd
Orillia Power Distribution Corp.
Wasaga Distribution Inc.

3 REGIONAL ISSUE/TRIGGER

In accordance with the Regional Planning process, the Regional Planning cycle should be triggered at least every five years. In light of Regional Planning cycle timelines and new needs in the SGB-Muskoka region, the 2nd Regional Planning cycle was triggered for the SGB-Muskoka region.

4 SCOPE OF NEEDS ASSESSMENT

The scope of this NA covers the SGB-Muskoka region and includes:

- Review the status of needs/plans identified in the previous RIP; and
- Identification and assessment of any new needs (e.g. system capacity, reliability, operation, and aging infrastructure)

The Study Team may identify additional needs during the next phases of the regional planning process, namely Scoping Assessment ("SA"), Local Planning ("LP"), IRRP, and/or RIP.

5 REGIONAL DESCRIPTION AND CONNECTION CONFIGURATION

The geographical area of the South Georgian Bay/Muskoka Region is the area roughly bordered by West Nippising on the North-West, the Algonquin Provincial Park on the North-East, Scugog on the South, Erin on the South-West, and Grey Highlands on the West. This region is divided into two sub-regions:

- Barrie/Innisfil Sub-region: This area encompasses the City of Barrie, the Towns of Innisfil, New Tecumseth and Bradford West Gwillimbury, and the Townships of Essa, Springwater, Clearview, Mulmur, and Adjala-Tosorontio.
- Parry Sound/Muskoka Sub-region: This area encompasses the Districts of Muskoka and Parry Sound, and the northern part of Simcoe County.

The boundaries of South Georgian Bay - Muskoka Region is shown below in Fig. 1.

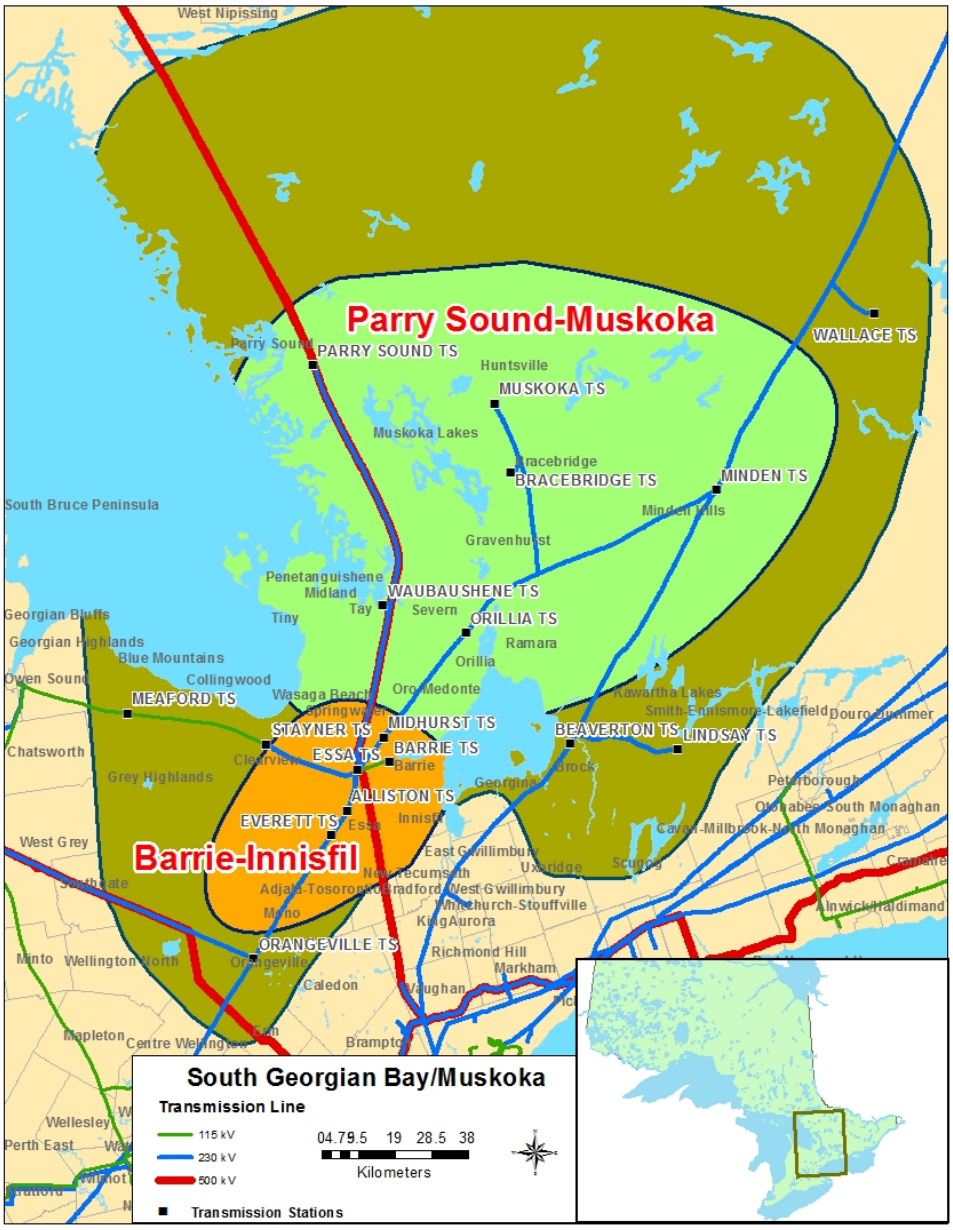

Figure 1: Geographical Area of SGB-Muskoka Region with Electrical Layout

Electrical supply to the Region is provided through two (2) 500/230kV auto-transformers at Essa TS, the 230kV transmission lines connecting Minden TS to Des Joachims TS, the 230kV circuits E8V and E9V coming from Orangeville TS, and the single 115kV circuit S2S connecting to Owen Sound TS. There are sixteen (16) HONI step-down transformer stations in the Region, most of which are supplied by circuits radiating out from Essa TS, and the majority of the distribution system is at 44kV, except for Orangeville TS which has 27.6kV and 44kV feeders.

