



Chatham-Kent/Lambton/Sarnia

Regional Infrastructure Plan

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Prepared by Hydro One Networks Inc. (Lead Transmitter)

With support from:

Companies
Independent Electricity System Operator (IESO)
Bluewater Power Distribution Corporation
Entegrus Inc.
Hydro One Networks Inc. (Distribution)

Disclaimer

This Regional Infrastructure Plan (“RIP”) was prepared for the purpose of developing an electricity infrastructure plan to address needs identified in the Chatham-Kent/Lambton-Sarnia Region. The preferred solution(s) that have been identified in this report may be reevaluated based on the findings of further analysis. The load forecast and results reported in this RIP report are based on the information provided and assumptions made by the members in the region.

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EXECUTIVE SUMMARY

This Regional Infrastructure Plan (“RIP”) was prepared by Hydro One, with input from the Region’s Local Distribution Companies (“LDCs”) and the IESO in accordance with the Ontario Transmission System Code (“TSC”) and Distribution System Code (“DSC”) requirements. It summarizes investments in transmission facilities, distribution facilities, or both, recommended to meet the electricity infrastructure needs within the Chatham-Kent/Lambton/Sarnia Region.

The regional planning process for the Chatham-Kent/Lambton/Sarnia Region was initiated with a Needs Assessment in April 2016, which identified loading at Kent TS would exceed their transformer 10-day Limited Time Rating (“LTR”) in 2016 based on the net load forecast. The Needs Assessment Study Team recommended Hydro One and relevant LDCs to develop a Local Plan to address this issue (“Kent TS T3 Capacity Limitation”). This Local Plan was completed in June 2017, and concluded that there is existing distribution transfer capability to ensure that the transformer T3 would not exceed its LTR.

The major sustainment projects planned for the region over the near and medium-term are given as below:

- Refurbishment of existing Wanstead TS is currently underway and is scheduled to be completed in 2018;
- Chatham SS component replacement, including a capacitor and the associated breaker, is planned to be completed by 2023;
- St. Andrews TS T3, T4 & switchyard refurbishment, planned to be completed by 2023;
- Sarnia Scott TS T5 & Component Replacement, which includes autotransformer T5, breaker, and other components, planned to be completed by 2024.

In accordance with the regional planning process as mandated by the TSC and DSC, the next planning cycle will be started no later than 2020. However, should there be a need that emerges due to a change in load forecast or any other reason, the regional planning cycle may commence earlier to address the need.

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1. INTRODUCTION

This Regional Infrastructure Plan (“RIP”) summarizes all the regional planning activities undertaken in the Chatham-Kent/Lambton/Sarnia Region. It was prepared by Hydro One Networks Inc. (“Hydro One”) as the lead transmitter in the region, and is supported by the representatives from Bluewater Power Distribution Corporation, Entegrus Inc., Hydro One Networks Inc. (Distribution), and the Independent Electricity System Operator (“IESO”). This RIP is the final phase of the regional planning process for the region in accordance with the Ontario Transmission System Code (“TSC”) and Distribution System Code (“DSC”) requirements.

1.1 Background and Scope

In accordance with the TSC and DSC amendments in August 2013, the regional planning process for the Chatham-Kent/Lambton/Sarnia Region began with Needs Assessment in April 2016 and was completed in June 2016.

Based on the findings, the Needs Assessment Study Team agreed that Scoping Assessment was not required for this region at the time. The only need identified, thermal overloading of transformer T3 at Kent TS, was to be addressed between Hydro One (transmitter) and relevant LDCs through Local Planning process which was completed in June 2017.

Being the final phase of the regional planning process, the scope of this RIP includes a comprehensive summary of the needs and relevant wire plans to address near and medium-term needs (2015-2025) identified in previous planning phases.

2. REGIONAL DESCRIPTION

The Chatham-Kent/Lambton/Sarnia Region, as shown in Figure 2-1, includes the municipalities of Lambton Shores and Chatham-Kent, as well as the townships of Petrolia, Plympton-Wyoming, Brooke-Alvinston, Dawn-Euphemia, Enniskillen, St. Clair, Warwick, and Villages of Oil Springs and Point Edward. The area is bordered by the London area to the east and Windsor-Essex to the southwest. The region’s summer coincident peak load was about 710 MW in 2016.



Figure 2-1 Map of Chatham-Kent/Lambton/Sarnia Region

Electricity supply for the region is provided through a network of 230 kV and 115 kV transmission lines. The bulk of the electrical supply is transmitted through 230 kV circuits (N21W/N22W, L24L/L26L, and W44LC/W45LS) towards Buchanan TS. This region also contains a number of interconnections with neighboring Michigan State (B3N, L4D, and L51D). Figure 2-2 shows Hydro One transmission and transmission-connected customers’ assets in the Chatham-Kent/Lambton/Sarnia Region.

