NEEDS ASSESSMENT REPORT

Niagara Region

July 20th, 2026

Needs Assessment Report
Niagara Region
July 20th 2026

Lead Transmitter:
Hydro One Networks Inc.

Prepared by: Niagara Region Technical Working Group

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Disclaimer

This Needs Assessment (NA) Report was prepared for the purpose of identifying potential needs in the Niagara Region and to recommend which needs a) do not require further regional coordination and can be directly addressed by developing a preferred plan as part of the NA phase and b) require further assessment and regional coordination. The results reported in this NA are based on the input and information provided by the Technical Working Group (TWG) for this region at the time. Updates may be made based on the best available information throughout the planning process.

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Executive Summary

REGION Niagara Region (the "Region")

LEAD Hydro One Networks Inc. ("HONI")

START DATE: March 24th 2026 **END DATE:** July 20th 2026

The 2nd cycle Regional Planning cycle for the Niagara Region was completed in July 2023 with the publication of the Regional Infrastructure Plan ("RIP") report.

In accordance with the Regional Planning process, the Regional Planning cycle should be triggered at least once every five years. Considering these timelines, the 3rd Regional Planning cycle was triggered in March 2026 for this Region. The planning horizon for this Needs Assessment ("NA") is ten years. A 20-year planning assessment is undertaken in the next phases of regional planning, i.e., IRRP and RIP phases.

The purpose and scope of the NA is to:

a) Identify any new needs and reaffirm needs identified in the previous regional planning cycle; and,
b) Recommend which needs:
   i) require further assessment and regional coordination to develop a preferred plan (and hence, proceed to the next phases of regional planning); and,
   ii) do not require further regional coordination (i.e., can be addressed directly between Hydro One and the impacted LDC(s) to develop a preferred plan and/or no regional investment is required at this time and the need may be reviewed during the next regional planning cycle).

The Technical Working Group (TWG) comprises of representatives from Local Distribution Companies ("LDC"), the Independent Electricity System Operator ("IESO"), and Hydro One Transmission. They provide input and relevant information for the region and undertake a technical assessment to identify the electrical infrastructure needs in the region. They collaborate to develop both summer and winter gross and net peak electricity demand forecasts (including input from municipalities), which form the basis for the technical assessment. The following are key considerations of the technical assessment:

a) Current and future station capacity and transmission adequacy.
b) System reliability needs and operational concerns.
c) Major HV transmission equipment requiring replacement with consideration to "right-sizing"; and,
d) Sensitivity analysis to capture uncertainty in the load forecast as well as variability of demand drivers such as electrification.

In this Needs Assessment, TWG has identified the following regional needs and recommendations:

Needs that require further regional coordination.

#	Need Location	Need Description
1	Allanburg DESN TS	Load demand at Allanburg TS exceeds its capacity in 2028.
2	Carlton TS	Load demand at Carlton TS exceeds its capacity in 2028.
3	D9HS/D10S – Vansickle TS x Louth Jct	The section of the D9HS/D10S between Vansickle TS x Louth Junction is approaching its limit by 2035.

Needs that do not require further regional coordination.

#	Need Location	Need Description
1	Glendale TS T1/T2	Replace the existing T1/T2 45/60/75 MVA transformers with like-for-like units.
2	Murray TS T11/T12	Replace the existing 45/60/75 MVA transformers T11 and T12 with new 60/80/100 MVA units.
3	Murray T13/T14	Replace the existing 45/60/75 MVA transformers T13 and T14 with like-for-like units.
4	Allanburg TS T3	Replace the existing 150/250 MVA autotransformer with a like-for-like unit.
5	Vansickle TS LV Switchyard	Replace the BY MV switchgear with like-for-like unit.
6	Bunting TS T3	Replace the existing 45/60/75 MVA T3 transformer like-for-like unit.
7	115kV Q2AH – Rosedene Jct. x St. Anns Jct	Line refurbishment to address asset renewal need.

List of LDC(s) to be involved in further regional planning phases:

- Alectra Utilities
- Canadian Niagara Power
- Grimsby Power
- Hydro One Distribution
- Niagara-on-the-Lake Hydro
- Niagara Peninsula Energy
- Welland Hydro Electric System

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1. INTRODUCTION

The second cycle of the Regional Planning process for the Niagara Region was completed in July 2023 with the publication of the Regional Infrastructure Plan ("RIP") report. The RIP report included a common discussion of all the options and recommended plans for preferred wire infrastructure investments to address the near- and medium-term needs.

This Needs Assessment initiates the third regional planning cycle for the Niagara Region. The purpose of this Needs Assessment ("NA") is to:

a) Identify any new needs and reaffirm needs identified in the previous regional planning cycle; and,
b) Recommend which needs:
   i) require further assessment and regional coordination to develop a preferred plan (and hence, proceed to the next phases of regional planning); and,
   ii) do not require further regional coordination (i.e., can be addressed directly between Hydro One and the impacted LDC(s) to develop a preferred plan and/or no regional investment is required at this time and the need may be reviewed during the next regional planning cycle).

The planning horizon for this NA assessment is ten years. A flow chart of the Regional Planning Process is shown in Figure 1 below.

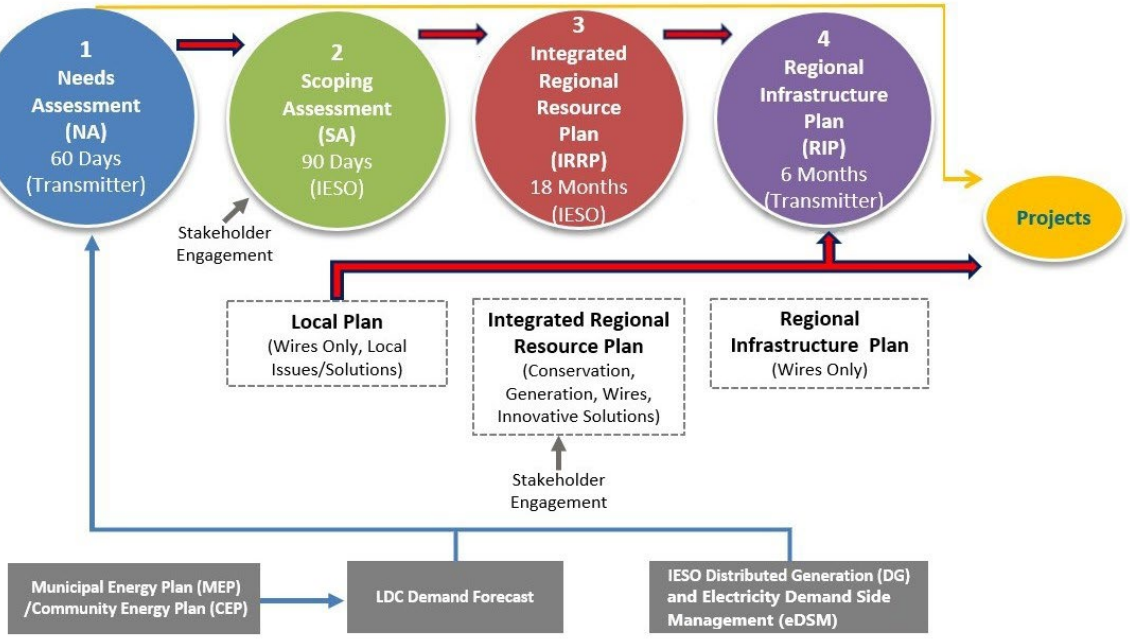

Figure 1: Regional Planning Process

This report was prepared by the Niagara Region Technical Working Group("TWG"), led by Hydro One Networks Inc. 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"). Participants of the TWG are listed below in Table 1.