The following circuits are not included in the South Georgian Bay/Muskoka Region:

• The 230kV circuits, B4V and B5V, and all stations which they supply. These circuits and stations are included in the Greater Bruce/Huron Region.
• The 230kV circuits, D6V and D7V, and all stations which they supply. These circuits and stations are included in the Kitchener/Waterloo/Cambridge/Guelph Region.

The existing facilities in the Region are summarized below and depicted in the single line diagram shown in Figure 2. The 500kV system is part of the bulk power system and is not studied as part of this Needs Assessment:

• Essa TS is the major transmission station that connects the 500kV network to the 230kV system via two 500/230kV auto-transformers. Essa TS also supplies the 115kV system towards Barrie TS via two 230/115kV auto-transformers.

• Eleven step-down transformer stations supply load to the north and east areas of the Region (north and east of Essa TS): Barrie TS, Beaverton TS, Bracebridge TS, Lindsay TS, Midhurst TS, Minden TS, Muskoka TS, Orillia TS, Parry Sound TS, Wallace TS, and Waubashene TS.

• Five step-down transformer stations supply load to the south and west areas of the Region (south and west of Essa TS): Alliston TS, Everett TS, Meaford TS, Orangeville TS, and Stayner TS.

• Eight 230kV circuits (E8V, E9V, E20S, E21S, E26, E27, M6E, and M7E) radiating outward from Essa TS provide local supply to the Region. These circuits are essential to the Region and will be included in the study to ensure long-term reliability. Four 230kV circuits (D1M, D2M, D3M, and D4M) entering the region from the east are also a major supply path for the Region and will be analyzed in this study.

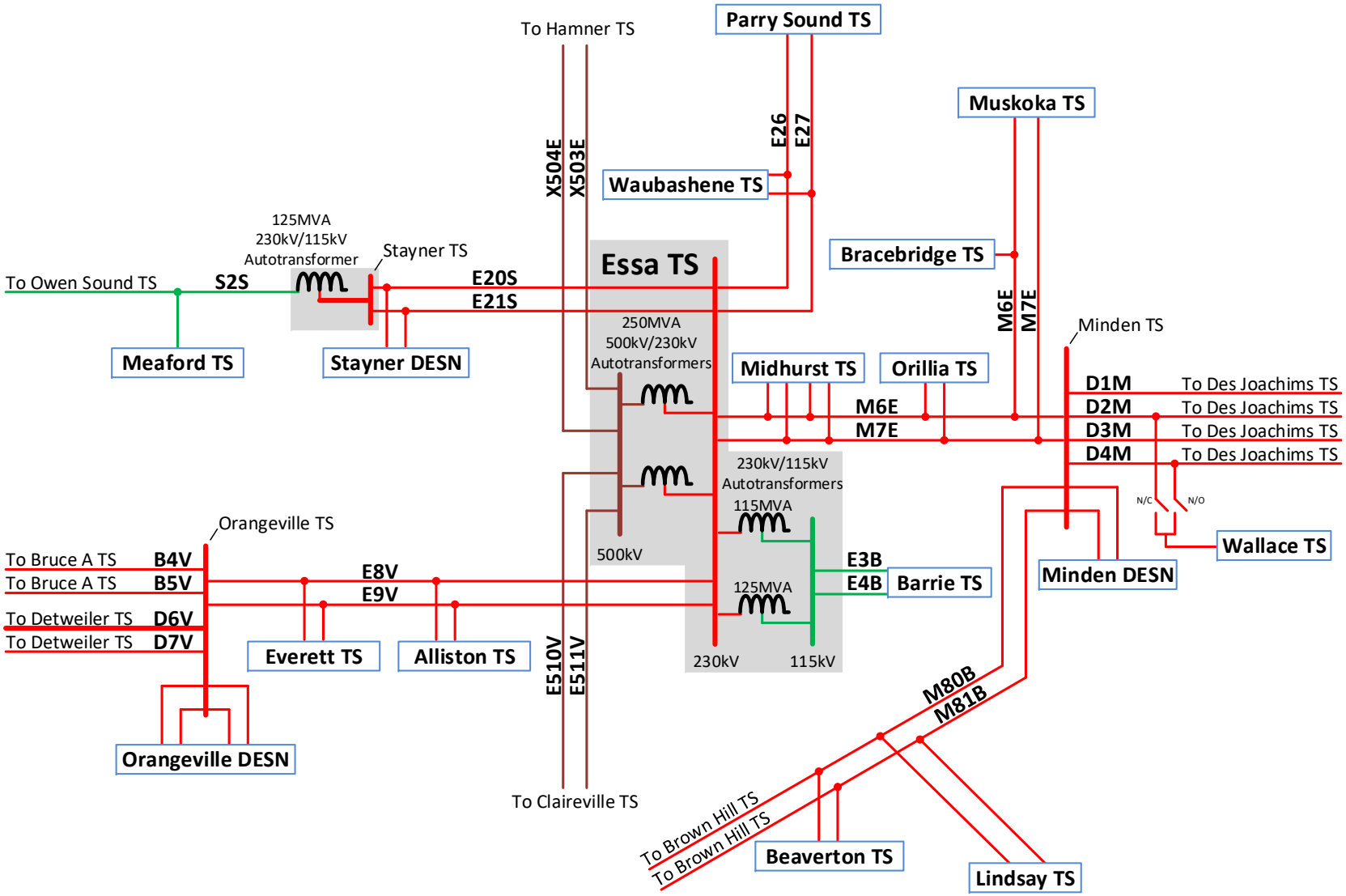

Figure 2: Single Line Diagram of South Georgian Bay - Muskoka Region

6 INPUTS AND DATA

Study Team participants, including representatives from LDCs, IESO, and Hydro One provided information and input for the South Georgian Bay - Muskoka Region NA. The information provided includes the following:

- South Georgian Bay - Muskoka Load Forecast for all supply stations;
- Known capacity and reliability needs, operating issues, and/or major assets approaching the end of life ("EOL"); and
- Planned/foreseen transmission and distribution investments that are relevant to regional planning for the SGB-Muskoka Region.

