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NEEDS ASSESSMENT REPORT

Northwest Ontario Region

Date: July 17th 2020

Prepared by: Northwest Ontario Region Study Team



Disclaimer

This Needs Assessment Report was prepared for the purpose of identifying potential needs in the Northwest Ontario Region and to recommend which need may require further assessment and/or regional coordination to develop a preferred plan. The results reported in this Needs Assessment are based on the input and information provided by the Study Team.

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Executive Summary

REGION	Northwest Ontario Region
LEAD	Hydro One Networks Inc. (“HONI”)
START DATE: March 10 th 2020	END DATE: July 17 th 2020

1. INTRODUCTION

For the first cycle of the Regional Planning process for the Northwest Ontario Region an Integrated Regional Resource Plan (“IRRP”) was published in 2016 which identified a number of near- and mid-term needs. The planning process was completed in June 2017 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. The RIP also identified some near- and mid-term needs that will be reviewed during this Regional Planning cycle.

The purpose of this Needs Assessment (“NA”) is to identify any new needs and to reaffirm needs identified in the previous Northwest Ontario Regional Planning cycle.

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 the timing of the needs identified in the previous Integrated Regional Resource Plan (“IRRP”) and RIP reports as well as new replacement/ refurbishment needs in the Northwest Ontario Region, the 2nd Regional Planning cycle was triggered for this Region.

3. SCOPE OF NEEDS ASSESSMENT

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.
- 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.

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 the Northwest Ontario Region regarding capacity needs, reliability needs, operational issues, and major assets/facilities approaching end-of-life (“EOL”).

5. ASSESSMENT METHODOLOGY

The assessment’s primary objective is to identify the electrical infrastructure needs, recommend further mitigation or action plan(s) to address these needs, and determine whether further regional coordination or broader study would be beneficial.

The assessment reviewed available information including load forecasts, conservation and demand management (“CDM”) and distributed generation (“DG”) forecasts, reliability needs, operational issues, and major high voltage equipment identified to be at or near the end of their useful life and requiring replacement/refurbishment.

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 useful life.

6. NEEDS

I. Update on Needs Identified from Previous Cycle

- E1C (Ear Falls Transformer Station (“TS”) x Crow River DS) / Red Lake TS Near Capacity – The new 230kV Watay connection between Pickle Lake Switching Station (“SS”) and Dinorwic Junction (“Jct”) will provide relief to the capacity constraint on E1C by 2021
- A4L Capacity Increase to Accommodate Mining Development in the Geraldton Area – Geraldton Area mining development activities have not fully materialized
- New wires to accommodate Energy East Pipeline and Ring of Fire – Due to cancellation of Energy East Pipeline project and uncertainties associated with developments at the Ring of Fire, this need has not yet materialized
- Additional Capacity Anticipated on the Dryden 115kV Sub-System by mid-2020s – The updated 2029 forecast for Dryden 115kV Sub-System is 80MW. Under this growth

assumption, the Load Meeting Capability (“LMC”) is sufficient to meet the demand of this sub-system.

- Kenora Municipal Transformer Station (“MTS”) Supply Need - The forecasted load growth at Kenora MTS is anticipated to reach 23MW by year 2027, which is also near the station’s 10-Day Limited Time Rating (“LTR”).
- Moose Lake 115kV and Fort Frances 115kV Sub-System Supply Capacity – The updated load forecast indicate sufficient supply capacity to meet demands at these two sub-systems within the West of Thunder Bay Sub-Region
- Port Arthur TS #1 Transformation Capacity – Once the Low Voltage (“LV”) yard refurbishment is complete in 2025, the capacity will increase to 59MW. The total station load is forecasted to be around 45MW in year 2029, which is still well below the revised station LTR of 59MW.

II. New Needs Identified in the Region

- Lakehead TS Capacity Need – With the significant load increase and substantial decrease in dependable generation output assumption¹ in the Thunder Bay Sub-Region, voltage support will be required to prevent voltage collapse under N-1-1 Contingency Scenario (i.e.: Loss of Lakehead auto-transformers T7 and T8), while at the same time mitigation is required to prevent overloading of the 115kV circuits A5A, A1B, and T1M under this outage condition.
- Marathon TS – With the significant load increase and substantial decrease in dependable generation output assumption¹ in the Greenstone-Marathon Sub-Region, under N-1-1 contingency (i.e: loss of both auto-transformers at Marathon TS), the Greenstone-Marathon Sub-Region system experiences voltage collapse. Even with additional voltage support to resolve the voltage issue, the 115kV circuit A5A could be overloaded at peak load conditions.
- Sapawe DS – This station is a 115/12.5kV distribution station owned by Hydro One Distribution. The station has a Winter Planned Loading Limit (PLL) of 4.30MW and a Summer PLL of 3.42MW (assuming 0.9 power factor), and its load growth is anticipated to reach these levels by year 2028 and 2026 respectively.
- Sam Lake DS –The station is the sole supply for Sioux Lookout Hydro, and this embedded LDC is anticipating to have significant load increase up to 35MW throughout the next 10 year period. The existing transformation facility at Sam Lake DS

¹ In future studies, the total hydro output of all facilities within a sub-system will be summed before calculating the 98% dependable output in order to reflect a more accurate assessment of the capacity need.

has already reached its Winter 10-Day LTR, and various options including adding an additional step-down transformer or having a brand new station built in the vicinity are being considered. Due to the significant load increase, additional voltage support is also needed at this station.

III. EOL Asset Replacements and Refurbishments

- Projects Under Execution:
 - i. Birch TS – High Voltage (“HV”) Breaker, Disconnect Switch, and Insulator Replacement
 - ii. Dryden TS – New 115/44kV Step-Down Transformers & HV Breaker Replacement
 - iii. Fort Frances MTS – HV Breaker Replacement
 - iv. Pine Portage SS – HV Breaker & Disconnect Switch Replacements
- New Station Projects:
 - i. Alexander SS – HV Breaker and Line Disconnect Switch Replacement
 - ii. Ear Falls TS – HV Breaker Replacement
 - iii. Fort Frances TS - HV Breaker & 230/115kV Step-Down Auto-Transformer Replacement
 - iv. Kenora TS – HV Circuit Breaker, Switch Replacement, 230/115kV Step-Down Auto-Transformer Replacement
 - v. Lakehead TS – HV Breaker, Switch and Protection & Control Facility Replacement
 - vi. Mackenzie TS – HV Breaker, Line Disconnect Switch, 230/115kV Step-Down Auto-Transformer Replacement
 - vii. Marathon TS – HV Breaker and Line Disconnect Switch Replacement
 - viii. Moose Lake TS - 115/44kV Step-Down Transformer Replacement
 - ix. Port Arthur TS #1 – LV Yard Replacement
 - x. Rabbit Lake SS – New HV Load Break Switch Install; HV Breaker & Disconnect Switch, Line Disconnect Switch Replacement
 - xi. Whitedog Falls SS – HV Breaker, Line Disconnect Switch Replacement
- New Line Projects:
 - i. 115kV A4L Circuit – Beardmore Jct x Longlac TS Refurbishment

- ii. 115kV E1C Circuit – Ear Falls TS x Slate Falls DS Refurbishment;
Etruscan Jct x Crow River DS Refurbishment

7. RECOMMENDATIONS

The Study Team’s recommendations for the above identified needs are as follows:

- a) E1C (Ear Falls TS x Crow River DS) / Red Lake TS Near Capacity – No actions required at this time, but it is prudent to continue to monitor the Red Lake Area load and growth-related activities.
- b) A4L Capacity Increase to Accommodate Mining Development in the Geraldton Area – No actions required at this time other than to continue to monitor the Geraldton Area Mining Development.
- c) New wires to accommodate Energy East Pipeline and Ring of Fire – No actions required at this time other than to continue to monitor the Ring of Fire development.
- d) Additional Capacity Anticipated on the Dryden 115kV Sub-System by mid-2020s – Further regional coordination will be required in order to study different growth scenarios and the resulting impact they may have on the Dryden 115kV Sub-System.
- e) Kenora MTS Capacity Need – No further regional coordination is required as Synergy North will take the lead to further assess the need in co-ordination with Hydro One Transmission as part of the Local Planning (“LP”). However, this need may be revisited at a later date should additional findings during subsequent phases of Regional Planning trigger the Study Team to reconsider the recommendation made in the NA phase.
- f) Lakehead TS Capacity Need – IESO will take the lead to further study the need throughout SA and IRRP stages of the Regional Planning in order to determine a preferred solution.
- g) Marathon TS Capacity Need – IESO will take the lead to further study the need throughout SA and IRRP stages stages of the Regional Planning in order to determine a preferred solution.