Table 1: Niagara Region TWG Participants

Sr. no.	Name of TWG Participants
1	Hydro One Networks Inc. (Lead Transmitter)
2	Alectra Utilities
3	Canadian Niagara Power Inc.
4	Grimsby Power Inc.
5	Hydro One Networks Inc. (Distribution)
6	Independent Electricity System Operator
7	Niagara-on-the-Lake Hydro Inc.
8	Niagara Peninsula Energy Inc.
9	Welland Hydro Electric System Corp.

2. REGIONAL ISSUE/TRIGGER

In accordance with the Regional Planning process, the Regional Planning cycle should be triggered at least once every five years. As such, the 3rd Regional Planning cycle was triggered for the Niagara Region.

3. SCOPE OF NEEDS ASSESSMENT

The scope of this NA covers the Niagara Region and includes:

- Review and reaffirm needs/plans identified in the previous cycle RIP (as applicable),
- Identify any new needs resulting from this assessment,
- Recommend which need(s) require further assessment and regional coordination in the next phases of the regional planning cycle to develop a preferred plan; and,
- Recommend which needs do not require further regional coordination (i.e., can be addressed directly between Hydro One and the impacted LDC(s) to develop a preferred plan and/or no

regional investment is required at this time and the need may be reviewed during the next regional planning cycle).

The Technical Working Group TWG may also identify additional needs during the next phases of the planning process, namely Scoping Assessment ("SA"), Integrated Regional Resource Plan ("IRRP"), Local plan (LP) and RIP, based on updated information available at that time.

The planning horizon for this NA assessment is 10 years.

4. REGIONAL DESCRIPTION AND CONNECTION CONFIGURATION

For regional planning purposes, the Niagara region includes the City of Port Colborne, City of Welland, City of Thorold, City of Niagara Falls, Town of Niagara-on-the-Lake, City of St. Catharines, Town of Fort Erie, Town of Lincoln, Township of West Lincoln, Town of Grimsby, Township of Wainfleet, and Town of Pelham. Haldimand County has also been included in the regional infrastructure planning needs assessment for Niagara region.

The Local Distribution Companies in the Niagara Region are Alectra Utilities Corporation, Canadian Niagara Power Inc., Grimsby Power Inc., Hydro One Networks Inc. (Distribution), Niagara-on-the-Lake (NOTL) Hydro Inc., Niagara Peninsula Energy Inc., and Welland Hydro Electric System Corp. The high-voltage system in this Region also provides supply to several direct transmission-connected industrial customers transformer stations.

Electrical supply for this region is provided through a network of 230kV and 115kV transmission circuits supplied mainly by the local generation from Sir Adam Beck #1, Sir Adam Beck #2, Decew Falls GS, Thorold GS and the 230kV/115kV autotransformers at Allanburg TS.

The 230kV circuits (Q23BM, Q24HM, Q25BM, Q26M, Q28A, Q29HM, Q30M, and Q35M) from Sir Adam Beck #2 SS connect this region to Hamilton/Burlington. The power is distributed through thirteen (13) HONI and six (6) LDC owned step-down transformer stations. The distribution system in this Region is at two voltage levels, 27.6 kV and 13.8 kV.

The geographical boundaries of the Niagara Region are shown in Figure 2.

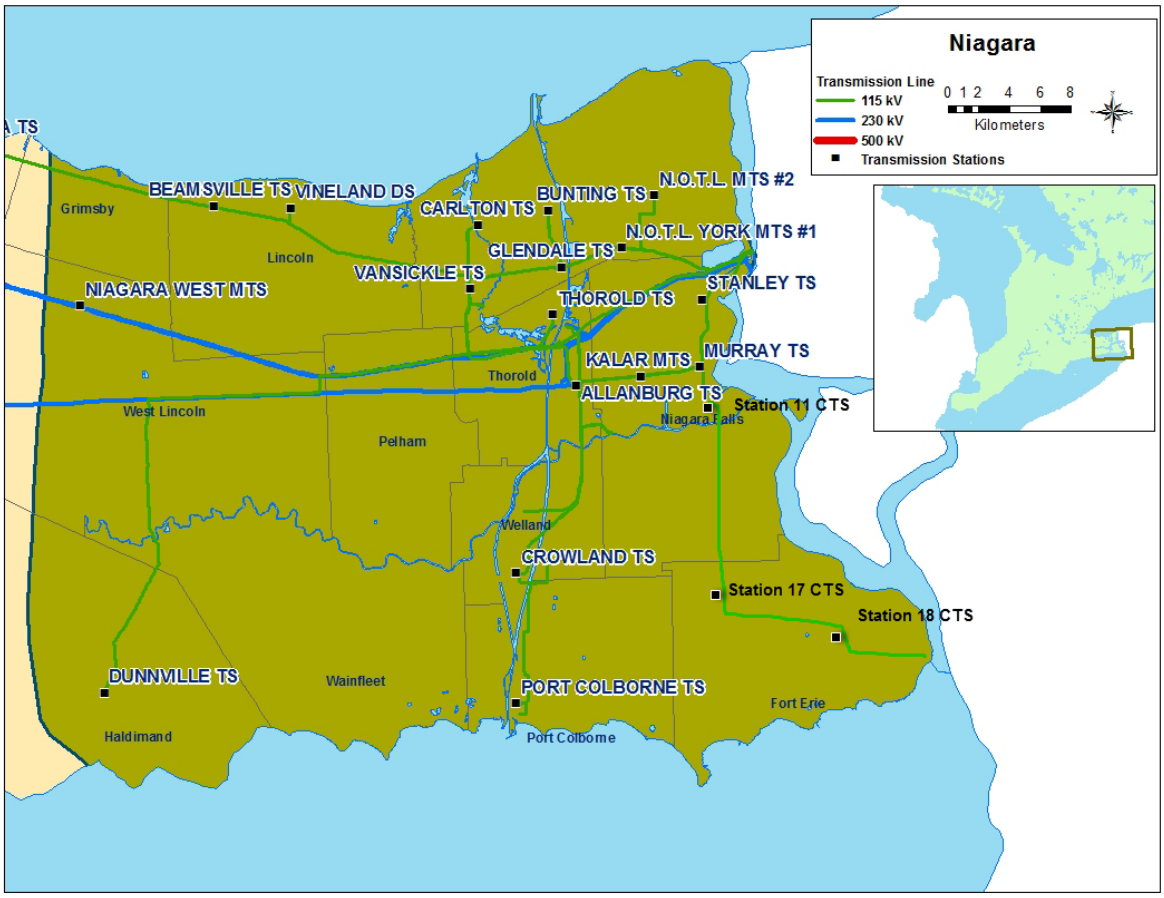

Figure 2: Map of Niagara Region Planning Area

The circuits and stations of the area are summarized in Table 2 below:

Table 2: Transmission Station and Circuits in the Niagara Region

115kV circuits	230kV circuits	Transformer Stations	Generation Stations
Q3N, Q4N, Q11S, Q12S, A36N, A37N, A6C, A7C, D9HS, D10S, D1A, D3A, Q2AH	Q23BM, Q24HM, Q25BM, Q26M, Q28A, Q29HM, Q30M, Q35M, Q10P	Allanburg TS*, Beamsville TS, Bunting TS, Carlton TS, Crowland TS, Dunnville TS, Glendale TS, Kalar MTS, Niagara Murray TS, Niagara West MTS, NOTL York MTS, NOTL #2 MTS, Port Colborne TS, Stanley TS, Thorold TS, Vansickle TS, Vineland DS, CNPI Station #17 MTS, CNPI	Sir Adam Beck GS #1, Sir Adam Beck GS #2, Sir Adam Beck PGS, Thorold CGS, Decew Falls GS

		Station #18 MTS	

*Stations with Autotransformers installed

The single line diagram of the Transmission Network of Niagara Region is shown in Figure 3 below.