Large gas-fired generators in the region include: Greenfield Energy Centre CGS, TransAlta Sarnia CGS, St. Clair Power CGS, and Greenfield South Power Corporation (GSPC). Lists of transmission lines, stations, and distributors (LDCs) in the region are provided in Appendix A, B, and C, respectively.

3. NEEDS ASSESSMENT RESULTS

3.1 Load Forecast

During the Needs Assessment phase, LDCs in the region provided gross load forecasts for Hydro One's step-down transformer stations and assumed 2015 historical extreme weather-corrected summer peak loads as reference points. As for transmission connected industrial customers, 2014 historical load levels were assumed throughout the study period.

Based on data provided by the Study Team, the summer gross coincident load in the region is expected to grow at an average rate of approximately 1.3% annually over the next 10 year period. Factoring in the contributions of conservation and demand management and distributed generation, the summer net coincident load in the region is expected to grow at an average rate of approximately 0.2% annually.

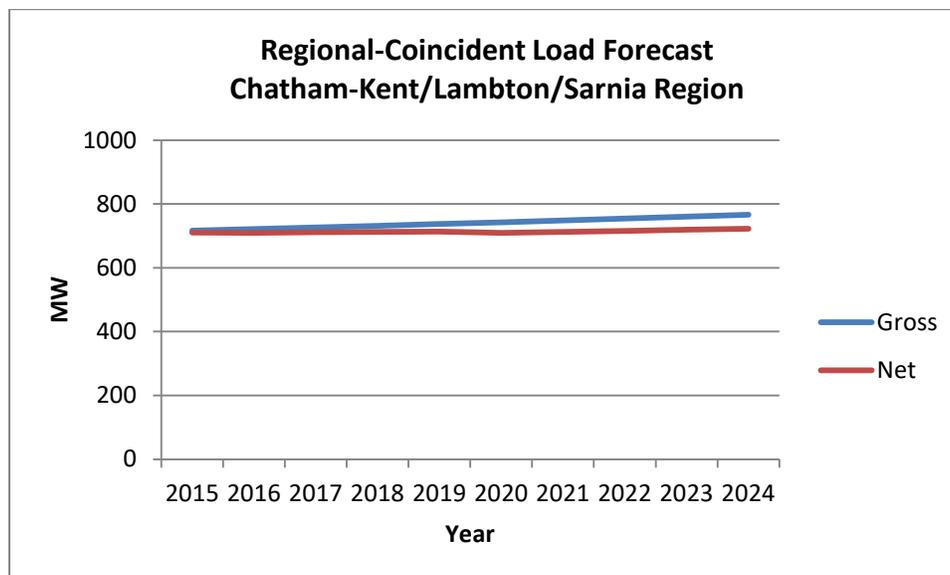


Figure 3-1 Regional load forecast during Needs Assessment

Further load forecast details are provided in Appendix D.

3.2 Major Transmission Projects Completed or Underway

Over the last 10 years, a number of major transmission projects, shown below, have been completed by Hydro One aimed to maintain or improve the reliability and adequacy of supply in the Chatham-Kent/Lambton/Sarnia Region:

- Lambton to Longwood 230kV L24L/L26L Circuit Reconductoring
- New Transformer Station Duart TS

In addition, as part of Hydro One’s transmission rates application (EB-2016-0160), existing Wanstead TS has been identified as reaching end-of-life. Effort is underway to convert Wanstead TS from 115 kV to 230 kV and connecting to 230 kV circuits N21W/N22W. The target in-service date is Q4 2018.

3.3 Regional Needs

The results from the Needs Assessment for the region are summarized below:

Table 3-1 Regional Needs

No.	Needs	Description
1	Kent TS Capacity	Loading at Kent TS is expected to exceed the transformer 10-day limited time rating (LTR) in 2016 based on the net load forecast.
2	End-of-Life equipment at St. Andrews TS, Scott TS, and Chatham SS	During the study period, plans to replace end of life equipment at St. Andrews TS, Scott TS, and Chatham SS ¹ are identified.

4. RECOMMENDED PLANS

This section provides a consolidated summary of the regional infrastructure plans for addressing needs in the Chatham-Kent/Lambton/Sarnia Region.