- h) Sapawe DS Capacity Need – Hydro One Distribution will take the lead to look into this need in co-ordination with Hydro One Transmission as part of the Distribution Planning.
- i) Sam Lake DS Capacity Need – Since no upstream system voltage and flow violations are observed, no further regional coordination is required. Sioux Lookout Hydro, Hydro One Distribution and Hydro One Transmission will collaborate in order to develop a suitable solution to address this need as part LP. However, this need may be revisited at a later date should additional findings during subsequent phases of Regional Planning trigger the Study Team to reconsider the recommendation made in the NA phase.
- j) Based on this region’s sensitivity to industrial load growth scenarios as seen in the 1st cycle of IRRP, it is prudent to review those affected sub-regions starting with an IESO-led Scoping Assessment. This will help in verifying any changes in assumptions with respect to anticipated industrial loads in those regions.
- k) The implementation and execution for the replacement of the EOL transmission assets will be coordinated between Hydro One Transmission and the affected LDCs, where required. These projects will be coordinated with the IESO when required and where feasible within the timelines afforded by each project.

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1 INTRODUCTION

The first cycle of the Regional Planning process for the Northwest Ontario Region was completed in June 2017 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 Northwest Ontario Regional Planning cycle. Since the previous Regional Planning cycle, some new needs in the region have been identified.

This report was prepared by the Northwest Ontario 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: Northwest Ontario Region Study Team Participants

Company
Atikokan Hydro Inc.
Fort Frances Power Corporation
Hydro One Networks Inc. (Distribution)
Hydro One Networks Inc. (Lead Transmitter)
Independent Electricity System Operator (“IESO”)
Sioux Lookout Hydro Inc.
Synergy North

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 the timing of the needs identified in the previous Integrated Regional Resource Planning (“IRRP”) and RIP reports as well as new replacement/refurbishment identified needs in the Northwest Ontario Region, the 2nd Regional Planning cycle was triggered for the Northwest Ontario region.

3 SCOPE OF NEEDS ASSESSMENT

The scope of this NA covers the Northwest Ontario Region and includes:

- Identification of new needs based on latest information provided by the Study Team; and,
- Confirmation/updates of existing needs and/or plans identified in the previous planning cycle.

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.

4 REGIONAL DESCRIPTION AND CONNECTION CONFIGURATION

Bulk electrical supply to the Northwest Ontario Region is provided through a combination of local generation stations connected to the 230 kV and 115 kV network, and the East-West Tie transmission corridor.

The Local Distribution Companies (“LDCs”) that serve the electricity demands for the Northwest Ontario are Hydro One Networks Inc. (Distribution), Atikokan Hydro Inc., Sioux Lookout Hydro Inc., Synergy North, and Fort Frances Power Corporation (“FFPC”). The LDCs receive power at the step down transformer stations (“TS”) and distribute it to the end users – industrial, commercial and residential customers.

The January 2015 IRRP report for North of Dryden Sub-Region, the June 2016 IRRP report for Greenstone-Marathon Sub-Region, the July 2016 IRRP report for West of Thunder Bay Sub-Region, and the December 2016 IRRP report for Thunder Bay Sub-Region focused on northern, eastern, western, and central parts, respectively, of the Region. All IRRP reports were prepared

by the IESO in conjunction with Hydro One and the LDCs. A map and a single line diagram showing the electrical facilities of the Northwest Ontario Region, consisting of the sub-regions, is shown in Figure 1 and Figure 2, respectively.

North of Dryden Sub-Region

A radial single-circuit 115 kV transmission line (“E4D”) supplies electricity to the customers in the North of Dryden sub-region from Dryden TS. A new 230 kV transmission line between Dinorwic (~40 km southeast of Dryden) to Pickle Lake, along with associated station facilities, are currently under construction. The major supply station for this sub-region is Dryden TS, where the voltage is stepped down from the 230 kV to 115 kV, to serve local and industrial customers. Electricity demand in the North of Dryden sub-region is also supplied by local hydroelectric generation.

Greenstone-Marathon Sub-Region

Electrical supply to the customers in the Greenstone-Marathon Sub-Region comprises of Marathon TS and Alexander Switching Station (“SS”). Marathon TS steps down 230 kV to 115 kV and supplies customers in the Town of Marathon, White River and Manitouwadge through a 115 kV single circuit - M2W. Three circuits A5A, A1B, and T1M - in series connect Marathon TS to Alexander SS.

Alexander SS connects Alexander Generating Station (“GS”), Cameron Falls GS, and Pine Portage GS - to the system. A 115 kV single-circuit A4L, connected to the Alexander SS, supplies electricity to the Municipality of Greenstone and its surrounding areas. Nipigon GS is also connected to the circuit A4L.

West of Thunder Bay Sub-Region

Supply to this Sub-Region is provided from a 230 kV transmission system consisting of the Kenora TS, Fort Frances TS, Dryden TS, and Mackenzie TS. Kenora TS steps down 230 kV to 115 kV and supplies customers in the City of Kenora and surrounding areas. In addition, it also connects Ontario to Manitoba’s electrical system through two 230 kV transmission lines – K21W and K22W. Fort Frances TS steps down 230 kV to 115 kV and supplies customers in the City of Fort Frances and surrounding areas. It also connects Ontario to Minnesota’s electrical system through a 115 kV transmission line – F3M. Dryden TS steps down 230 kV to 115 kV and supplies customers in the City of Dryden and surrounding areas. It also connects West of

Thunder Bay to North of Dryden Sub-Region. Mackenzie TS steps down 230 kV to 115 kV and supplies customers in Atikokan and surrounding areas. It also connects West of Thunder Bay to the Thunder Bay Sub-Region. The West of Thunder Bay Sub-Region is also supplied by many local hydroelectric generation facilities

Thunder Bay Sub-Region

Thunder Bay Sub-Region consists of the Lakehead TS as the 230 kV step-down transformation facility which steps down 230 kV to 115 kV and supplies customers in the City of Thunder Bay and surrounding areas. The area is served primarily at 115 kV by three step-down transformer stations - Birch TS, Fort William TS, and Port Arthur TS #1.