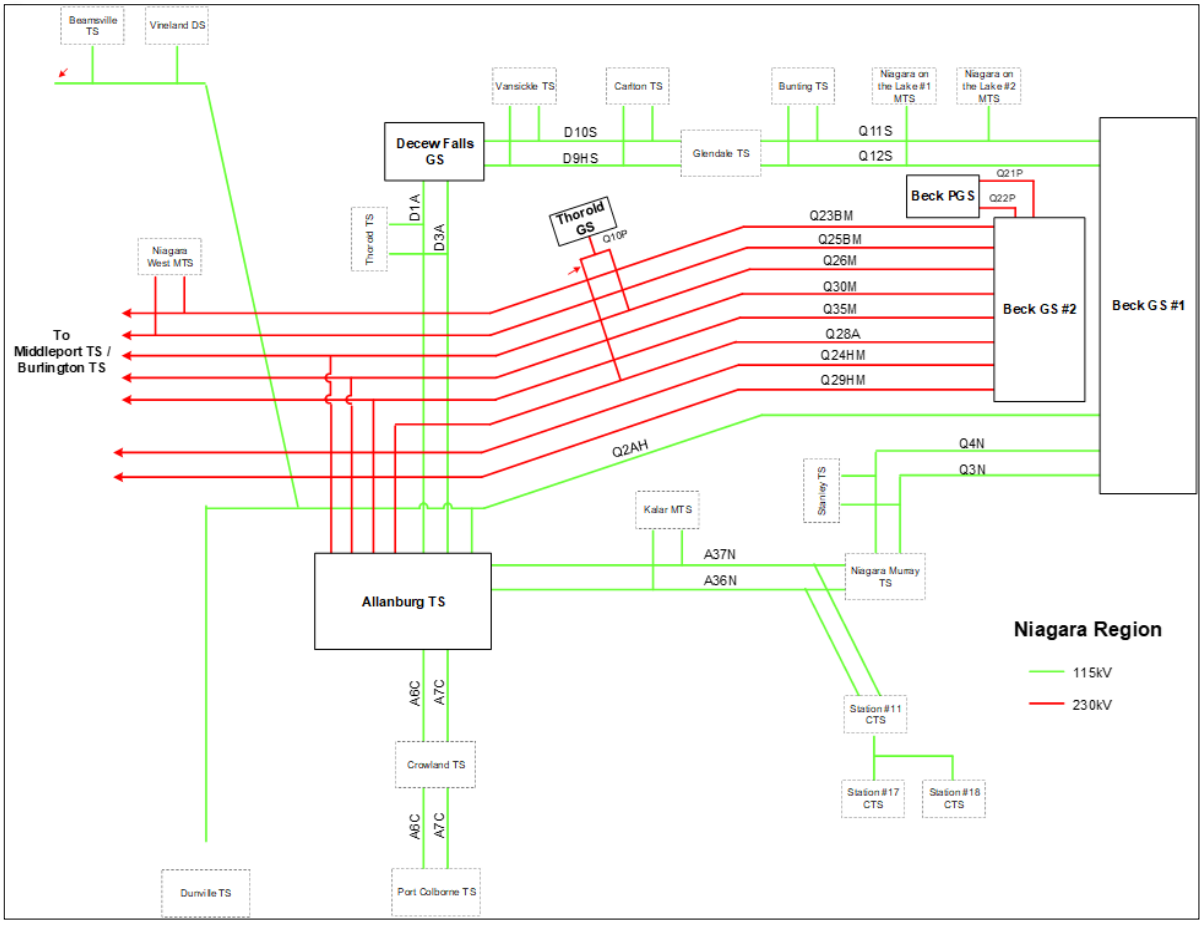

Figure 3: Niagara Region Transmission Single Line Diagram

5. INPUTS AND DATA

TWG participants, including representatives from LDCs, IESO, and Hydro One provided information and input for the Niagara Region Needs Assessment. With respect to the load forecast information, the OEB Regional Planning Process Advisory Group (RPPAG) recently published a document called “Load Forecast Guideline for Ontario” in Oct. 2022. The objective of this document is to provide guidance to the TWG in the development of the load forecasts used in the various phases of the regional planning process with a focus on the NA and the IRRP. One of the inputs into the LDC’s load forecast that is called for in this

guideline is information from Municipal Energy Plans (MEP) and/or Community Energy Plans (CEP). The list of all the Municipalities falling under the geographical boundaries of the region are given in Appendix-E.
The information provided includes the following:

- Niagara Region 10-year summer and winter Load Forecasts for all supply stations inclusive of the inputs provided by the municipalities (e.g. through their MEPs & CEPs). Sensitivity analysis is undertaken which captures uncertainties via different growth scenarios.
- Known capacity and reliability needs, operating issues, and/or major assets requiring replacement/ refurbishment; and
- Planned/foreseen transmission and distribution investments that are relevant to Regional Planning for the Niagara Region.
- Captured uncertainty in the load forecast as well as variability of electric demand drivers to identify any emerging needs and/or advancement or deferment of recommended investments.

6. ASSESSMENT METHODOLOGY

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

6.1 Technical Assessments and Study Assumptions

The technical assessment of needs was undertaken based on:

- Current and future station capacity and transmission adequacy.
- System reliability and operational considerations.
- Asset renewal for major high voltage transmission equipment requiring replacement with consideration to “right-sizing”; and,
- Load forecast data was requested from industrial customers in the region, and
- This assessment is based on summer peak loads. Three forecasts were developed i.e. Normal Growth scenario, High and Low Growth scenarios. The High and Low Growth scenarios were developed to conduct a sensitivity analysis to cover unforeseen developments such as fuel switching, Government policies, higher than expected EV charging trend during peak load conditions, etc.

The following other assumptions are made in this report.

- The study period for this Needs Assessment is 2026-2035.
- The Region is summer peaking, so this assessment is based on summer peak loads.
- Line capacity adequacy is assessed by using coincidence peak loads in the area.
- Station capacity adequacy is assessed by comparing the non-coincident peak load with the station’s normal planning supply capacity, assuming a 90% lagging power factor for stations

having no low-voltage capacitor banks and 95% lagging power factor for stations having low-voltage capacitor banks.

- Normal planning supply capacity for transformer stations is determined by the Hydro One summer 10-Day Limited Time Rating (LTR) of a single transformer at that station.
- Adequacy assessment is conducted as per Ontario Resource Transmission Assessment Criteria (ORTAC).