7 ASSESSMENT METHODOLOGY

The following methodology and assumptions are made in this Needs Assessment:

Information gathering included:

i. Load forecast: The LDCs provided load forecasts for all the stations supplying their loads in the SGB-Muskoka region for the 10-year study period. The IESO provided a Conservation and Demand Management ("CDM") and Distributed Generation ("DG") forecast for the SGB-Muskoka region. The region's extreme summer non-coincident peak gross load forecast for each station were prepared by applying the LDC load forecast load growth rates to the actual 2019 summer and winter peak weather corrected loads. The summer / winter weather correction factors were provided by Hydro One. The net weather summer load forecasts were produced by reducing the gross load forecasts for each station by the % age CDM and then by the amount of effective DG capacity provided by the IESO for that station. It is to be noted that in the mid-term (5 to 10 year) time frame, contracts for existing DG resources in the region begin to expire, at which point the load forecast indicates a decreasing contribution from local DG resources, and an increase in net demand. These load forecasts for the individual stations in the SGB-Muskoka region is given in Appendix A;

ii. Relevant information regarding system reliability and operational issues in the region; and

iii. List of major HV transmission equipment planned and/or identified to be refurbished and/or replaced due to the end of life which is relevant for regional planning purposes. This includes HV transformers, autotransformers, HV Breakers, HV underground cables and overhead lines.

A technical assessment of needs was undertaken based on:

- Current and future station capacity and transmission adequacy;
- System reliability and operational concerns; and
- Any major high voltage equipment reaching the end of life.

8 NEEDS

This section describes emerging needs identified in the South Georgian Bay - Muskoka Region, and also reaffirms the near, mid, and long-term needs already identified in the previous regional planning cycle.

The status of the previously identified needs is summarized in Table 2 below.

Table 2: Needs Identified in the Previous Regional Planning Cycle

Needs identified in the previous RP cycle	Needs Details	Current Status	In-Service
Supply Capacity & End-Of Life	Barrie TS transformer supply capacity will be exceeded and has consequently overload the supply circuits (E3B/E4B) InnPower is an embedded LDC supplied from a single 44kV feeder from Barrie TS and requires an additional feeder to supply its loads.	Hydro One's Barrie Area Transmission Reinforcement (BATU) project is underway This investment will address the needs identified in the last RP cycle.	2022
	Parry Sound TS supply capacity has been exceeded, and in need of upgrading. Transformers have also been assessed at being end of life and in need of replacement due to asset condition.	Hydro One will be installing new 230/44kV 83MVA transformers to address both end of life and supply capacity needs.	2024
Load Restoration	Loss of M6E and M7E will result in violation of ORTAC load restoration criteria based on the peak load	Hydro One is installing 230kV motorized disconnect switches on the M6E and M7E circuits. This will improve load restoration time. Underway	2021
End of Life Asset Replacement	Minden TS – Replacement of 230/44kV (T1/T2) transformers	Underway	2021
	Orangeville – Replacement of 230/44/27.6 (T1/T2) and 230/44 (T3/T4) transformers, low voltage switchyard	Underway	2023

8.1 End-Of-Life (EOL) Equipment Needs

Hydro One and LDCs have provided high voltage asset information under the following categories that have been identified at this time and are likely to be replaced over the next 10 years:

- Autotransformers
- Power transformers
- HV breakers
- Transmission line requiring refurbishment where an uprating is being considered for planning needs and require Leave to Construct (i.e., Section 92) application and approval
- HV underground cables where an uprating is being considered for planning needs and require EA and Leave to Construct (i.e., Section 92) application and approval

The end-of-life assessment for the above high voltage equipment typically included consideration of the following options:

- Replacing equipment with similar equipment and built to current standards (i.e., "like-for-like" replacement);
- Replacing equipment with similar equipment of higher / lower ratings i.e. right sizing opportunity and built to current standards;
- Replacing equipment with lower ratings and built to current standards by transferring some load to other existing facilities;
- Eliminating equipment by transferring all of the load to other existing facilities;

In addition, 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 cost and longer duration of customer outages.

Accordingly, following major high voltage equipment has been identified as approaching its end of life over the next 10 years and assessed for right sizing opportunity.

a. Barrie TS – Replace and Upgrade existing 115/44kV 83MVA transformers (T1/T2) with new 230kV/44kV 125MVA transformers. Remove Essa TS T1/T2 autotransformers and convert Barrie TS supply circuits (E3B/E4B) from 115kV to 230kV.

b. Minden TS -Replace and upgrade existing 230/44kV 42MVA transformers (T1/T2) with new 230/44kV 83MVA units.

c. Orangeville TS - Replace and upgrade existing 230/44kV 83MVA transformers (T3/T4) with new 125MVA units. Replace and upgrade existing non standard three winding 230/44/27.6 125MVA transformers (T1/T2) with new dual winding 230/27.6 83MVA units. Reconfigure low voltage equipment and transfer existing 44kV feeders from T1/T2 DESN to the T3/T4 DESN.

d. Parry Sound TS – Replace and upgrade existing 230/44kV 42MVA transformers (T1/T2) with new 230/44kV 83MVA units.

e. M6E/M7E – Refurbish 25km of 230kV transmission line from Orillia TS x Coopers Fls JCT (In-Service 2024)

f. E8V / E9V – Refurbish 56km of 230kV transmission line from Orangeville TS x Essa JCT * (In-Service 2027)

g. D1M / D2M – Refurbish 62km of 230kV transmission line from Minden TS x Otter Creek JCT * (In-Service 2028)

*- further conductor samples/testing to be performed to confirm need.