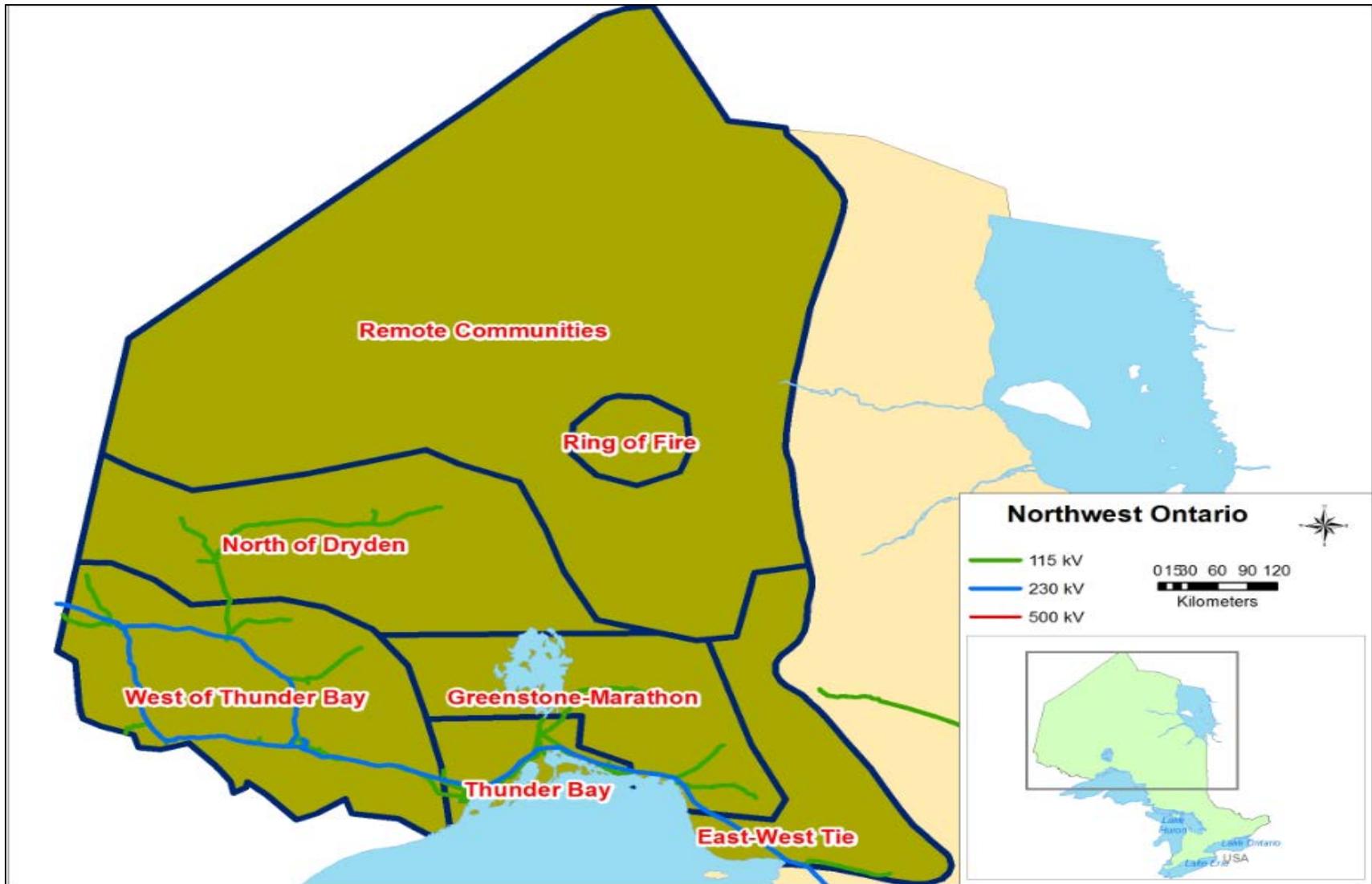


Figure 1 - Northwest Ontario Region Map

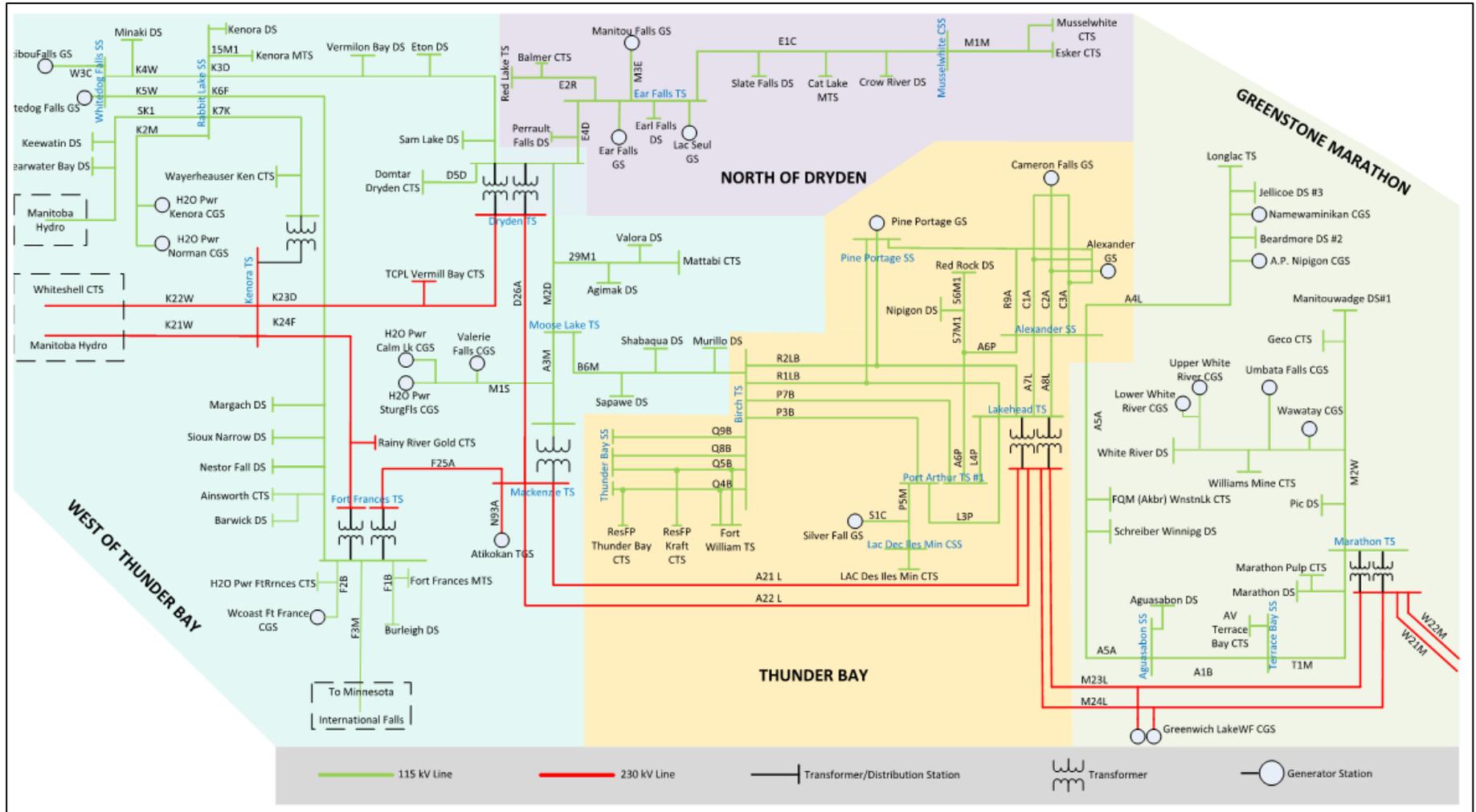


Figure 2 - Single Line Diagram for Northwest Ontario Region

5 INPUTS AND DATA

Study Team participants, including representatives from LDCs, IESO, and Hydro One provided information and input for the Northwest Ontario Region NA Report. The information provided includes the following:

- Northwest Ontario Region Load Forecast for all supply stations;
- Known capacity and reliability needs, operating issues, and/or major assets approaching the end of their useful life (“EOL”); and
- Planned/foreseen transmission and distribution investments that are relevant to Regional Planning for the Northwest Ontario Region.

6 ASSESSMENT METHODOLOGY

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

Information gathering included:

- i. Load forecast: The relevant LDCs provided load forecasts for their respective load supply stations in the Northwest Ontario Region for the ten (10) year study period. The IESO provided a Conservation and Demand Management (“CDM”) and Distributed Generation (“DG”) forecast for the Northwest Ontario Region. The region’s extreme winter and summer non-coincident peak gross load forecasts for each station were prepared by applying the LDC load forecast load growth rates to the actual 2019 winter and summer peak extreme weather corrected loads, with Hydro One providing extreme weather correction factors. The net extreme weather summer and winter load forecasts were then produced by subtracting the percentage CDM reduction, and the amount of effective DG capacity from each station’s gross load forecast. These extreme weather winter and summer load forecasts for the individual stations in the Northwest Ontario Region are given in Appendix A;
- ii. Relevant information regarding system reliability and operational issues in the region; and
- iii. List of major High Voltage (“HV”) transmission equipment planned and/or identified to be refurbished and/or replaced due to the EOL which is relevant for Regional Planning

purposes. This includes HV transformers, auto-transformers, HV breakers, HV underground cables and overhead lines.

A technical assessment of needs was undertaken based on:

- Planning criteria outlined in IESO-ORTAC (section 2.7.1) for analysis of current and future transmission system adequacy (critical N-1-1 contingencies for assessing load supply reliability);
- Planning criteria outlined in IESO-ORTAC (section 2.7.2) for analysis of current and future station capacity and transmission adequacy;
- Planning criteria outlined in IESO-ORTAC (section 7) for load reliability;
- System reliability and operational concerns; and
- Any major high voltage equipment reaching EOL.