6.2 Information Gathering Process

6.2.1. Load forecast:

The LDCs provided their load forecasts for summer and winter for all the stations supplying their loads in the Niagara Region for the 10-year study period including the inputs from the Municipalities such as MEPs and CEPs. The IESO provided an Electricity Demand Side Management ("eDSM"), and Distributed Generation ("DG") forecast for the Niagara Region. The region's extreme summer non-coincident peak gross load forecasts for each station were prepared by applying the LDC load forecast growth rates to the actual 2025 summer peak extreme weather corrected loads. The extreme summer weather correction factors were provided by Hydro One. The net extreme summer weather forecasts were produced by reducing the gross load forecasts for each station by the percentage eDSM and then by the amount of effective DG capacity provided by the IESO for that station. It is to be noted that as contracts for existing DG resources in the region begin to expire, at which point the load forecast has a decreasing contribution from local DG resources, and an increase in net demand. This extreme summer weather corrected net load forecast for the individual stations in the Niagara Region is given in Appendix A.

6.2.2. Sensitivity Analysis:

A sensitivity analysis was undertaken by the TWG to capture uncertainty in the load forecast as well as variability of drivers such as electrification. Hence, the NA recommendations are not necessarily linked to sensitivity scenarios; but rather are used to identify any emerging needs for consideration in developing recommendations. The impact of sensitivity analysis for the high and low growth scenarios is provided in section 8 of this report.

6.2.3. Asset Renewal Needs for Major HV Equipment:

List of major HV transmission equipment planned and/or identified to be refurbished and/or replaced based on asset condition assessment, relevant for Regional Planning purposes. This includes HV transformers, autotransformers, HV Breakers, HV underground cables and overhead lines. The scope of equipment considered is given in section 7.1.

6.2.4. System Reliability and Operational Issues:

Relevant information regarding system reliability and operational issues in the region as feedback provided by the IESO during the NA phase.

7. NEEDS

This section describes emerging new needs identified in the Niagara Region and/or updates on previously identified needs since the completion of Previous Regional Planning cycle.

Needs that were identified in the previous regional planning cycle with associated projects that were recently completed and reaffirmed needs that are underway are briefly described below with relevant updates and will not be discussed further in this report.

1. Circuit D1A/D3A (Gibson Jct x Thorold TS) Replacement – Line refurbishment to address asset renewal need. Completed in Q4 2023.
2. Thorold TS T1 Transformer Replacement – Replace existing 45/60/75 MVA T1 transformer with a new 45/60/75 MVA unit. Completed in Q4 2023.
3. Station No. 11 CSS 2nd Breaker Replacement - Completed in Q4 2025.
4. Circuit Q28A Additional Supply Capacity Need - Re-tensioning to higher capacity is in progress and planned to be placed in service in Q2 2027.
5. Lincoln Area Supply Capacity Need – Project to build a new 2 x 50/83MVA, 230kV/27.6 station is in progress and planned to be placed in service in Q4 2027.
6. Carlton TS LV Switchyard Refurbishment – Project is in progress and planned to be placed in service in Q1 2028.
7. Crowland TS Station Capacity Need – Replace 115/27.6 kV T5/T6 DESN with a new 230/27.6 kV DESN and supply with a new 230kV transmission circuit. Project is in progress and planned to be placed in service in Q3 2029.
8. Carlton TS Station Capacity: Project to transfer excess load from Carlton T1/T2 DESN to Bunting TS is in progress and planned to be completed in Q4 2029.

The planned in-service year for the above underway projects is tentative and is subject to change.
All near and mid-term needs that are discussed as a part of this report are summarized in Table 3 below.

Table 3: Near/Mid-term Needs Identified in this NA and/or Updated from Previous RIP

Need Location	Need Description/Update	NA Report Section
Asset Renewal Needs		
Glendale TS T1/T2	Replace the existing T1/T2 45/60/75 MVA transformers with like-for-like units. Expected in service date is updated as Q4 2031.	7.1.1
Murray TS T11/T12	Replace the existing 45/60/75 MVA transformers T11 and T12 with new 60/80/100 MVA units. Expected in service date is updated as Q4 2032.	7.1.2
Murray T13/T14	Replace the existing 45/60/75 MVA transformers T13 and T14 with like-for-like units. Expected in service date is updated as Q4 2032.	7.1.2
Allanburg TS T3	Replace the existing 150/250 MVA autotransformer with a like-for-like unit. Expected in service date is updated as Q4 2032.	7.1.3
Vansickle TS LV Switchyard	Replace the BY MV switchgear with like-for-like unit. Expected in service date is updated as Q4 2034.	7.1.4
Bunting TS T3	Replace the existing 45/60/75 MVA T3 transformer like-for-like unit. Expected in service date is updated as beyond 2035.	7.1.5
Q2AH - Rosedene Jct. x St. Anns Jct	Line refurbishment to address asset renewal need. Expected in service date is updated as Q4 2031.	7.1.6
Station Capacity Needs		
Allanburg DESN TS	Load demand at Allanburg TS exceeds its capacity in 2028.	7.2.1
Carlton TS	Load demand at Carlton TS exceeds its capacity in 2028.	7.2.2
Murray TS	Load demand at Murray TS exceeds its capacity in 2031.	7.2.3
Transmission Line Capacity Needs		
115kV D9HS/D10S – Vansickle TS x Louth Junction	The section of the D9HS/D10S between Vansickle TS x Louth Junction is approaching its limit by 2034.	7.3.1

7.1 Asset Renewal Needs for Major HV Transmission Equipment

In addition to the previously identified asset renewal needs from the second regional planning cycle, Hydro One and the TWG identified new asset renewal needs for major HV transmission equipment over the next 10 years in the Niagara Region. They are listed in Table 4 below. Hydro One and Canadian Niagara Power are the only Transmission Asset Owners (TAO) in the Region.

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

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

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

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

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

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

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

There are no major HV transmission assets requiring replacement in the Niagara Region in the next 10 years.

7.1.1 Glendale TS – T1/T2 Replacement

Glendale TS is comprised of two DESN units, T1/T2 and T3/T4. The T1 transformer has been identified for asset renewal. The scope of the project is to replace the existing 45/60/75 MVA T1 transformer with a like-for-like new 45/60/75 MVA unit. The in-service date for this asset renewal has been updated to Q4 2031.

7.1.2 Murray TS – T11/T12, T13/T14 Replacement

Murray TS is currently comprised of two DESN units, T11/T12 and T13/T14. All four existing transformers units have a rating of 45/75MVA. The current asset renewal plan is to replace the existing 45/60/75 MVA transformers T11 and T12 with new 60/80/100 MVA units, while the T13/T14 units will be like-for-like new 45/75MVA units. The in-service date for this asset renewal has been updated to Q4 2032.

7.1.3 Allanburg TS – T3 Replacement

Allanburg TS is comprised of four autotransformer units, T1, T2, T3, and T4. The T3 transformer has been identified for asset renewal. The scope of the project is to replace the existing 150/250 MVA T3 transformer with a like-for-like new 150/250 MVA unit. The in-service date for this asset renewal has been updated to Q4 2032. The need for this asset renewal is subject to change based on the findings of the IESO's Niagara Bulk Plan study, currently scheduled for completion in Q3 2027.

7.1.4 Vansickle TS – LV Switchyard Replacement

Vansickle TS is comprised of two DESNs, BY and JQ, supplied by T5 and T6. The BY MV switchgear has been identified for asset renewal. The scope of the project is to replace the existing switchgear. The in-service date for this asset renewal has been updated to Q4 2034.