8.2 Station and Transmission Capacity Needs in the South Georgian Bay - Muskoka Region

The following Station and Transmission supply capacities needs have been identified in the SGB-Muskoka region during the study period of 2020 to 2029.

8.2.1 230/115 kV, & 500/230kV Autotransformers

230/115 kV autotransformers at Essa TS(T1/T2) and Stayner TS (T1) remain within limits for the study period based on both and summer and winter demand forecast. Note: The existing Barrie area transmission upgrade project (BATU) will remove the Essa TS (T1/T2) autotransformers as part of its scope of work in 2022.

500/230kV autotransformers at Essa TS (T3/T4) remain within limits for the study period based on both and summer and winter demand forecast.

8.2.2 230 kV Transmission Lines

The 230kV M6E/M7E circuits from Essa TS to Midhurst TS exceed the Long-Term Emergency (LTE) rating within the study period. With four out of eight Des Joachims GS units are out of service (approx. 200MW) the subsequent loss of either M6E or M7E will result in the companion circuit to exceed its LTE rating. This overload occurs as early as 2023 and continues until the end of the NA study period.

8.2.3 115kV Transmission Lines

With the loss of E4B, the companion E3B circuit will exceed its summer Long-Term Emergency (LTE) rating within the study period. The scope of the Barrie Area Transmission Upgrade (BATU) project will address this finding with an expected 2022 in-service date.

8.2.4 230 kV and 115 kV Connection Facilities

A station capacity assessment was performed over the study period for the 230 kV and 115 kV TSs in the Region using both summer and winter station peak load forecasts provided by the study team. The results are as follows:

a. Waubaushene TS

Waubaushene TS has a summer 10-day LTR of 94MW and will exceed its normal supply capacity at the end of 2020 based on the summer demand forecast. Summer overloading at this station has been increasing becoming a concern and the forecast in this NA further reinforces the need for an immediate solution.[1] Initial distribution studies have shown that up to 10MW of load can be permanently transferred to Midhurst TS. This solution in combination with additional CDM/DG initiates may provide the capacity relief needed and its effectiveness will be confirmed in the next stage. While these initiatives are being explored, it is important to note that the existing 230/44kV transformers (T5/T6) are scheduled for replacement in 2030, and if needed can be upgraded to larger units to permanently alleviate supply capacity constraints. This investment can be advanced with agreement from connected LDCs if it needs to be coordinated with shorter term solutions.

b. Everett TS

Everett TS has a summer and winter 10-Day LTR of 86MW. The station supply capability is limited by a CT ratio setting on the low voltage bushing of the transformer breakers, thereby restricting the ability to utilize the full supply capability of the transformers. This restriction can be alleviated by adjusting the CT ratio of the transformer breakers, and must be completed by 2026 to allow station load to continue growing.

c. Barrie TS

Barrie TS presently has a 10-Day LTR of 109MW which will exceed its normal supply capacity in the year 2024 based on the summer demand forecast. The Barrie Area Transmission Project (BATU) project currently underway and once completed will see two new 230/44kV 125MVA transformers increasing the supply capacity of the station (170MVA in the summer), even with the new units installed, station LTR will exceed in the summer 2029. Although capacity does appear to be available for the near and mid-term, Hydro One distribution and its' embedded LDC (InnPower) will see a supply capacity constraint at the 44kV feeder level in 2025. Minor capacity increases can be accommodated on the 44kV system but only on an emergency basis, and can not be used as a permanent supply solution for increased load growth.

[1] Waubaushene TS experienced station loading in excess of 100MVA in July 2018. Although this load occurred for 2hrs and both T5/T6 were in-service, Hydro One operations were ready to initiate control actions to shed load in the event of a transformer outage.

The working group agreed that for this station, it would be reasonable to use the explicit MW values provided by the LDCs, to coincide with ongoing regulatory proceeding related to the aforementioned BATU project. [2] As such, the load forecast for each connected LDC (Shown in Appendix A) at Barrie TS is explicitly shown to provide the working group greater transparency and help to identify individual LDC needs within the study period. A near term solution is required to address this need from InnPower and should be incorporated with any long-term solutions to supply their study forecast of 93MW. InnPower will need new supply capacity into the Innisfil service territory to be provided by 2025 to service its load growth. This growth is consistent with the forecasted growth identified in the 2016 Barrie/Innisfil IRRP.

d. Parry Sound TS

Parry Sound TS has a 10-day winter LTR of 51MW and will be exceeded at the end of 2020 based on the winter demand forecast.
Parry Sound TS presently has 230/44kV 42MVA transformers (T1/T2) that have approached end of life. Hydro One will be right sizing these transformers and replacing these with two new 230/44kV 83MVA units which will provide the supply capacity needed for future load growth. These transformers are scheduled to be in-service 2024. Based on the immediate need for capacity relief at the station, Hydro One will try to expedite the replacement as quickly as possible and manage overloading risk to the existing transformers.

e. Other TSs in the Region

All the other transmission stations (TS) in the region are forecasted to remain within their normal supply capacity during the study period. Capacity needs for these stations will be reviewed in the next planning cycle.

8.3 System Reliability, Operation and Restoration Review

No new significant system reliability and operating issues identified for this Region. Based on the net coincident load forecast, the loss of one element will not result in load interruption greater than 150MW. The maximum load interrupted by configuration due to the loss of two elements is below the load loss limit of 600MW by the end of the 10-year study period.

[2] The forecast provided in IR response (January 9, 2020) with respect to BATU Leave to construct application (EB-2018-0017) illustrates Alectra's assigned capacity of 90MW at Barrie TS.