In addition, the following assumptions were made in this Needs Assessment Report:

- 1) The new East-West Tie Transmission Reinforcement is included in the assessment model
- 2) The new 230kV circuit to be built by Wataynikaneyap Power between Watay 230/115kV TS and Dinorwic Jct on 230kV circuit D26A is assumed to be in-service
- 3) 115kV circuit E1C is sectionalized at Placer Jct to accommodate the connection of Hydro One owned 115kV Pickle Lake SS, which in turn is connected to the new Watay TS. As a result, the section of E1C from Pickle Lake SS to Musselwhite Customer Switching Station (“CSS”) is being renamed as C2M:
 - a. 115kV C2M (Pickle Lake SS x Musselwhite CSS)
 - b. 115kV E1C (Ear Falls TS x Pickle Lake SS)
- 4) Ten (10) remote First Nation communities north of Pickle Lake are electrically supplied by Watay TS
- 5) Six (6) remote First Nation communities north of Red Lake are electrically supplied by Wataynikaneyap Power owned Switching Station that taps onto Hydro One owned 115kV circuit E2R adjacent to Balmer Jct

- 6) Inter-tie flows between Ontario and Manitoba on 230kV circuits K21W and K22W are reduced to near zero
- 7) Inter-tie flows between Ontario and Minnesota on 115kV circuit F3M is reduced to near zero
- 8) The Northwest Ontario Region is winter peaking, and the 2029 Winter Load Forecast is used in the simulation study
- 9) The assessment of transmission system adequacy is conducted using the winter non-coincident forecasts
- 10) Adequacy of transformation capacity at load stations was assessed assuming a 0.9 lagging power factor and non-coincident station loads for both summer and winter forecasts²
- 11) Hydroelectric generation is assumed to be at 98% dependable when all elements are in service, as well as during N-1 contingency analysis as per IESO's ORTAC documentation. Generation is assumed to be at 85% dependable when one transmission element is out of service pre-contingency³

7 NEEDS

This section describes emerging needs identified in the Northwest Ontario Region, and also reaffirms the near, mid, and long-term needs already identified in the previous Regional Planning cycle.

7.1 Review of Needs Identified in the Previous Cycle of Regional Planning

This section review the status of the needs identified in the previous cycle of Region Planning as summarized in Table 2 below, followed by detailed analysis of select needs from the table.

² Please see Appendices A & B more more details

³ Please see Appendix C for more details

Table 2: Needs Identified in the Previous Regional Planning Cycle

Type of Needs identified in the previous RP cycle	Needs Details	2020 Update
North of Dryden Sub-Region		
115kV Line Capacity	E1C (Ear Falls TS x Crow River DS) Near Capacity	The new 230kV Watay connection between Pickle Lake SS and Dinorwic Jct will provide relief to the capacity constraint on E1C by 2021
115kV Line Capacity	Red Lake Sub-System Near Capacity	The new 230kV Watay connection between Pickle Lake SS and Dinorwic Jct will provide relief to the capacity constraints on E4D and E2R. This additional capacity will be made available to serve the growths of Red Lake area loads
Greenstone-Marathon Sub-Region		
115kV Line Capacity	A4L Capacity Increase to Accommodate Mining Development in the Geraldton Area	Geraldton Area mining development activities have not fully materialized. The Study Team will continue to monitor the mining development in the Geraldton Area.
230kV Line Capacity	New 230kV transmission circuit / switching station and 230/115kV Auto-Transformer	Cancellation of Energy East Pipeline project and uncertainties surrounding Ring of Fire developments have resulted in the need not being materialized. However, the Study Team will continue to monitor the Ring of Fire developments.
West of Thunder Bay Sub-Region		
230/115kV Transformation Capacity	Additional Capacity Anticipated on the Dryden 115kV Sub-System by mid-2020s	The updated 2029 forecast for the Dryden 115kV Sub-System and the North of Dryden Sub-Region are forecasted at 80MW and 97MW respectively ⁴ . Under these growth assumptions, the LMC is sufficient to meet the demand of this sub-system.
115kV Station Capacity	Kenora MTS – Capacity Need	The forecasted load growth at Kenora MTS is anticipated to reach 23MW by year 2027, which is near the station’s 10-Day LTR.

⁴ As per West of Thunder Bay IRRP from the first planning cycle, Dryden 115kV Sub-System can provide up to 240MW of continuous supply to Dryden 155kV Sub-System and North of Dryden Sub-Region. The updated forecasted demand for these two systems is 177MW, and this is a significant decline from the IRRP forecast of 310MW.

Type of Needs identified in the previous RP cycle	Needs Details	2020 Update
115kV Station & Line Capacities	Moose Lake 115kV Sub-System Supply Capacity	No actions were recommended in the 1 st cycle IRRP due to sufficient supply capacity to meet demand in the planning horizon. The updated load forecast also indicate sufficient supply capacity to meet demands at Moose Lake TS, Sapawe DS, and Shabqua DS.
115kV Station & Line Capacities	Fort Frances 115kV Sub-System Supply Capacity	No actions were recommended in the 1 st cycle IRRP due to sufficient supply capacity to meet demand in the planning horizon. The updated load forecast also indicate sufficient supply capacity to meet demands at load stations along 115kV K6F, F1B and F2B circuits.
Thunder Bay Sub-Region		
115kV Station Capacity	Port Arthur TS #1 – Transformation Capacity	Once the station LV yard refurbishment is complete in 2025, the capacity will increase to 59MW. The total station load is forecasted to be around 45MW in year 2029, which is still well below the station’s 10-Day LTR of 59MW.
230/115kV Transformation Capacity	Lakehead TS – Capacity Need	Due to significant growths in Thunder Bay and Greenstone-Marathon Sub-Regions, the forecasted load in the Thunder Bay 115kV System has exceeded the IRRP’s High Scenario forecast from the previous planning cycle and has therefore escalated the need.

E1C (Ear Falls TS x Crow River DS) Near Capacity / Red Lake Sub-System Near Capacity

The North of Dryden IRRP from the previous planning cycle has indicated that the 115kV circuit E1C from Ear Falls TS to the Pickle Lake area has reached capacity. At the same time, the Red Lake Sub-System Load Meeting Capability (“LMC”) may be insufficient to meet the needs of mining loads.

However, the new 230kV circuit to be built by Wataynikaneyap Power between Pickle Lake and Dinorwic Jct on 230kV circuit D26A will provide relief to the capacity constraint on E1C and E4D. Hydro One is in the process of constructing a new 115kV switching station at Pickle Lake to connect E1C circuit to the new 230kV circuit via a new 230/115kV auto-transformer station. The anticipated completion date is mid-2021.

No actions are required at this time, and the Study Team will continue to monitor the Red Lake Area load growth related activities.

Additional Capacity Anticipated on the Dryden 115kV Sub-System by mid-2020s

The West of Thunder Bay IRRP from the previous planning cycle has indicated that under high load growth scenario, additional capacity of 50MW will be required on the Dryden 115kV Sub-System by mid-2020s. The IRRP has indicated that the Dryden 115kV Sub-System can provide up to 240MW of continuous supply to Dryden 155kV Sub-System and North of Dryden Sub-Region.

As per the current load forecast, the Dryden 115kV Sub-System is forecasted to be 80MW, and the North of Dryden Sub-Region is forecasted at 97MW. The total demand from these two systems is 177MW, and this is a significant decline from the IRRP forecast of 310MW.

The Study Team recommends the further regional c to study different growth scenarios for the Dryden 115kV Sub-Sytem and the resulting impact they may present.

Kenora MTS – Capacity Need

Kenora Municipal Transformer Station (“MTS”) is a 115kV load station owned by Synergy North and its forecasted load growth is anticipated to reach 23MW by year 2027, which is also the station’s Winter 10-Day Limited Time Rating (“LTR”). Please see **Section 7.2** for more details.

Port Arthur TS #1 – Transformation Capacity Need

Port Arthur TS #1 is a 115/25kV load station located just east of the City of Thunder Bay, supplying Hydro One Distribution and Synergy North customers. Due to equipment

limitations and assets reaching EOL at the low voltage side of the station, the station has historically been limited to provide up to 55MW. However, once the Low Voltage (“LV”) yard refurbishment is complete in year 2025, the station capacity will revert back to 59MW. As per the latest load forecast, the updated station capacity will be able to accommodate both Hydro One Distribution and Synergy North load growths up to and beyond year 2029.

The Study Team recommends no actions to be taken at this time.

Lakehead TS – Capacity Need

Lakehead TS is a critical 230/115kV Step-Down Transformation Station located approximately 7km east of the City of Thunder Bay. The Thunder Bay Sub-Region IRRP from the previous cycle has indicated that under high growth scenario, the Thunder Bay Sub-Region would require additional supply capacity of 20MW by year 2030. However, the latest load forecast indicates the demand has significantly increased in the Thunder Bay Sub-Region and at the same time the dependable generation output has significantly decreased. Please see **Section 7.2** for more details.