7.1.5 Bunting TS – T3 Replacement

Bunting TS is comprised of a single DESN supplied by transformers T3/T4. The T3 transformer has been identified for asset renewal. The scope of the project is to replace the existing 45/60/75 MVA T3 transformer with a like-for-like new 45/60/75 MVA unit. The in-service date for this asset renewal has been updated to beyond 2035.

7.1.6 Q2AH - Rosedene Jct. x St. Anns Jct – Line Refurbishment

The portion of the single 115kV circuit Q2AH supplying Dunnville TS, between Rosedene Jct and St.Anns Jct, has been identified for asset renewal. The length of this portion of circuit is approximately 11km. The scope of the project is to replace the asset with a like-for-like equivalent conductor size. The in-service date for this asset renewal has been updated to Q4 2031.

7.2 Station Capacity Needs

A Station Capacity assessment was performed over the study period 2026-2035 for the 230kV and 115kV Transforming stations in the Niagara Region using either the summer or winter peak load forecasts that were provided by the Technical Working Group. Based on the results, the following Station capacity needs have been identified during the study period:

7.2.1 115kV Allanburg TS – Station Capacity

The load at Allanburg TS is expected to exceed its 10-Day LTR within the 2027-2035 time period.

Allanburg TS is comprised of one DESN with transformers T7/T8 with a rating of 25/42MVA, having a summer 10-Day LTR of 58.0 MW. The station's actual non-coincident summer peak load in 2025 was about 48MW and is forecasted to almost 79MW (net adjusted for extreme weather) by 2035. However, there is an immediate need by 2028 to increase the station capacity. This unexpected increase in forecasted load was identified during the Needs Assessment process.

The TWG recommends reviewing the load forecast and if necessary, initiating discussions for transformer replacement at Allanburg TS with larger units.

7.2.2 115kV Carlton TS – Station Capacity

The load at Carlton TS is expected to exceed its 10-Day LTR within the 2029-2035 time period.

Carlton TS is currently a single DESN facility, with transformers T1 and T2. The existing transformers T1/T2 have a rating of 45/75MVA, with a summer 10-Day LTR of 99.6MW. The station's actual non-coincident summer peak load in 2025 was about 84.4MW and is forecasted to be approximately 122.4MW (net adjusted for extreme weather) by 2035.

However, there is a need by 2028 to increase the station capacity. This unexpected increase in forecasted load was identified during this Needs Assessment process. At this time, the LDC planned load transfers to Bunting TS by 2029 and additional capacity through expansion from Vansickle TS is expected to aid capacity needs over the current planning horizon. Station capacity needs at Carlton TS will continue to be monitored. Should additional capacity be required, transformer upgrades to 60/100 MVA could be considered to address future capacity needs.

7.2.3 115kV Murray TS – Station Capacity

The load at Murray TS (T11/T12) is expected to exceed its 10-Day LTR by 2031 with its current transformers.

Murray TS is currently comprised of two DESN units, T11/T12 and T13/T14. Both DESNs are currently considered for asset renewal by 2032. The existing transformers T11/T12 have a rating of 45/75MVA, with a summer 10-Day LTR of 71.6MW. The station's 2025 actual non-coincident summer peak load was about 66.8MW and is forecasted to be approximately 72MW (net adjusted for extreme weather) by 2031. The current asset renewal plan is to replace the existing 45/60/75 MVA transformers T11 and T12 with new 60/80/100 MVA units, which will provide approximately a 10-Day LTR of 122MW. Expected in service date is updated as Q4 2032.

At this time, the asset renewal project and forecast will be both closely monitored and adjusted to ensure the station capacity meets the future load requirement.

7.3 Transmission Lines Capacity Needs

All line and equipment loads shall be within their continuous ratings with all elements in service and within their long-term emergency ratings with any one element out of service. Immediately following contingencies, lines may be loaded up to their short-term emergency ratings where control actions such as re-dispatch, switching, etc. are available to reduce the loading to the long-term emergency ratings. A Transmission Lines Capacity Assessment was performed over the study period 2026-2035 for the 230kV and 115kV Transmission line circuits in the Niagara Region by assessing thermal limits of the circuit and the voltage range as per ORTAC Local Area Contingency-Based Assessment to cater to this need.

Based on the results, the following line capacity needs have been identified during the study period.

7.3.1 115kV D9HS/D10S – Vansickle TS x Louth Junction

The double 115kV circuits D9HS/D10S between Decew Falls GS and Glendale TS are an alternate supply path for loads in the St.Catharines area, via Carlton TS and Glendale TS.

With the increasing demand forecasted on this corridor, a section of the D9HS/D10S is potentially overloaded in the long term, specifically the 1km of overhead D9HS/D10S section between Vansickle TS x Louth Junction following the loss of all generation from 115kV Sir Adam Beck GS via the Beck E-bus contingency.

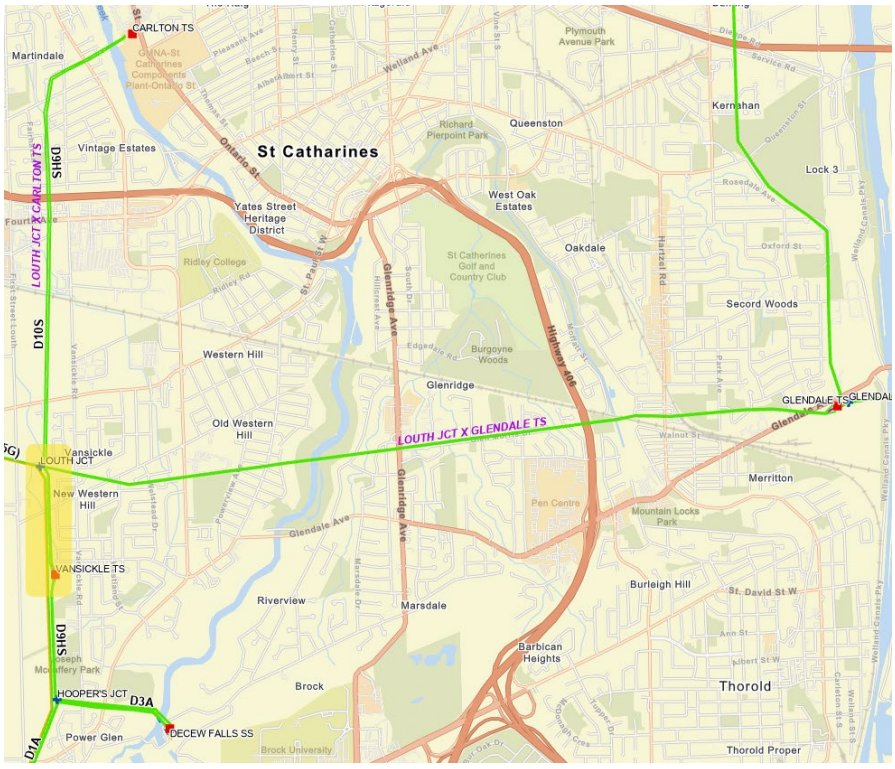

Figure 4: 115kV D9HS/D10S – Vansickle TS x Louth Junction (highlighted)

This section is shown in Figure 4. The calculated need for this line capacity upgrade is by 2035 if the current load forecast in this area holds true.

7.4 System Reliability, Operation and Restoration Needs

The transmission system must be planned to satisfy demand levels up to the extreme weather, and to provide a median-economic forecast for an extended period with any one transmission element out of service. A study has been carried out, considering the net coincident load forecast and the loss of one element over the study period 2026-2035 to cater for this need**.** Based on the results, no significant new system reliability, operating and restoring issues have been identified for this Region.