9 CONCLUSION AND RECOMMENDATIONS

The Study Team recommends the following –

i. Waubaushene TS – Hydro One will coordinate with the connected LDC and their embedded customers (as needed) to address the immediate supply capacity constraints that may appear within the next year. Permanent solution(s) will require further regional coordination to verify if non-wires options would be beneficial. Further regional coordination is required.

ii. Everett TS – Full utilization of the station transformer capacity is restricted by a series limiting component. A CT ratio on the low voltage bushing of the transformer breaker can be changed to allow full transformer LTR capability.
Hydro One will initiate a project directly in collaboration with the LDCs as soon as practical. Further regional coordination is not required.

iii. Barrie TS – The Barrie Area Transmission Upgrade (BATU) project is presently underway with a planned in service of 2022. No further coordination is required for the BATU project.

The working group will continue to develop supply capacity solution(s) for Innisfil area load growth. Further regional coordination is required.

iv. Parry Sound TS – The station transformer upgrade is presently underway and scheduled to be in service in 2024. Hydro One will try to expedite the replacement as quickly as possible and manage overloading risk to the existing transformers. No further regional coordination is required.

v. M6E/M7E (Essa x Midhurst) Overloading – Further regional coordination is required.

vi. Replacement of end of life assets (section 8.1 e.f.g) require further regional coordination.

Appendix A: Weather Adjusted Non-Coincident Summer Forecast

Transformer Station Name	DESN ID (e.g. T1/T2)	LTR (MVA)	LV Cap bank	LTR (MW)	Customer Data (MW)	Summer Peak Load											
						Historical Data (MW)			Near Term Forecast (MW)					Medium Term Forecast (MW)			
						2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Alliston TS	T2	83	N	75	Gross Peak Load				44.0	44.3	44.6	44.9	45.2	45.5	45.9	46.2	46.5	46.8
					CDM (MW)				0.4	0.5	0.6	0.8	1.0	1.2	1.3	1.6	1.8	1.9
					DG (MW)				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Net Load Forecast	41.0	38.5	43.7	43.6	43.8	44.0	44.1	44.2	44.4	44.5	44.5	44.7	45.0
Alliston TS	T3/T4	111	N	100	Gross Peak Load				71.1	73.2	75.4	77.7	80.1	82.5	85.0	87.5	90.2	92.9
					CDM (MW)				0.6	0.8	1.0	1.4	1.7	2.1	2.4	3.1	3.4	3.7
					DG (MW)				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Net Load Forecast	76.7	61.8	69.0	70.5	72.5	74.4	76.3	78.3	80.3	82.5	84.4	86.8	89.2
Barrie TS	T1/T2	115	Y	109	Gross Peak (Alectra)				65.1	67.1	69.2	71.3	73.5	75.5	77.4	79.4	81.5	83.6
					Gross Peak (InnPower)				19.0	23.2	30.1	39.8	48.8	56.8	65.4	75.6	84.3	92.9
					Gross Peak (Total)				84.1	90.3	99.3	111.2	122.3	132.2	142.8	155.0	165.8	176.5
					CDM (MW)				0.7	0.9	1.4	2.0	2.7	3.4	4.1	5.5	6.3	7.0
					DG (MW)				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Net Load Forecast	93.9	119.5	127.9	83.4	89.4	97.9	109.1	119.7	128.8	138.8	149.5	159.5	169.5
Beaverton TS	T3/T4	203	Y	193	Gross Peak Load				60.2	60.8	61.3	61.9	62.4	63.0	63.5	64.1	64.7	65.3
					CDM (MW)				0.5	0.6	0.8	1.1	1.4	1.6	1.8	2.3	2.4	2.6
					DG (MW)				0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
					Net Load Forecast	52.9	55.7	59.7	59.5	59.9	60.3	60.5	60.9	61.2	61.5	61.7	62.0	62.5
Bracebridge TS	T1	83	N	75	Gross Peak Load				0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
					CDM (MW)				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					DG (MW)				0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
					Net Load Forecast	13.0	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2

Everett TS	T1/T2	95	N	86	Gross Peak Load				74.6	76.8	79.0	81.3	83.7	86.2	88.7	91.3	94.0	96.8
					CDM (MW)				0.6	0.8	1.1	1.5	1.8	2.2	2.5	3.2	3.6	3.8
					DG (MW)				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Net Load Forecast	82.0	70.9	72.5	73.9	76.0	77.9	79.9	81.9	84.0	86.2	88.1	90.4	92.9
Lindsay TS	T1/T2	169	Y	161	Gross Peak Load				79.9	80.9	82.0	83.0	84.1	85.2	86.3	87.4	88.5	89.7
					CDM (MW)				0.7	0.8	1.1	1.5	1.8	2.2	2.5	3.1	3.3	3.5
					DG (MW)				0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
					Net Load Forecast	72.3	72.9	78.9	79.1	80.0	80.7	81.4	82.2	82.9	83.7	84.2	85.1	86.0
Meaford TS	T1/T2	55	Y	52	Gross Peak Load				26.8	27.0	27.1	27.3	27.5	27.7	27.8	28.0	28.2	28.4
					CDM (MW)				0.2	0.3	0.4	0.5	0.6	0.7	0.8	1.0	1.1	1.1
					DG (MW)				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Net Load Forecast	30.2	33.4	26.6	26.6	26.7	26.8	26.8	26.9	27.0	27.0	27.0	27.1	27.2
Midhurst TS	T1/T2	171	Y	162	Gross Peak Load				120.6	122.9	125.3	127.7	130.2	132.7	135.3	137.9	140.6	143.3
					CDM (MW)				1.0	1.3	1.7	2.3	2.8	3.4	3.9	4.9	5.3	5.7
					DG (MW)				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Net Load Forecast	122.0	122.5	118.3	119.5	121.6	123.6	125.4	127.4	129.3	131.4	133.1	135.3	137.6
Midhurst TS	T3/T4	166	N	149	Gross Peak Load				99.7	102.5	105.4	108.4	111.4	114.6	117.8	121.1	124.6	128.1
					CDM (MW)				0.9	1.1	1.4	2.0	2.4	2.9	3.4	4.3	4.7	5.1
					DG (MW)				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Net Load Forecast	110.1	97.2	97.0	98.8	101.5	104.0	106.4	109.0	111.6	114.5	116.9	119.9	123.0
Minden TS	T1/T2	58	N	52	Gross Peak Load				42.9	43.2	43.5	43.9	44.2	44.5	44.8	45.1	45.4	45.8
					CDM (MW)				0.4	0.4	0.6	0.8	1.0	1.1	1.3	1.6	1.7	1.8
					DG (MW)				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Net Load Forecast	39.9	39.5	42.6	42.6	42.8	42.9	43.1	43.2	43.3	43.5	43.5	43.7	44.0
Muskoka TS	T1/T2	178	Y	169	Gross Peak Load				131.0	133.1	135.1	137.2	139.4	141.6	143.8	146.0	148.3	150.6
					CDM (MW)				1.1	1.4	1.9	2.5	3.0	3.6	4.1	5.1	5.6	6.0
					DG (MW)				0.1	0.1	0.1	0.1	0.1	0.1	0.1	-1.0	-1.2	-1.2
					Net Load Forecast	118.8	132.7	129.0	129.8	131.6	133.2	134.6	136.2	137.8	139.5	141.9	143.8	145.8