7.2 Assessment of New Findings on Station and Transmission Capacities in the Northwest Ontario Region

230/115kV Auto-Transformation Facilities

Kenora TS

No capacity and voltage concerns when 230/115kV auto-transformer T1 is in-service.

Upon observing N-1 auto-transformer contingency, loadings on all 230kV, 115kV and remaining auto-transformers in the Northwest Ontario Region are kept within their respective 10-Day LTRs. Bus voltages also are kept within change limits criteria as per Section 4.3 – Voltage Change Limits from ORTAC.

Mackenzie TS

No capacity and voltage concerns when 230/115kV auto-transformer T3 is in-service.

Upon observing N-1 auto-transformer contingency, loadings on all 230kV, 115kV and remaining auto-transformers in the Northwest Ontario Region are kept within their respective 10-Day LTRs. Bus voltages also are kept within change limits criteria as per Section 4.3 – Voltage Change Limits from ORTAC.

Dryden TS

No capacity and voltage concerns when both 230/115kV auto-transformers T22 and T23 are in-service.

Upon observing N-1 auto-transformer contingency, the loading on the remaining auto-transformer is within its 10-Day Limited Time Ratings (LTRs). Loadings on all 230kV, 115kV and remaining auto-transformers in the Northwest Ontario Region are kept within their respective 10-Day LTRs. Bus voltages also are kept within change limits criteria as per Section 4.3 – Voltage Change Limits from ORTAC.

Upon observing N-1-1 auto-transformer contingency⁵, loadings on all 230kV, 115kV and remaining auto-transformers in the Northwest Ontario Region are kept within their respective 10-Day LTRs. Bus voltages also are kept within change limits criteria as per Section 4.3 – Voltage Change Limits from ORTAC.

Fort Frances TS

No capacity and voltage concerns when both 230/115kV auto-transformers T1 and T2 are in-service.

Upon observing N-1 auto-transformer contingency, the loading on the remaining auto-transformer is within its 10-Day Limited Time Ratings (LTRs). Loadings on all 230kV, 115kV and remaining auto-transformers in the Northwest Ontario Region are kept within their respective 10-Day LTRs. Bus voltages also are kept within change limits criteria as per Section 4.3 – Voltage Change Limits from ORTAC.

Upon observing N-1-1 auto-transformer contingency, loadings on all 230kV, 115kV and remaining auto-transformers in the Northwest Ontario Region are kept within their

⁵ The loss of the second auto-transformer was simulated at Dryden TS and at other 230/115kV supply stations in the Northwest Ontario Region.

respective 10-Day LTRs. Bus voltages also are kept within change limits criteria as per Section 4.3 – Voltage Change Limits from ORTAC.

Lakehead TS

No capacity and voltage concerns when both Lakehead 230/115kV auto-transformers T7 and T8 are in-service.

Upon observing N-1 auto-transformer contingency, the loading on the remaining auto-transformer is within its 10-Day Limited Time Ratings (LTRs). Loadings on all 230kV, 115kV and remaining auto-transformers in the Northwest Ontario Region are kept within their respective 10-Day LTRs. Bus voltages also are kept within change limits criteria as per Section 4.3 – Voltage Change Limits from ORTAC.

With the significant load increase and substantial decrease in dependable generation output assumption in the Thunder Bay Sub-Region, voltage support will be required to prevent voltage collapse under N-1-1 Contingency Scenario (i.e.: Loss of Lakehead auto-transformers T7 and T8), while at the same time mitigation is required to prevent overloading of the 115kV circuits A5A, A1B, and T1M under this outage condition.

The Study Team recommends the IESO to take the lead in conducting further studies in SA and IRRP stages of Regional Planning in order to determine a preferred solution.

Marathon TS

No capacity and voltage concerns when both Marathon 230/115kV auto-transformers T11 and T12 are in-service.

Upon observing N-1 auto-transformer contingency, the loading on the remaining auto-transformer is within its 10-Day Limited Time Ratings (LTRs). Loadings on all 230kV, 115kV and remaining auto-transformers in the Northwest Ontario Region are kept within their respective 10-Day LTRs. Bus voltages also are kept within change limits criteria as per Section 4.3 – Voltage Change Limits from ORTAC.

With the significant load increase and substantial decrease in dependable generation output assumption in the Greenstone-Marathon Sub-Region, upon observing N-1-1 contingency (i.e. loss of both Marathon auto-transformers), the Greenstone-Marathon Sub-Region system experiences voltage collapse unless voltage support or load

reduction is implemented. Without load reduction there will be overload on 115kV circuit A5A.

The Study Team recommends the IESO to take the lead in conducting further studies in SA and IRRP stages of Regional Planning in order to determine a preferred solution.

115kV Connection Facilities

Voltage performance for the 115kV connection facilities is within ORTAC guidelines upon experiencing N-1 and N-1-1 contingencies. Based on the demand forecast, there is sufficient transformation and circuit capacity throughout the study period for 115kV connected load stations with the following exceptions:

Kenora MTS

Kenora MTS is a 115kV substation owned by Synergy North, and it is located approximately 1.4km southeast of Rabbit Lake SS. Kenora MTS has a Winter 10-Day LTR of 23.40MW (assuming 0.9 power factor), and its load growth is anticipated to reach this level by year 2027.

The Study Team recommends the decision to expand / modify Kenora MTS in order to accommodate load growth past 2027 be made by Synergy North in co-ordination with Hydro One as part of the LP. However, this need may be revisited at a later date should additional findings during subsequent phases of Regional Planning trigger the Study Team to reconsider the recommendation made in the NA phase.

Sapawe DS

Sapawe DS is a 115/12.5kV distribution station owned by Hydro One Distribution, and it is located approximately 2.4km northeast of Sapawe Jct on 115kV circuit B6M. Sapawe DS has a Winter Planned Loading Limit (PLL) of 4.30MW and a Summer PLL of 3.42MW (assuming 0.9 power factor), and its load growth is anticipated to reach these levels by year 2028 and 2026 respectively.

Hydro One Distribution will look into this as part of its Distribution Planning.

Murillo DS

Murillo DS is a 115/25kV distribution station owned by Hydro One Distribution, and it is located immediately south of Murillo Jct on 115kV circuit B6M. As of 2019, the load has already reached the station's PLL, however due to OPG owned Kakabeka GS generating at the LV side of Murrillo DS, the 115/25kV step-down transformer is in reverse flow most of the time.

No further actions are required at this time.

Sam Lake DS

Sam Lake DS is a Hydro One owned 115/25kV distribution station located 75km northeast of Dryden TS, feeding off from 115kV circuit K3D. The station is the sole supply for Sioux Lookout Hydro, and this embedded LDC is anticipated to have significant load increase up to 35MW throughout the next 10 year period. The existing transformation facility at Sam Lake DS has already reached its Winter 10-Day LTR, and various options including adding an additional step-down transformer or having a new station built in the vicinity are being be considered. Due to the significant load increase, additional voltage support will also be required at this station in order to address the post-contingency voltage decline issue and to satisfy ORTAC's Voltage Change Limits requirements.

Since no upstream system voltage and flow violations are observed, no further regional coordination is required. The Study Team recommends Sioux Lookout Hydro, Hydro One Distribution and Hydro One Transmission to collaborate in order to develop a suitable solution to address this need as part the LP. However, this need may be revisited at a later date should additional findings during subsequent phases of Regional Planning trigger the Study Team to reconsider the recommendation made in the NA phase.

115kV Transmission Lines

M2W

M2W pre-contingency voltage levels are relatively low (at around 114kV) in the vicinity of White River DS due to reduced hydroelectric generation output assumptions at Gitchi Animki GS and Umbata Falls CGS, and increased load forecast at industrial sites along

M2W and White River DS. However with the use of ULTC the customers are not expected to experience low voltage at the LV bus.

No further actions are required at this time, and Hydro One will continue to closely monitor the voltage levels along M2W.

Q4B

Due to significant increase in industrial loads feeding from 115kV circuit Q4B, voltages along this circuit are in the vicinity of 116kV pre-contingency. In addition, with increased load forecast at Ft. Williams TS, additional voltage support maybe required locally.

No further actions are required at this time, and Hydro One will continue to closely monitor the voltage levels along Q4B.

Load Security

As per Section 7.1 – Load Security Criteria of IESO’s ORTAC documentation:

With all transmission facilities in service, equipment loading must be within continuous ratings, voltages must be within normal ranges and transfers must be within applicable normal condition stability limits. This must be satisfied coincident with an outage to the largest local generation unit.