8. SENSITIVITY ANALYSIS

The objective of a sensitivity analysis is to capture uncertainty in the load forecast as well as variability of electric demand drivers to identify any emerging needs and/or advancement or deferment of recommended investments. The TWG determined that the key electric demand driver in the Niagara Region to be considered in this sensitivity analysis is electric vehicle (EV) penetration and unforeseen electrification which would cause the load to increase at a faster rate than shown in the forecast; or the potential delay in some projects which could result in less demand than anticipated.
The TWG reviewed EV scenarios, and any unforeseen electrification needs to develop high demand growth forecasts by applying 50% additional growth to the growth rate on the extreme summer/winter corrected Normal Growth net load forecasts. The low growth scenario was obtained by reducing the growth rate by 50%. The normal and high growth forecasts are shown in Tables A.1, A.2, A.3 and A.4.

The impact of sensitivity analysis for the high and low growth scenario identified the following updates or new Station/Line capacity needs:

Table 4: Impact of Sensitivity Analysis on Station/Line capacity Needs in the Region

Sr.no.	Need Identified	Normal Growth Scenario	High Growth Scenario	Low Growth Scenario
1	Allanburg DESN TS	2028	2028	2028
2	Carlton TS	2028	2028	2030
3	Murray T11/T12 TS	2031	2029	2034
4	115kV D9HS/D10S Vansickle TS x Louth Junction	2035	2034	-
5	Bunting TS	-	2032	-

The sensitivity analysis identified the additional capacity needs for Bunting TS towards the end of the study period. These needs will be assessed again during the next phases of this Regional Planning cycle.

9. CONCLUSION AND RECOMMENDATION

The Technical Working Group's recommendations to address the needs identified are as follows:

Table 5: Needs that Do Not Require Further Regional Coordination

#	Need Location	Need Description
1	Glendale TS T1/T2	Replace the existing T1/T2 45/60/75 MVA transformers with like-for-like units.
2	Murray TS T11/T12	Replace the existing 45/60/75 MVA transformers T11 and T12 with new 60/80/100 MVA units.
3	Murray T13/T14	Replace the existing 45/60/75 MVA transformers T13 and T14 with like-for-like units.
4	Allanburg TS T3	Replace the existing 150/250 MVA autotransformer with a like-for-like unit.
5	Vansickle TS LV Switchyard	Replace the BY MV switchgear with like-for-like unit.
6	Bunting TS T3	Replace the existing 45/60/75 MVA T3 transformer like-for-like unit.
7	115kV Q2AH – Rosedene Jct. x St. Anns Jct	Line refurbishment to address asset renewal need.

Table 6: Needs that Require Further Regional Coordination

#	Need Location	Need Description
1	Allanburg DESN TS	Load demand at Allanburg TS exceeds its capacity in 2028.
2	Carlton TS	Load demand at Carlton TS exceeds its capacity in 2028.
3	D9HS/D10S – Vansickle TS x Louth Jct	The section of the D9HS/D10S between Vansickle TS x Louth Junction is approaching its limit by 2035.

List of LDC(s) to be involved in further regional planning phases:

- Alectra Utilities
- Canadian Niagara Power
- Grimsby Power
- Hydro One Distribution
- Niagara-on-the-Lake Hydro
- Niagara Peninsula Energy
- Welland Hydro Electric System

10. REFERENCES

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

[2] Ontario Energy Board, Transmission System Code (issue July 14, 2000 rev. March 31, 2025)

[3] Ontario Energy Board, Distribution system Code (issue July 14, 2000 rev. September 16, 2025)

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

Appendix A: Extreme Summer Weather Adjusted Net Load Forecast

Table A.1: Niagara Region - Non-Coincident – Normal Growth Net Load Forecast

Station	LTR MW	2025 Actuals	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Allanburg TS	58.0	47.7	52.8	55.5	66.3	70.0	69.6	71.6	74.2	75.6	77.1	78.8
Beamsville TS	56.5	58.4	57.5	57.8	58.3	39.2	39.0	39.2	39.5	39.9	40.4	41.0
Bunting TS	74.9	55.0	54.8	57.2	60.6	65.9	66.4	67.6	68.8	69.1	70.5	72.0
Carlton TS	99.6	84.4	86.2	92.3	100.4	107.3	115.0	116.6	117.3	118.2	120.1	122.4
CNPI Station #17 MTS	56.3	23.3	23.9	23.9	23.9	24.0	23.7	23.7	23.7	23.7	23.8	23.9
CNPI Station #18 MTS	56.3	54.1	55.5	55.5	55.5	55.6	55.0	55.0	55.0	55.0	55.2	55.5
Crowland TS	101.7	90.8	93.0	92.5	92.1	91.7	91.0	91.3	91.6	92.1	96.8	97.7
Dunnville TS	55.8	30.7	35.0	34.9	35.1	36.7	36.4	36.5	36.6	36.8	36.9	37.3
Glendale TS (T1/T2)	93.2	27.1	29.4	32.1	33.8	34.5	35.6	36.2	36.7	38.3	38.9	40.6
Glendale TS (T3/T4)	18.1	9.0	11.2	13.0	13.9	14.8	14.4	15.2	15.1	15.9	15.8	15.7
Kalar MTS	67.5	46.8	49.2	49.7	51.2	51.7	51.6	52.1	52.5	53.0	53.6	54.4
Murray TS (T11/T12)	71.6	66.8	69.5	70.1	70.8	71.6	71.4	72.0	72.6	73.4	74.3	75.4
Murray TS (T13/T14)	77.2	37.5	37.7	37.8	38.0	38.3	38.1	38.3	38.5	38.7	39.0	39.5
Niagara West MTS	60.0	54.4	56.9	57.4	56.8	57.4	56.2	56.8	56.2	56.7	58.6	59.5
Spring Creek MTS	96.3	0.0	0.0	0.0	5.8	25.7	26.1	26.7	26.9	27.5	28.3	27.4
NOTL #2 MTS	59.0	36.3	36.0	36.1	36.3	36.4	36.5	36.5	36.7	36.9	37.1	37.4
NOTL York MTS	74.7	25.7	60.9	60.2	59.6	59.1	57.8	57.1	56.5	56.0	55.5	55.2
Port Colborne TS	108.0	38.4	39.4	39.3	44.1	46.4	47.0	47.6	47.9	47.8	48.1	49.5
Stanley TS	99.2	68.0	70.6	71.0	71.8	72.5	72.4	73.0	73.7	74.4	75.3	76.5
Thorold TS	88.4	25.2	28.5	28.4	28.5	28.5	28.3	28.3	28.3	28.4	28.5	28.7
Vansickle TS	97.4	52.8	51.7	55.2	61.6	66.9	68.4	69.5	70.6	71.8	73.2	74.8
Vineland DS	25.0	20.8	21.7	21.6	22.4	23.1	23.8	23.8	23.8	24.0	24.0	24.1
Industrial Customer 1			5.1	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2
Industrial Customer 2			2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
Industrial Customer 3			3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Industrial Customer 4			8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Industrial Customer 5			51.5	59.5	63.0	66.0	66.0	66.0	66.0	66.0	66.0	66.0
Industrial Customer 6			3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9
Industrial Customer 7			87.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0
Industrial Customer 8			0.2	19.5	19.5	19.5	19.5	19.5	19.5	19.5	19.5	19.5
Industrial Customer 9			5.0	11.0	23.0	30.0	40.0	40.0	40.0	40.0	40.0	40.0
Industrial Customer 10			0.0	0.0	0.0	0.0	79.0	79.0	79.0	79.0	79.0	79.0
Industrial Customer 11			0.0	0.0	0.0	0.0	20.0	20.0	20.0	20.0	20.0	20.0