Orangeville TS	T1/T2	103	N	93	Gross Peak Load				58.2	58.8	59.5	60.2	60.8	61.5	62.2	62.9	63.6	64.3
					CDM (MW)				0.5	0.6	0.8	1.1	1.3	1.6	1.8	2.2	2.4	2.5
					DG (MW)				0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.2	-0.2	-0.2
					Net Load Forecast	50.7	52.7	57.5	57.7	58.2	58.7	59.1	59.5	59.9	60.4	60.9	61.4	62.0
Orangeville TS	T3/T4	106	Y	101	Gross Peak Load				75.4	76.3	77.1	78.0	78.9	79.7	80.6	81.5	82.4	83.4
					CDM (MW)				0.7	0.8	1.1	1.4	1.7	2.1	2.3	2.9	3.1	3.3
					DG (MW)				0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.2	-0.2	-0.2
					Net Load Forecast	70.2	69.9	74.6	74.8	75.5	76.1	76.6	77.1	77.7	78.3	78.8	79.5	80.2
Orillia TS	T1/T2	162	Y	154	Gross Peak Load				116.7	118.3	119.9	121.5	123.2	124.9	126.6	128.4	130.1	131.9
					CDM (MW)				1.0	1.2	1.6	2.2	2.7	3.2	3.6	4.5	4.9	5.2
					DG (MW)				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Net Load Forecast	96.1	107.4	115.1	115.7	117.1	118.3	119.3	120.5	121.7	123.0	123.9	125.2	126.7
Parry Sound TS	T1/T2	52	N	47	Gross Peak Load				45.1	45.5	45.9	46.3	46.8	47.2	47.6	48.0	48.4	48.8
					CDM (MW)				0.4	0.5	0.6	0.8	1.0	1.2	1.4	1.7	1.8	1.9
					DG (MW)				0.0	1.4	1.4	1.4	1.4	1.4	1.4	1.4	-0.2	-0.2
					Net Load Forecast	41.0	42.5	44.8	44.8	43.6	43.9	44.1	44.3	44.5	44.8	44.9	46.7	47.1
Stayner TS	T3/T4	191	Y	181	Gross Peak Load				119.5	120.7	122.0	123.2	124.5	125.8	127.0	128.3	129.7	131.0
					CDM (MW)				1.0	1.2	1.7	2.3	2.7	3.2	3.6	4.5	4.9	5.2
					DG (MW)				0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
					Net Load Forecast	108.0	112.4	118.3	118.5	119.4	120.2	120.8	121.6	122.4	123.3	123.7	124.6	125.7
Wallace TS	T3/T4	54	N	49	Gross Peak Load				39.8	40.1	40.4	40.8	41.1	41.5	41.8	42.2	42.5	42.9
					CDM (MW)				0.3	0.4	0.6	0.7	0.9	1.1	1.2	1.5	1.6	1.7
					DG (MW)				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Net Load Forecast	27.0	37.5	39.4	39.4	39.7	39.9	40.0	40.2	40.4	40.6	40.7	40.9	41.2
Waubaushene TS	T5/T6	99	Y	94	Gross Peak Load				99.0	100.0	100.9	101.9	102.9	103.9	104.9	105.9	107.0	108.0
					CDM (MW)				0.9	1.0	1.4	1.9	2.2	2.7	3.0	3.7	4.0	4.3
					DG (MW)				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Net Load Forecast	85.3	92.2	98.0	98.1	98.9	99.5	100.0	100.7	101.2	101.9	102.2	102.9	103.8