Assessment:

Under each of the simulated outage scenarios⁶, all equipment are within their continuous ratings, voltages are within normal ranges.

⁶ The largest generation output (assuming 85% Generation Dependability) was taken out in each of the four sub-regions:

- 1) West of Thunder Bay Sub-Region: Whitedog Falls GS – 3 Units O/S
- 2) North of Dryden Sub-Region: Manitou Falls GS – 4 Units O/S
- 3) Greenstone-Marathon Sub-Region: Aguasabon GS O/S
- 4) Thunder Bay Sub-Region: Pine Portage GS – 2 Units O/S

With any one element out of service, equipment loading must be within applicable long-term emergency ratings, voltages must be within applicable emergency ranges, and transfers must be within applicable normal condition stability limits. Planned load curtailment or load rejection, excluding voluntary demand management, is permissible only to account for local generation outages. Not more than 150MW of load may be interrupted by configuration and by planned load curtailment or load rejection, excluding voluntary demand management.

Assessment:

Upon N-1 contingencies in the Northwest Ontario Region (including 115kV and 230kV lines, 230/115kV autotransformers and 115kV step-down transformers), equipment loading are within applicable long-term emergency ratings, voltages are within applicable emergency ranges as per ORTAC's Section 4.3 – Voltage Change Limits. Not more than 150MW is loss by configuration or load rejection.

With any two elements out of service, voltages must be within applicable emergency ranges, equipment loading must be within applicable short-term emergency ratings and transfers must be within applicable emergency condition stability limits. Equipment loading must be reduced to the applicable long-term emergency ratings in the time afforded by the short-time ratings. Planned load curtailment or load rejection exceeding 150MW is permissible only to account for local generation outages. Not more than 600MW of load may be interrupted by configuration and by planned load curtailment or load rejection, excluding voluntary demand management.

Assessment:

The simultaneous loss of two adjacent circuits on a common tower does not result in interruption of more than 600 MW of load by either configuration, planned load curtailment or load rejection. It also does not result in post-contingency voltage and equipment loading violations. More specifically, the study included the following scenarios:

- P3B and P7B between Port Arthur TS #1 and Birch TS
- R1LB and R2LB between Pine Portage, Lakehead TS and Birch TS
- A7L and A8L between Lakehead TS and Alexander SS

Furthermore, the simultaneous loss of two (2) 230/115 kV auto-transformers does not interrupted more than 600 MW of load by configuration or by planned load curtailment or load rejection. However, as previously discussed, post-contingency voltage and loading levels resulting from loss of Marathon TS and Lakehead TS auto-transformers do not meet criteria.

Load Restoration

The Northwest Ontario Region has multiple radial single circuit and/or single transformer connected load stations where load loss is anticipated after a single transformer and/or single circuit contingency. At these locations ORTAC restoration criteria of 8 hours may not always be met. Impacted radial single circuits include, but not limited to:

- 115kV A4L (Alexander SS x Longlac TS)
- 115kV M2W (Marathon TS x White River DS)
- 115kV E2R (Ear Falls TS x Red Lake TS)
- 115kV C2M (Pickle Lake SS x Musselwhite CSS)
- 115kV K3D (Sam Lake DS x Dryden TS)
- 115kV 29M1 (Ignace Jct x Matabi CTS)
- 115kV M1S (Moose Lake TS x Crilly DS)
- 115kV A6P/56M1/57M1 (Alexander SS x Port Arthur TS x Red Rock DS)
- 115kV P5M/S1C (Port Arthur TS x Lac Des Iles Mine CTS)

There may be a need to review load restoration reliability for these circuits, especially given that lengthy restoration times and aging HV circuits can contribute to greater socio-economic costs for local communities in Northern Ontario than those in Southern Ontario where more opportunities exist to switch to alternate supplies when a HV circuit is out of service. During the IRRP phase, the IESO will take the lead in conducting additional studies and to engage with local communities as necessary.

7.3 End-of-Life 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:

- Auto-transformers
- Power transformers
- HV and LV breakers
- Transmission lines
- Protection Systems

Accordingly, following major high voltage equipment has been identified as approaching its EOL over the next 10 years.

Table 3: EOL Equipment – Northwest Ontario Region

Station / Circuit	Scope of Work	Replacement/ Refurbishment Timing	Details
Projects Under Execution			
Birch TS	<ul style="list-style-type: none"> • HV Breaker, Disconnect Switch, and Insulator Replacement 	2020	These projects are discussed further in Section 7.3.1
Dryden TS	<ul style="list-style-type: none"> • Two (2) New Standard 115/44kV Step-Down Transformers to replace Three Existing (3) Non-Standard 115/44kV Step-Down Transformer • HV Breaker Replacement 	2020	
Fort Frances MTS	<ul style="list-style-type: none"> • HV Breaker⁷ Replacement 	2020	
Pine Portage SS	<ul style="list-style-type: none"> • HV Breaker, Disconnect Switch and Protection & Control Facilities Replacement 	2020	

⁷ FFPC-owned asset

Newly Identified Station Projects			
Alexander SS	<ul style="list-style-type: none"> HV Breaker and Line Disconnect Switch Replacement 	2022	These projects are discussed further in Section 7.3.2
Ear Falls TS	<ul style="list-style-type: none"> HV Breaker Replacement 	2022	
Fort Frances TS	<ul style="list-style-type: none"> HV Breaker Replacement Two (2) 230/115kV Step-Down Auto-Transformer Replacement 	2027	
Kenora TS	<ul style="list-style-type: none"> HV Circuit Breaker, Switch Replacement One (1) 230/115kV Step-Down Auto-Transformer Replacement 	2025	
Lakehead TS	<ul style="list-style-type: none"> HV Breaker, Switch and Protection & Control Facility Replacement 	2025	
Mackenzie TS	<ul style="list-style-type: none"> HV Breaker, Line Disconnect Switch One (1) 230/115kV Step-Down Auto-Transformer Replacement 	2024	
Marathon TS	<ul style="list-style-type: none"> HV Breaker and Line Disconnect Switch Replacement 	2024	
Moose Lake TS	<ul style="list-style-type: none"> Two (2) 115/44kV Step-Down Transformer Replacement One (1) 44kV Breaker Replacement 	2024	
Port Arthur TS #1	<ul style="list-style-type: none"> LV Yard Replacement 	2025	
Rabbit Lake SS	<ul style="list-style-type: none"> New HV Load Break Switches HV Breaker & Disconnect Switch, Line Disconnect Switch Replacement 	2022 2024	
Whitedog Falls SS	<ul style="list-style-type: none"> HV Breaker, Line Disconnect Switch Replacement 	2023	

Newly Identified Line Projects			
115kV A4L	<ul style="list-style-type: none"> Beardmore Jct x Longlac TS 	2022	These projects are discussed further in Section 7.3.3
115kV E1C	<ul style="list-style-type: none"> Ear Falls TS x Slate Falls DS Refurbishment Etruscan Jct x Crow River DS Refurbishment 	2025	

The EOL assessment for the above high voltage equipment typically included consideration of the following options:

1. Maintaining the status quo;
2. Replacing equipment with similar equipment of lower ratings and built to current standards;
3. Replacing equipment with lower ratings and built to current standards by transferring some load to other existing facilities;
4. Eliminating equipment by transferring all of the load to other existing facilities;
5. Replacing equipment with similar equipment and built to current standards (i.e., “like-for-like” replacement);
6. Replacing equipment with higher ratings and built to current standards; and
7. Station reconfiguration

Maintaining status quo is not an option for any of the above EOL auto-transformer, station transformer or line sections due to risk of equipment failure, would result in increased maintenance cost and customer outages. Replacing “Like-for-Like” with nonstandard transformers would result in complexity with failures and difficulty in getting similar spare equipment along with their installation. Nonstandard equipment also poses serious safety risk for employees under normal and emergency situations.

7.3.1 EOL Projects Under Execution

The following EOL refurbishment project is currently under execution. Since the completion of the first Regional Planning cycle, the need for proceeding with this project

arose before the initiation of the second Regional Planning cycle. Hence, the following project was not listed or discussed during the first cycle of Regional Planning and are currently in execution:

Birch TS

Birch TS is a 115kV-connected load supply station in the City of Thunder Bay serving Synergy North customers. It is supplied by multiple 115kV connections from Lakehead TS and Mackenzie TS. The existing 115kV breakers, disconnect switches, and insulators are at EOL, and Hydro One is planning to replace them before end of 2020.