4.1 Kent TS Transformation Capacity

Based on the information available at the time of Chatham-Kent/Lambton/Sarnia Region Needs Assessment, it was identified that transformer T3 at Kent TS will be overloaded for the loss of its companion transformer T4. Subsequently, local planning team consists of Hydro One and impacted LDCs had undertaken further investigations and determined there is a sufficient transfer capability on the distribution system to offload Kent TS T3. Therefore, the local planning team agreed no further action is required at this time.

¹ The need to replace end-of-life equipment at Chatham SS was identified post completion of the 2016 Needs Assessment report.

4.2 Sustainment Plans

As part of Hydro One’s transmitter license requirements, Hydro One continues to ensure a reliable transmission system by carrying out maintenance programs as well as periodic replacement of equipment based on their condition. Since the conclusion of Needs Assessment, additional sustainment projects have been planned for the region in the medium-term. Below is a list of Hydro One’s major transmission sustainment projects in the Chatham-Kent/Lambton/Sarnia Region that are currently planned. Note that the project scopes and timelines are currently under development and may change accordingly.

- Chatham SS Component Replacement, mainly to replace capacitor SC21 and the associated breaker and is planned to be completed by 2023.
- St. Andrews TS T3, T4 & Switchyard Refurbishment, planned to be completed by 2023. The current scope includes both transformers and a breaker replacement.
- Sarnia Scott TS T5 & Component Replacement, which includes autotransformer T5, breaker, and other components, planned to be completed by 2024.

5. CONCLUSION AND NEXT STEPS

This Regional Infrastructure Plan (RIP) report summarizes the regional planning activities for the Chatham-Kent/Lambton/Sarnia Region and concludes the first regional planning cycle for the region.

As mandated by the OEB, next planning cycle will begin no later than 2020. Should there be a need that emerges due to change in load forecast or any other reason, the regional planning cycle will be started earlier to address the need.

6. REFERENCES

- [1] Needs Assessment Report, Chatham-Kent/Lambton/Sarnia Region. June 12, 2016. <http://www.hydroone.com/RegionalPlanning/Chatham/Documents/Needs%20Assessment%20Report%20-%20Chatham-Kent-Lambton-Sarnia.pdf>
- [2] Local Planning Report – Kent TS Transformation Capacity, Chatham-Kent/Lambton/Sarnia Region. June, 2017. [http://www.hydroone.com/RegionalPlanning/Chatham/Documents/Kent%20TS%20Transformation%20Capacity%20Local%20Planning%20Report%20\(Final\).pdf](http://www.hydroone.com/RegionalPlanning/Chatham/Documents/Kent%20TS%20Transformation%20Capacity%20Local%20Planning%20Report%20(Final).pdf)

APPENDIX A: TRANSMISSION LINES IN THE CHATHAM-KENT/LAMBTON/SARNIA REGION

No	Circuit Designation	Location	Voltage (kV)
1	N6S, N7S	Scott TS to TransAlta Sarnia CGS	230
2	V41N, V43N	Scott TS to Nova SS	230
3	L23N	Scott TS to Lambton TS	230
4	L25V, L27V	Lambton TS to Nova SS	230
5	L37G, L38G	Lambton TS to Greenfield Energy Centre CGS	230
6	L28C, L29C	Lambton TS to Chatham SS	230
7	C31	Chatham SS to South Kent Wind Farm CGS	230
8	W44LC	Buchanan TS to Longwood TS to Chatham SS	230
9	W45LS	Buchanan TS to Longwood TS to Spence SS	230
10	S47C	Spence SS to Chatham SS	230
11	L24L, L26L	Lambton TS to Longwood TS	230
12	N21W, N22W	Scott TS to Buchanan TS	230
13	N1S, N4S	Scott TS to CTS	115
14	N6C, N7C	Scott TS to St. Andrews TS	115
15	S2N	Scott TS to CTS	115
16	N5K	Scott TS to Wallaceburg TS	115
17	K2Z	Kent TS (115kV) to Lauzon TS	115

APPENDIX B: STATIONS IN THE CHATHAM-KENT/LAMBTON/SARNIA REGION

No.	Station	Voltage (kV)	Supply Circuits
1	Scott TS	230/115	N/A
2	Lambton TS	230	N/A
3	Kent TS	115	L28C/L29C
4	Duart TS	230	W44LC, W45LS
5	Modeland TS	230	N21W, N22W
6	Wanstead TS	115 (existing) 230 (future)	S2N (existing) N21W/N22W (future)
7	St. Andrews TS	115	N6C, N7C
8	Wallaceburg TS	115	N5K
9	Forest Jura HVDS	115	S2N