Appendix A: Weather Adjusted Non-Coincident Winter Forecast

Transformer Station Name	DESN ID (e.g. T1/T2)	LTR (MVA)	LV Cap bank	LTR (MW)	Customer Data (MW)	Winter Peak Load											
						Historical Data (MW)			Near Term Forecast (MW)					Medium Term Forecast (MW)			
						2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Alliston TS	T2	83	N	75	Gross Peak Load				31.3	31.5	31.7	31.9	32.1	32.3	32.5	32.7	32.9	33.1
					CDM (MW)				0.2	0.2	0.2	0.3	0.4	0.5	0.5	0.5	0.5	0.5
					DG (MW)				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Net Load Forecast	35.9	36.2	31.1	31.1	31.3	31.5	31.6	31.7	31.8	32.0	32.2	32.3	32.5
Alliston TS	T3/T4	128	N	115	Gross Peak Load				73.7	75.9	78.2	80.6	83.0	85.5	88.1	90.8	93.5	96.4
					CDM (MW)				0.4	0.4	0.6	0.8	1.0	1.2	1.4	1.4	1.5	1.5
					DG (MW)				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Net Load Forecast	57.0	57.3	71.6	73.3	75.5	77.7	79.8	82.0	84.3	86.8	89.4	92.1	94.8
Barrie TS	T1/T2	127	Y	121	Gross Peak (Alectra)				54.7	56.4	58.2	60.0	61.8	63.4	65.1	66.8	68.5	70.3
					Gross Peak (InnPower)				19.0	23.2	30.1	39.8	48.8	56.8	65.4	75.6	84.3	92.9
					Gross Peak (Total)				73.7	79.6	88.2	99.8	110.6	120.2	130.5	142.3	152.8	163.2
					CDM (MW)				0.4	0.5	0.6	1.0	1.3	1.7	2.0	2.3	2.4	2.6
					DG (MW)				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Net Load Forecast	95.1	78.4	80.9	73.3	79.2	87.6	98.8	109.3	118.5	128.5	140.1	150.4	160.6
Beaverton TS	T3/T4	224	Y	213	Gross Peak Load				83.7	84.4	85.1	85.8	86.5	87.2	87.9	88.7	89.4	90.2
					CDM (MW)				0.5	0.5	0.6	0.8	1.0	1.2	1.4	1.4	1.4	1.4
					DG (MW)				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Net Load Forecast	79.2	78.4	83.0	83.2	83.9	84.5	84.9	85.5	86.0	86.6	87.3	88.0	88.7
Bracebridge TS	T1	83	N	75	Gross Peak Load				0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
					CDM (MW)				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					DG (MW)				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Net Load Forecast	0.2	0.2	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4

Everett TS	T1/T2	95	N	86	Gross Peak Load				81.6	82.2	82.9	83.6	84.3	85.0	85.7	86.4	87.1	87.9
					CDM (MW)				0.5	0.5	0.6	0.8	1.0	1.2	1.3	1.4	1.4	1.4
					DG (MW)				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Net Load Forecast	78.2	76.4	80.9	81.1	81.8	82.3	82.8	83.3	83.8	84.4	85.0	85.7	86.5
Lindsay TS	T1/T2	192	Y	182	Gross Peak Load				95.5	96.7	97.9	99.1	100.3	101.5	102.8	104.0	105.3	106.6
					CDM (MW)				0.5	0.6	0.7	1.0	1.2	1.4	1.6	1.6	1.7	1.7
					DG (MW)				0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
					Net Load Forecast	88.7	91.5	94.4	94.9	96.0	97.1	98.0	99.0	100.0	101.1	102.3	103.6	104.8
Meaford TS	T1/T2	62	Y	59	Gross Peak Load				34.4	34.7	34.9	35.1	35.4	35.6	35.8	36.1	36.3	36.5
					CDM (MW)				0.2	0.2	0.2	0.3	0.4	0.5	0.6	0.6	0.6	0.6
					DG (MW)				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Net Load Forecast	33.8	30.2	34.2	34.2	34.5	34.7	34.8	34.9	35.1	35.3	35.5	35.7	36.0
Midhurst TS	T1/T2	193	Y	183	Gross Peak Load				98.8	101.8	105.0	108.2	111.6	114.5	117.5	120.5	123.6	126.9
					CDM (MW)				0.6	0.6	0.7	1.1	1.3	1.6	1.8	1.9	2.0	2.0
					DG (MW)				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Net Load Forecast	103.5	100.5	100.6	98.2	101.2	104.2	107.2	110.3	112.9	115.6	118.6	121.7	124.9
Midhurst TS	T3/T4	191	N	172	Gross Peak Load				119.4	122.8	126.3	129.8	133.5	137.3	141.1	145.1	149.2	153.4
					CDM (MW)				0.7	0.7	0.9	1.3	1.6	1.9	2.2	2.3	2.4	2.4
					DG (MW)				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Net Load Forecast	123.6	91.5	116.1	118.7	122.1	125.4	128.5	131.9	135.3	138.9	142.8	146.9	151.0
Minden TS	T1/T2	64	N	58	Gross Peak Load				55.3	55.7	56.0	56.4	56.8	57.1	57.5	57.9	58.3	58.6
					CDM (MW)				0.3	0.3	0.4	0.6	0.7	0.8	0.9	0.9	0.9	0.9
					DG (MW)				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Net Load Forecast	57.0	53.3	55.0	55.0	55.4	55.6	55.8	56.1	56.3	56.6	57.0	57.3	57.7
Muskoka TS	T1/T2	209	Y	199	Gross Peak Load				164.3	166.8	169.4	172.1	174.7	177.4	180.2	183.0	185.8	188.7
					CDM (MW)				0.9	1.0	1.2	1.7	2.1	2.5	2.8	2.9	2.9	3.0
					DG (MW)				0.1	0.1	0.1	0.1	0.1	0.1	0.1	-1.2	-1.3	-1.3
					Net Load Forecast	163.7	157.8	161.8	163.2	165.7	168.1	170.2	172.5	174.8	177.2	181.2	184.2	187.0