Dryden TS

Dryden TS is a critical transformer station in the West of Thunder Bay Sub-Region and it consists of two (2) 230/115kV, 75/100/125MVA auto-transformers supplied by 230kV circuits D26A and K23D. The 115kV station yard supplies multiple load stations via K3D circuit to West of Thunder Bay Sub-Region and E4D circuit to North of Dryden Sub-Region. In addition, the 115kV yard supplies Hydro One Distribution customer via three (3) non-standard 115/44kV, 15 MVA step-down transformers. The non-standard step-down transformers are being replaced with two (2) new standard 115/44kV, 42 MVA transformers along with 115kV breakers. This work is anticipated for completion before end of 2020.

Fort Frances MTS

Fort Frances MTS is a 115kV connected load supply station serving the Town of Fort Frances in the Rainy River District. It is owned by FFPC and supplied by 115kV circuit F1B emanating from Fort Frances TS. The existing 115kV HV breaker at Fort Frances MTS is at EOL, and FFPC is planning to replace it before end of 2020.

Pine Portage SS

Pine Portage SS is a 115kV switching station located within the OPG owned Pine Portage GS, and approximately 120km northeast of Lakehead TS. The switching station terminates three 115kV circuits and connects 144MW of hydroelectric generation on the Nipigon River. The existing 115kV breakers, line disconnect switches, and protection & control equipment are at EOL through visual inspections and diagnostic testing. The anticipated replacement date is before end of 2020.

7.3.2 Newly Identified EOL Station Refurbishment Projects

The following EOL station refurbishment needs have been identified in the current Regional Planning cycle:

Alexander SS

Alexander SS is a 115kV switching station that was constructed in 1955 and is considered a critical asset in the Northwest. This station is connected to OPG-owned Alexander GS, and it has five (5) 115kV circuits for the supply of customers in the south. The existing HV breaker and line disconnect switches have reached EOL, and there are plans in place to replace them by year 2022.

Ear Falls TS

Ear Falls TS is a 115kV supply station located approximately 100km northwest of City of Dryden. Presently Ear Falls TS has four incoming and outgoing 115 kV circuits: E2R, M3E, E4D and E1C connecting the Ear Falls TS to Red Lake TS, Manitou Falls GS, Dryden TS and Cat Lake MTS, respectively. Ear Falls TS also connects to OPG-owned Lac Seul GS and Ear Falls GS, and it feeds Ear Falls DS via a 115kV step-down transformer. The existing HV breaker at the station is reaching EOL, and the anticipated replacement year is 2022.

Fort Frances TS

Fort Frances TS is a critical 230/115kV supply station located in the Town of Fort Frances. Multiple 115kV circuit emanates from this station including F1B, F2B, K6F, and F3M which ties into Minnesota. The two (2) 230/115kV Step-Down Auto-Transformer and 115kV breakers at the station are reaching EOL, and the plan to replacement them is scheduled for 2027.

Kenora TS

Kenora TS is a critical 230/115kV supply station located approximately 9km east of City of Kenora. It consists of one (1) 230/115kV step-down auto-transformer, and in turn it supplies the northwest portion of the West of Thunder Bay Sub-Region. The existing step-down auto-transformer, as well as HV breakers and switches are reaching EOL, and these are to be replaced by year 2025.

Lakehead TS

Lakehead TS is a critical 230/115kV step-down transformer station in-serviced in 1955 and is located approximately 4km east of the City of Thunder Bay. The station consists of a 230kV and an 115kV switchyard connected by two 250MVA auto-transformers. The existing HV breakers, switches, and Protection & control facilities at the station are approaching EOL, and the anticipated replacement year is 2025.

Mackenzie TS

Mackenzie TS is a 230/115kV supply station in-serviced since 1972 and it is located just south of Town of Atikokan. The station consists of a 230kV yard and supplies 115kV circuit A3M via a 230/115kV, 125MVA auto-transformer. The existing 230/115kV auto-transformer, as well as HV breakers and line disconnect switches are near EOL, and Hydro One has plans to replace them by year 2024.

Marathon TS

Marathon TS is a critical 230/115kV supply station located just outside of the Town of Marathon. This station provides supply to the Greenstone-Marathon Sub-Region via two (2) 230/115kV step-down auto-transformers. The existing HV breakers at this station is approaching EOL, and there are plans to replace these by year 2024.

Moose Lake TS

Moose Lake TS is a 115kV connected load supply station approximately 8km north of the Town of Atikokan, and it the sole supply station for Atikokan Hydro customers. The existing two (2) 115/44kV Step-Down Transformer and LV breakers are near EOL, and Hydro One is looking at replacing them by 2024.

Port Arthur TS #1

Port Arthur TS #1 is a 115kV connected load station located on the north-eastern edge of the City of Thunder Bay. The station consists of two (2) 115/25kV step-down transformers and it supplies both Hydro One Distribution and Synergy North customers. Due to equipment limitations and EOL assets on the LV side of the station, the station has been limited to provide up to 55MW. Once the LV yard refurbishment is complete in 2025, the station capacity will increase to 59MW.

Rabbit Lake SS

Rabbit Lake SS was originally built in 1956 and it is located within the city limits of Kenora. The station consists of a 115kV switchyard with six (6) 115kV circuits. It provides supply

to Synergy North-owned Kenora MTS, and Hydro One Distribution-owned Kenora DS. New HV load break switch installs are due for completion in 2022, while the existing HV breaker / disconnect switches, and line disconnect switches are also near EOL and plans are in place to replace them by 2024.

Whitedog Falls SS

Whitedog Falls SS is a 115kV-connected switching station located approximately 45km northwest of the City of Kenora. It is connected to multiple 115kV circuits including K4W, K5W extending to Rabbit Lake SS, W3C from Caribou Falls GS, and locally it directly connects to OPG-owned Whitedog GS. The existing 115kV breakers, and line disconnect switches at the station are near EOL, and Hydro One is planning to replace them in 2023.

7.3.3 Newly Identified EOL Line Refurbishment Projects

The following EOL line refurbishment needs have been identified in the current Regional Planning cycle:

115kV A4L

115kV A4L is a 150km radial circuit running between Alexander SS and Longlac TS. Conductors stringing the section between Beardmore Jct and Longlac TS was constructed in 1937 and therefore have reached EOL as per laboratory test results. It is anticipated that the refurbishment of this section is due for completion in year 2022.

115kV E1C

115kV E1C is a 260km radial circuit running between Ear Falls TS and Musselwhite CSS. Along this circuit, sections of Ear Falls TS x Slate Falls DS and Etruscan Jct X Crow River DS have reached EOL as per laboratory testing, and as a result, have been prescribed for full line refurbishment. Both of these line section were constructed in 1939 and have therefore reached 77 years of age. It is anticipated that the refurbishment of both sections are due for completion in year 2025.

8 CONCLUSION AND RECOMMENDATIONS

The Study Team's recommendations for the above identified needs are as follows:

- a) E1C (Ear Falls TS x Crow River DS) / Red Lake TS Near Capacity – No actions required at this time, but it is prudent to continue to monitor the Red Lake Area load and growth-related activities.
- b) A4L Capacity Increase to Accommodate Mining Development in the Geraldton Area – No actions required at this time other than to continue to monitor the Geraldton Area Mining Development.
- c) New wires to accommodate Energy East Pipeline and Ring of Fire – No actions required at this time other than to continue to monitor the Ring of Fire development.
- d) Additional Capacity Anticipated on the Dryden 115kV Sub-System by mid-2020s – Further regional coordination will be required in order to study different growth scenarios and the resulting impact they may have on the Dryden 115kV Sub-System.
- e) Kenora MTS Capacity Need – No further regional coordination is required as Synergy North will take the lead to further assess the need in co-ordination with Hydro One Transmission as part of the Local Planning ("LP"). However, this need may be revisited at a later date should additional findings during subsequent phases of Regional Planning trigger the Study Team to reconsider the recommendation made in the NA phase.
- f) Lakehead TS Capacity Need – IESO will take the lead to further study the need throughout SA and IRRP stages of the Regional Planning in order to determine a preferred solution.
- g) Marathon TS Capacity Need – IESO will take the lead to further study the need throughout SA and IRRP stages of the Regional Planning in order to determine a preferred solution.