Note: Customer-owned transformer stations are excluded

APPENDIX C: DISTRIBUTORS IN THE CHATHAM-KENT/LAMBTON/SARNIA REGION

Distributor Name	Station Name	Connection Type
Bluewater Power Distribution Corporation	Modeland TS	Tx
	St. Andrews TS	Tx
	Wanstead TS	Dx
Entegrus Inc.	Kent TS	Tx, Dx
	Wallaceburg TS	Dx
Hydro One Networks Inc. (Distribution)	Duart TS	Tx
	Forest Jura HVDS	Tx
	Kent TS	Tx
	Lambton TS	Tx
	Wallaceburg TS	Tx
	Wanstead TS	Tx

APPENDIX D: REGIONAL-COINCIDENT LOAD FORECAST (MW)**Coincidental Net Load (MW)**

Station	Forecast (MW)									
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Duart TS	14.5	14.5	14.4	14.5	14.5	14.6	14.7	14.8	15.0	15.1
Forest Jura DS	19.5	19.6	19.8	19.9	20.0	20.2	20.4	20.6	20.9	21.1
Kent TS T1/T2	69.8	70.0	71.1	72.0	72.9	74.0	75.3	76.6	78.1	79.5
Kent TS T3/T4	40.3	40.7	41.3	41.8	42.2	42.8	43.5	44.2	45.0	45.8
Lambton TS	61.7	61.6	61.8	61.7	61.6	61.7	61.9	62.2	62.5	62.8
Modeland TS	82.1	81.4	81.2	80.6	80.1	79.7	79.5	79.4	79.4	79.2
St. Andrews TS	63.0	62.3	61.8	61.1	60.5	60.0	59.6	59.3	59.0	58.7
Wallaceburg TS	27.0	26.8	27.2	27.6	27.9	23.2	23.7	24.2	24.8	25.3
Wanstead TS	28.1	28.2	28.5	28.6	28.8	29.0	29.3	29.6	30.0	30.3
CTS #1	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9
CTS #2	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8
CTS #3	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0
CTS #4	113.0	113.0	113.0	113.0	113.0	113.0	113.0	113.0	113.0	113.0
CTS #5	30.9	30.9	30.9	30.9	30.9	30.9	30.9	30.9	30.9	30.9
CTS #6	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
CTS #7	53.9	53.9	53.9	53.9	53.9	53.9	53.9	53.9	53.9	53.9
CTS #8	46.7	46.7	46.7	46.7	46.7	46.7	46.7	46.7	46.7	46.7

Coincidental Gross Load (MW)

Station	Forecast (MW)									
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Duart TS	14.7	14.9	15.1	15.3	15.5	15.7	16.0	16.2	16.4	16.7
Forest Jura DS	19.7	20.0	20.4	20.7	21.1	21.4	21.8	22.2	22.6	22.9
Kent TS T1/T2	71.1	72.7	74.4	76.1	77.9	79.7	81.6	83.5	85.4	87.4
Kent TS T3/T4	40.8	41.7	42.6	43.6	44.6	45.5	46.6	47.6	48.7	49.8
Lambton TS	62.3	62.9	63.5	64.1	64.8	65.4	66.1	66.7	67.4	68.0
Modeland TS	82.9	83.3	83.6	84.0	84.3	84.7	85.0	85.3	85.7	86.0
St. Andrews TS	63.6	63.6	63.6	63.6	63.6	63.6	63.6	63.6	63.6	63.6
Wallaceburg TS	27.7	28.3	29.0	29.7	30.3	31.0	31.8	32.5	33.3	34.0
Wanstead TS	28.7	29.2	29.7	30.1	30.6	31.1	31.6	32.2	32.7	33.2
CTS #1	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9
CTS #2	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8
CTS #3	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0
CTS #4	113.0	113.0	113.0	113.0	113.0	113.0	113.0	113.0	113.0	113.0
CTS #5	30.9	30.9	30.9	30.9	30.9	30.9	30.9	30.9	30.9	30.9
CTS #6	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
CTS #7	53.9	53.9	53.9	53.9	53.9	53.9	53.9	53.9	53.9	53.9
CTS #8	46.7	46.7	46.7	46.7	46.7	46.7	46.7	46.7	46.7	46.7

APPENDIX E: LIST OF 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
DSC	Distribution System Code
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
NERC	North American Electric Reliability Corporation
NPCC	Northeast Power Coordinating Council Inc.
OEB	Ontario Energy Board
OPA	Ontario Power Authority
ORTAC	Ontario Resource and Transmission Assessment Criteria
PF	Power Factor
PPWG	Planning Process Working Group
RIP	Regional Infrastructure Plan
SIA	System Impact Assessment
SS	Switching Station
TS	Transformer Station
TSC	Transmission System Code