Orangeville TS	T1/T2	121	N	109	Gross Peak Load				50.3	50.8	51.4	51.9	52.5	53.0	53.6	54.1	54.7	55.3
					CDM (MW)				0.3	0.3	0.4	0.5	0.6	0.7	0.8	0.9	0.9	0.9
					DG (MW)				0.0	0.0	0.0	0.0	0.0	0.0	0.0	-1.5	-1.5	-1.5
					Net Load Forecast	49.6	47.2	49.8	50.0	50.5	51.0	51.4	51.8	52.3	52.7	54.8	55.3	55.9
Orangeville TS	T3/T4	123	Y	117	Gross Peak Load				89.1	90.0	91.0	91.9	92.9	93.9	94.8	95.8	96.9	97.9
					CDM (MW)				0.5	0.5	0.6	0.9	1.1	1.3	1.5	1.5	1.5	1.6
					DG (MW)				0.0	0.0	0.0	0.0	0.0	0.0	0.0	-1.4	-1.4	-1.4
					Net Load Forecast	76.1	83.4	88.1	88.6	89.5	90.3	91.0	91.8	92.5	93.4	95.8	96.8	97.8
Orillia TS	T1/T2	184	Y	175	Gross Peak Load				127.2	128.9	130.6	132.4	134.1	135.9	137.8	139.6	141.5	143.4
					CDM (MW)				0.7	0.8	0.9	1.3	1.6	1.9	2.2	2.2	2.2	2.3
					DG (MW)				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Net Load Forecast	119.4	118.6	125.5	126.4	128.1	129.7	131.0	132.5	134.0	135.6	137.4	139.3	141.1
Parry Sound TS	T1/T2	57	N	51	Gross Peak Load				56.5	56.9	57.4	57.9	58.4	58.9	59.4	59.9	60.4	60.9
					CDM (MW)				0.3	0.3	0.4	0.6	0.7	0.8	0.9	0.9	1.0	1.0
					DG (MW)				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-1.8	-1.8
					Net Load Forecast	57.0	53.3	56.0	56.1	56.6	57.0	57.3	57.7	58.0	58.4	58.9	61.2	61.7
Stayner TS	T3/T4	213	Y	202	Gross Peak Load				140.0	141.1	142.1	143.2	144.3	145.3	146.4	147.5	148.7	149.8
					CDM (MW)				0.8	0.8	1.0	1.4	1.7	2.1	2.3	2.3	2.4	2.4
					DG (MW)				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Net Load Forecast	138.4	132.7	139.0	139.2	140.2	141.1	141.8	142.5	143.3	144.2	145.2	146.3	147.4
Wallace TS	T3/T4	60	N	54	Gross Peak Load				37.4	37.5	37.6	37.7	37.8	37.9	38.0	38.1	38.2	38.3
					CDM (MW)				0.2	0.2	0.3	0.4	0.5	0.5	0.6	0.6	0.6	0.6
					DG (MW)				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Net Load Forecast	38.0	35.2	37.3	37.2	37.3	37.3	37.3	37.3	37.4	37.4	37.5	37.6	37.7
Waubaushene TS	T5/T6	109	Y	104	Gross Peak Load				95.2	96.1	97.0	97.9	98.7	99.6	100.5	101.5	102.4	103.3
					CDM (MW)				0.5	0.6	0.7	1.0	1.2	1.4	1.6	1.6	1.6	1.6
					DG (MW)				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Net Load Forecast	94.0	90.5	94.4	94.7	95.5	96.3	96.9	97.6	98.2	99.0	99.9	100.8	101.7

Appendix B: Lists of Step-Down Transformer Stations

Sr. No.	Transformer Stations	Voltages (kV)
1.	Alliston TS	230/44
2.	Barrie TS	115/44
3.	Beaverton TS	230/44
4.	Bracebridge TS	230/44
5.	Essa TS	500/230/115
6.	Everett TS	230/44
7.	Lindsay TS	230/44
8.	Meaford TS	230/44
9.	Midhurst TS	230/44
10.	Minden TS	230/44
11.	Muskoka TS	230/44
12.	Orangeville TS	230/44/27.6
13.	Orillia TS	230/44
14.	Parry Sound TS	230/44
15.	Stayner TS	230/115/44
16.	Wallace TS	230/44
17.	Waubashene TS	230/44

Appendix C: Lists of Transmission Circuits

Sr. No.	Circuit ID	From Station	To Station	Voltage (kV)
1.	E20/E21S	Essa TS	Stayner TS	230
2.	E26/E27	Essa TS	Parry Sound TS	230
3.	M6E/M7E	Essa TS	Minden TS	230
4.	D1M/D2M	Minden TS	Des Joachims TS	230
5.	D3M/D4M	Minden TS	Des Joachims TS	230
6.	M80B/M81B	Minden TS	Brown Hill TS	230
7.	E3B/E4B	Essa TS	Barrie TS	115
8.	S2S	Stayner TS	Owen Sound TS	115

Appendix D: Lists of LDCs in the SGB-Muskoka Region

Sr. No.	Company	Connection Type (TX/DX)
1.	Hydro One Networks Inc. (Distribution)	TX
2.	Alectra Utilities	TX/DX
3.	InnPower	DX
4.	Orangeville Hydro	DX
5	Elexicon Energy	DX
6.	Lakeland Power	DX
7.	EPCOR Electricity Dist. Ontario Inc.	DX
8.	Newmarket-Tay Power Distribution Ltd	DX
9.	Orillia Power Distribution Corp.	DX
10.	Wasaga Distribution Inc.	DX

Appendix E: Acronyms

Acronym	Description
A	Ampere
BES	Bulk Electric System
BPS	Bulk Power System
CDM	Conservation and Demand Management
CIA	Customer Impact Assessment
CGS	Customer Generating Station
CSS	Customer Switching Station
CTS	Customer Transformer Station
DESN	Dual Element Spot Network
DG	Distributed Generation
DS	Distribution Station
GS	Generating Station
HV	High Voltage
IESO	Independent Electricity System Operator
IRRP	Integrated Regional Resource Plan
kV	Kilovolt
LDC	Local Distribution Company
LP	Local Plan
LTE	Long Term Emergency
LTR	Limited Time Rating
LV	Low Voltage
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
PPWG	Planning Process Working Group
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