Table A.2: Niagara Region - Coincident – Normal Growth Net Load Forecast

Station	LTR MW	2025 Actuals	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Allanburg TS	58.0	43.3	52.8	55.5	66.3	70.0	69.6	71.6	74.2	75.6	77.1	78.8
Beamsville TS	56.5	57.9	57.5	57.1	57.6	38.4	38.2	38.5	38.8	39.2	39.7	40.3
Bunting TS	74.9	48.3	49.0	51.1	54.1	59.0	59.4	60.3	61.3	61.5	62.7	64.0
Carlton TS	99.6	65.8	66.5	71.0	76.9	82.0	88.5	89.4	89.7	90.1	91.4	93.0
CNPI Station #17 MTS	56.3	23.3	23.9	23.9	23.9	24.0	23.7	23.7	23.7	23.7	23.8	23.9
CNPI Station #18 MTS	56.3	54.1	55.5	55.5	55.5	55.6	55.0	55.0	55.0	55.0	55.2	55.5
Crowland TS	101.7	81.2	83.1	82.5	82.1	81.6	80.8	80.9	81.1	81.4	86.0	86.8
Dunnville TS	55.8	29.3	33.3	33.2	33.3	34.9	34.6	34.7	34.8	34.9	35.1	35.4
Glendale TS (T1/T2)	93.2	23.8	25.9	28.3	29.7	30.3	31.2	31.6	32.1	33.4	33.9	35.3
Glendale TS (T3/T4)	18.1	9.8	11.2	13.0	13.9	14.8	14.4	15.2	15.1	15.9	15.8	15.7
Kalar MTS	67.5	41.7	43.1	43.4	44.8	45.2	45.0	45.3	45.6	46.0	46.4	47.1
Murray TS (T11/T12)	71.6	61.3	63.3	63.8	64.4	65.1	64.8	65.2	65.8	66.4	67.1	68.1
Murray TS (T13/T14)	77.2	34.7	37.7	37.8	38.0	38.3	38.1	38.3	38.5	38.7	39.0	39.5
Niagara West MTS	60.0	36.4	37.5	37.6	37.1	37.3	36.0	36.2	35.6	35.8	37.6	38.1
Spring Creek MTS	96.3	0.0	0.0	0.0	5.8	25.7	26.1	26.7	26.9	27.5	28.3	27.4
NOTL #2 MTS	59.0	32.3	34.1	34.2	34.3	34.4	34.4	34.5	34.7	34.8	34.9	35.2
NOTL York MTS	74.7	13.0	60.9	60.2	59.6	59.1	57.8	57.1	56.5	56.0	55.5	55.2
Port Colborne TS	108.0	33.6	34.4	34.3	38.3	40.3	40.7	41.1	41.2	41.2	41.4	42.6
Stanley TS	99.2	52.3	53.9	54.2	54.6	55.0	54.6	54.8	55.1	55.5	55.9	56.8
Thorold TS	88.4	22.2	25.1	24.9	24.9	25.0	24.7	24.6	24.6	24.7	24.7	24.9
Vansickle TS	97.4	46.3	49.9	53.2	59.4	64.5	65.8	66.9	68.0	69.1	70.4	71.9
Vineland DS	25.0	18.3	18.9	18.8	19.4	20.1	20.6	20.6	20.6	20.7	20.7	20.8
Industrial Customer 1			5.1	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2
Industrial Customer 2			2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
Industrial Customer 3			3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Industrial Customer 4			8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Industrial Customer 5			51.5	59.5	63.0	66.0	66.0	66.0	66.0	66.0	66.0	66.0
Industrial Customer 6			3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9
Industrial Customer 7			87.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0
Industrial Customer 8			0.2	19.5	19.5	19.5	19.5	19.5	19.5	19.5	19.5	19.5
Industrial Customer 9			5.0	11.0	23.0	30.0	40.0	40.0	40.0	40.0	40.0	40.0
Industrial Customer 10			0.0	0.0	0.0	0.0	79.0	79.0	79.0	79.0	79.0	79.0
Industrial Customer 11			0.0	0.0	0.0	0.0	20.0	20.0	20.0	20.0	20.0	20.0

Table A.3: Niagara Region Non-Coincident – High Growth Net Load Forecast

Station	LTR MW	2025 Actuals	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Allanburg TS	58.0	47.7	52.8	56.8	73.0	78.6	78.0	81.0	85.0	86.9	89.2	91.8
Beamsville TS	56.5	58.4	57.5	58.0	58.7	39.6	39.3	39.7	40.1	40.7	41.5	42.3
Bunting TS	74.9	55.0	54.8	58.4	63.5	71.4	72.3	74.0	75.8	76.3	78.3	80.7
Carlton TS	99.6	84.4	86.2	95.3	107.4	117.9	129.4	131.8	132.8	134.2	137.1	140.6
CNPI Station #17 MTS	56.3	23.3	23.9	23.9	24.0	24.1	23.5	23.5	23.5	23.5	23.7	24.3
CNPI Station #18 MTS	56.3	54.1	55.5	55.5	55.6	55.7	54.8	54.7	54.7	54.8	55.0	55.5
Crowland TS	101.7	90.8	93.0	92.2	91.6	91.1	90.0	90.4	90.9	91.6	98.7	100.1
Dunnville TS	55.8	30.7	35.0	34.9	35.1	37.5	37.1	37.2	37.4	37.6	37.9	38.4
Glendale TS (T1/T2)	93.2	27.1	29.4	33.5	36.0	37.0	38.8	39.6	40.4	42.7	43.6	46.2
Glendale TS (T3/T4)	18.1	9.0	11.2	14.0	15.3	16.6	16.3	17.4	17.3	18.5	18.3	18.2
Kalar MTS	67.5	46.8	49.2	49.9	52.2	53.0	52.8	53.5	54.1	54.9	55.8	57.0
Murray TS (T11/T12)	71.6	66.8	69.5	70.4	71.5	72.6	72.4	73.3	74.2	75.3	76.6	78.4
Murray TS (T13/T14)	77.2	37.5	37.7	37.8	38.2	38.6	38.3	38.5	38.8	39.2	39.7	40.4
Niagara West MTS	60.0	54.4	56.9	57.6	57.1	58.0	56.8	57.6	57.0	57.8	60.6	61.9
Spring Creek MTS	96.3	0.0	0.0	0.0	5.8	25.7	26.4	27.2	27.5	28.4	29.7	28.3
NOTL #2 MTS	59.0	36.3	36.0	36.2	36.4	36.6	36.7	36.8	37.1	37.3	37.6	38.1
NOTL York MTS	74.7	25.7	60.9	60.2	59.6	59.1	57.8	57.1	56.5	56.0	55.5	55.2
Port Colborne TS	108.0	38.4	39.4	39.3	46.4	50.0	50.9	51.7	52.1	52.1	52.5	54.6
Stanley TS	99.2	68.0	70.6	71.3	72.4	73.5	73.3	74.2	75.2	76.3	77.6	79.5
Thorold TS	88.4	25.2	28.5	28.3	28.4	28.5	28.3	28.3	28.3	28.5	28.6	29.0
Vansickle TS	97.4	52.8	51.7	56.9	66.5	74.6	76.7	78.4	80.1	81.9	84.0	86.3
Vineland DS	25.0	20.8	21.7	21.6	22.7	23.9	24.9	24.9	24.9	25.1	25.2	25.4
Industrial Customer 1			5.1	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2
Industrial Customer 2			2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
Industrial Customer 3			3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Industrial Customer 4			8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Industrial Customer 5			51.5	59.5	63.0	66.0	66.0	66.0	66.0	66.0	66.0	66.0
Industrial Customer 6			3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9
Industrial Customer 7			87.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0
Industrial Customer 8			0.2	19.5	19.5	19.5	19.5	19.5	19.5	19.5	19.5	19.5
Industrial Customer 9			5.0	11.0	23.0	30.0	40.0	40.0	40.0	40.0	40.0	40.0
Industrial Customer 10			0.0	0.0	0.0	0.0	79.0	79.0	79.0	79.0	79.0	79.0
Industrial Customer 11			0.0	0.0	0.0	0.0	20.0	20.0	20.0	20.0	20.0	20.0

Table A.4: Niagara Region – Coincident – High Growth Net Load Forecast

Station	LTR MW	2025 Actuals	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Allanburg TS	58.0	47.7	52.8	56.8	73.0	78.6	78.0	81.0	85.0	86.9	89.2	91.8
Beamsville TS	56.5	58.4	57.5	56.9	57.6	38.5	38.2	38.6	39.0	39.6	40.4	41.2
Bunting TS	74.9	55.0	49.0	52.1	56.6	64.0	64.6	66.0	67.5	67.8	69.5	71.5
Carlton TS	99.6	84.4	66.5	73.2	82.2	89.8	99.6	100.9	101.2	101.9	103.8	106.2
CNPI Station #17 MTS	56.3	23.3	23.9	23.9	23.9	24.0	23.6	23.6	23.6	23.6	23.7	23.9
CNPI Station #18 MTS	56.3	54.1	55.5	55.5	55.6	55.7	54.8	54.7	54.7	54.8	55.0	55.5
Crowland TS	101.7	90.8	83.1	82.2	81.6	81.1	80.3	80.4	80.7	81.2	88.0	89.3
Dunnville TS	55.8	30.7	33.3	33.1	33.3	35.7	35.4	35.5	35.7	35.9	36.1	36.5
Glendale TS (T1/T2)	93.2	27.1	25.9	29.4	31.6	32.4	33.8	34.5	35.1	37.1	37.8	40.0
Glendale TS (T3/T4)	18.1	9.0	11.2	14.0	15.3	16.6	16.3	17.4	17.2	18.4	18.3	18.2
Kalar MTS	67.5	46.8	43.1	43.6	45.7	46.3	46.1	46.5	47.0	47.5	48.2	49.2
Murray TS (T11/T12)	71.6	66.8	63.3	64.1	65.0	65.9	65.6	66.3	67.1	68.0	69.1	70.6
Murray TS (T13/T14)	77.2	37.5	37.7	37.8	38.2	38.6	38.4	38.6	38.9	39.3	39.8	40.5
Niagara West MTS	60.0	54.4	37.5	37.7	36.9	37.2	35.3	35.6	34.7	34.9	37.7	38.4
Spring Creek MTS	96.3	0.0	0.0	0.0	0.0	25.7	26.4	27.2	27.5	28.4	29.7	28.3
NOTL #2 MTS	59.0	36.3	34.1	34.2	34.4	34.6	34.6	34.7	34.9	35.1	35.4	35.8
NOTL York MTS	74.7	25.7	60.9	59.9	59.0	58.2	56.9	55.9	55.0	54.1	53.4	53.1
Port Colborne TS	108.0	38.4	34.4	34.3	40.3	43.3	43.8	44.4	44.7	44.6	44.9	46.7
Stanley TS	99.2	68.0	53.9	54.4	55.0	55.6	55.1	55.5	55.9	56.5	57.2	58.5
Thorold TS	88.4	25.2	25.1	24.8	24.9	24.9	24.6	24.6	24.6	24.6	24.7	25.0
Vansickle TS	97.4	52.8	49.9	54.9	64.1	71.8	73.8	75.4	77.0	78.7	80.6	82.8
Vineland DS	25.0	20.8	18.9	18.8	19.7	20.7	21.5	21.4	21.4	21.6	21.6	21.7
Industrial Customer 1			5.1	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2
Industrial Customer 2			2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
Industrial Customer 3			3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Industrial Customer 4			8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Industrial Customer 5			51.5	59.5	63.0	66.0	66.0	66.0	66.0	66.0	66.0	66.0
Industrial Customer 6			3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9
Industrial Customer 7			87.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0
Industrial Customer 8			0.2	19.5	19.5	19.5	19.5	19.5	19.5	19.5	19.5	19.5
Industrial Customer 9			5.0	11.0	23.0	30.0	40.0	40.0	40.0	40.0	40.0	40.0
Industrial Customer 10			0.0	0.0	0.0	0.0	79.0	79.0	79.0	79.0	79.0	79.0
Industrial Customer 11			0.0	0.0	0.0	0.0	20.0	20.0	20.0	20.0	20.0	20.0

Appendix B: Lists of Step-Down Transformer Stations

Transformer Station	Voltage (kV)	Supply Circuits
Allanburg TS	230kV	Q26M, Q28A, Q30M, Q35M
Allanburg TS (DESN)	115kV	A6C, A7C
Beamsville TS	115kV	Q2AH
Bunting TS	115kV	Q11S, Q12S
Carlton TS	115kV	D9HS, D10S
Crowland TS	115kV	A6C, A7C
Dunnville TS	115kV	Q2AH
Glendale TS	115kV	Q11S, Q12S
Kalar MTS	115kV	A36N, A37N
Niagara Murray TS	115kV	Q3N, Q4N (T11/T12) A36N, A37N (T13/T14)
Niagara West MTS	230kV	Q23BM, Q25BM
NOTL York MTS	115kV	Q12S
NOTL #2 MTS	115kV	Q11S
Port Colborne TS	115kV	A6C, A7C
Stanley TS	115kV	Q3N, Q4N
Thorold TS	115kV	D1A, D3A
Vansickle TS	115kV	D9HS, D10S
Vineland DS	115kV	Q2AH
CNPI Station #17 MTS	115kV	A37N
CNPI Station #18 MTS	115kV	A37N

Appendix C: List of Municipalities in the Niagara Region

Name of Municipality
City of Port Colborne
City of Welland
City of Thorold
City of Niagara Falls
Town of Niagara-on-the-Lake
City of St. Catharines
Town of Fort Erie
Town of Lincoln
Township of West Lincoln
Town of Grimsby
Township of Wainfleet
Town of Pelham

Appendix D: Acronyms

Acronym	Description
A	Ampere
BES	Bulk Electric System
BPS	Bulk Power System
CEP	Community Energy Plan
CIA	Customer Impact Assessment
CGS	Customer Generating Station
CSS	Customer Switching Station
CTS	Customer Transformer Station
DESN	Dual Element Spot Network
DG	Distributed Generation
DS	Distribution Station
eDSM	Electricity Demand Side Management
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
MEP	Municipal Energy Plan

Acronym	Description
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
RAS	Remedial Action Scheme
SS	Switching Station
TS	Transformer Station