- h) Sapawe DS Capacity Need – Hydro One Distribution will take the lead to look into this need in co-ordination with Hydro One Transmission as part of the Distribution Planning.
- i) Sam Lake DS Capacity Need – Since no upstream system voltage and flow violations are observed, no further regional coordination is required. Sioux Lookout Hydro, Hydro One Distribution and Hydro One Transmission will collaborate in order to develop a suitable solution to address this need as part LP. However, this need may be revisited at a later date should additional findings during subsequent phases of Regional Planning trigger the Study Team to reconsider the recommendation made in the NA phase.
- a) Based on this region’s sensitivity to industrial load growth scenarios as seen in the 1st cycle of IRRP, it is prudent to review those affected sub-regions starting with an IESO-led Scoping Assessment. This will help in verifying any changes in assumptions with respect to anticipated industrial loads in those regions.
- b) The implementation and execution for the replacement of the EOL transmission assets will be coordinated between Hydro One Transmission and the affected LDCs, where required. These projects will be coordinated with the IESO when required and where feasible within the timelines afforded by each project.

9 REFERENCES

Appendix A: Northwest Ontario Region Non-Coincident Winter Load Forecast

* LTR/PLL based on 0.9 power factor

Transformer Station		Near Term Forecast (MW)					Medium Term Forecast (MW)					Winter 10-Day LTR for TS / Planned Loading Limit for DS* (MW)
		2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	
Greenstone-Marathon Sub-Region												
Longlac TS	Hydro One Distribution (Gross Forecast)	13.34	15.49	16.25	20.43	20.56	20.68	20.82	14.96	15.11	15.25	42.84
	DG (Incremental)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	CDM (Incremental)	0.00	0.00	0.02	0.06	0.09	0.12	0.13	0.09	0.09	0.10	
	Net Load (Normal Weather Corrected)	13.34	15.48	16.23	20.36	20.47	20.56	20.69	14.87	15.02	15.16	
	Net Load (Extreme Weather Corrected)	14.21	16.48	17.28	21.68	21.79	21.89	22.03	15.83	15.99	16.14	
Manitouwadge TS	Hydro One Distribution (Gross Forecast)	10.05	10.15	10.26	10.39	11.86	11.95	12.06	12.17	12.28	12.39	37.53
	DG (Incremental)	8.00	8.00	8.00	8.00	0.00	0.00	0.00	0.00	0.00	0.00	
	CDM (Incremental)	0.00	0.00	0.01	0.03	0.05	0.07	0.07	0.08	0.08	0.08	
	Net Load (Normal Weather Corrected)	2.05	2.14	2.25	2.36	11.81	11.89	11.98	12.10	12.21	12.31	
	Net Load (Extreme Weather Corrected)	2.18	2.28	2.40	2.51	12.57	12.65	12.76	12.88	13.00	13.11	
Beardmore DS #2	Hydro One Distribution (Gross Forecast)	1.28	1.29	1.31	1.32	1.34	1.35	1.36	1.37	1.39	1.40	10.80
	DG (Incremental)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	CDM (Incremental)	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	
	Net Load (Normal Weather Corrected)	1.28	1.29	1.30	1.32	1.33	1.34	1.35	1.37	1.38	1.39	
	Net Load (Extreme Weather Corrected)	1.36	1.37	1.39	1.40	1.42	1.43	1.44	1.45	1.47	1.48	
Jellicoe DS #3	Hydro One Distribution (Gross Forecast)	0.56	0.72	0.72	0.73	0.73	0.73	0.73	0.74	0.74	0.74	2.16

Transformer Station		Near Term Forecast (MW)					Medium Term Forecast (MW)					Winter 10-Day LTR for TS / Planned Loading Limit for DS* (MW)
		2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	
	DG (Incremental)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	CDM (Incremental)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	Net Load (Normal Weather Corrected)	0.56	0.72	0.72	0.72	0.72	0.73	0.73	0.73	0.74	0.74	
	Net Load (Extreme Weather Corrected)	0.60	0.76	0.77	0.77	0.77	0.77	0.78	0.78	0.78	0.79	
Manitouwadge DS #1	Hydro One Distribution (Gross Forecast)	1.34	1.35	1.36	1.37	0.00	0.00	0.00	0.00	0.00	0.00	8.64
	DG (Incremental)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	CDM (Incremental)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	Net Load (Normal Weather Corrected)	1.34	1.35	1.36	1.37	0.00	0.00	0.00	0.00	0.00	0.00	
	Net Load (Extreme Weather Corrected)	1.42	1.43	1.44	1.45	0.00	0.00	0.00	0.00	0.00	0.00	
Marathon DS	Hydro One Distribution (Gross Forecast)	7.67	7.76	7.87	7.98	8.07	8.15	8.24	8.33	8.43	8.52	10.44
	DG (Incremental)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	CDM (Incremental)	0.00	0.00	0.01	0.02	0.04	0.05	0.05	0.05	0.05	0.05	
	Net Load (Normal Weather Corrected)	7.67	7.76	7.86	7.96	8.03	8.10	8.19	8.28	8.38	8.47	
	Net Load (Extreme Weather Corrected)	8.17	8.26	8.37	8.47	8.55	8.63	8.72	8.82	8.92	9.02	
Pic DS	Hydro One Distribution (Gross Forecast)	5.43	5.48	5.55	5.62	5.67	5.72	5.78	5.84	5.90	5.96	10.80
	DG (Incremental)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	CDM (Incremental)	0.00	0.00	0.01	0.02	0.02	0.03	0.04	0.04	0.04	0.04	
	Net Load (Normal Weather Corrected)	5.43	5.48	5.54	5.60	5.65	5.69	5.74	5.80	5.86	5.92	
	Net Load (Extreme Weather Corrected)	5.78	5.84	5.90	5.97	6.01	6.06	6.11	6.18	6.24	6.30	
Schreiber Winnipeg DS	Hydro One Distribution (Gross Forecast)	5.08	5.13	5.19	5.25	5.30	5.34	5.39	5.44	5.49	5.54	8.64
	DG (Incremental)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	CDM (Incremental)	0.00	0.00	0.01	0.02	0.02	0.03	0.03	0.03	0.03	0.03	

Transformer Station		Near Term Forecast (MW)					Medium Term Forecast (MW)					Winter 10-Day LTR for TS / Planned Loading Limit for DS* (MW)
		2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	
	Net Load (Normal Weather Corrected)	5.08	5.13	5.18	5.24	5.28	5.31	5.35	5.41	5.46	5.50	
	Net Load (Extreme Weather Corrected)	5.41	5.46	5.52	5.58	5.62	5.65	5.70	5.76	5.81	5.86	
White River DS	Hydro One Distribution (Gross Forecast)	8.25	8.34	8.44	10.25	10.33	10.41	10.49	10.58	10.66	10.74	14.04
	DG (Incremental)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	CDM (Incremental)	0.00	0.00	0.01	0.03	0.04	0.06	0.07	0.07	0.07	0.07	
	Net Load (Normal Weather Corrected)	8.25	8.34	8.43	10.22	10.29	10.35	10.42	10.51	10.60	10.68	
	Net Load (Extreme Weather Corrected)	8.78	8.88	8.98	10.88	10.95	11.02	11.10	11.19	11.28	11.37	
North of Dryden Sub-Region												
Red Lake TS	Hydro One Distribution (Gross Forecast)	24.79	25.19	25.61	26.05	26.44	26.83	27.23	27.65	28.07	28.48	55.35
	DG (Incremental)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	CDM (Incremental)	0.00	0.01	0.03	0.08	0.11	0.15	0.17	0.17	0.17	0.18	
	Net Load (Normal Weather Corrected)	24.79	25.18	25.58	25.97	26.33	26.67	27.06	27.48	27.89	28.30	
	Net Load (Extreme Weather Corrected)	26.39	26.81	27.23	27.66	28.03	28.40	28.81	29.25	29.70	30.13	
Cat Lake MTS	Hydro One Distribution (Gross Forecast)	1.29	1.30	1.32	1.33	1.34	1.35	1.36	1.37	1.39	1.40	2.70
	DG (Incremental)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	CDM (Incremental)	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	
	Net Load (Normal Weather Corrected)	1.29	1.30	1.31	1.33	1.33	1.34	1.35	1.36	1.38	1.39	
	Net Load (Extreme Weather Corrected)	1.38	1.39	1.40	1.41	1.42	1.43	1.44	1.45	1.47	1.48	
Crow River DS	Hydro One Distribution (Gross Forecast)	2.71	2.73	2.76	2.79	2.81	2.83	2.86	2.88	2.91	2.93	10.44
	DG (Incremental)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	CDM (Incremental)	0.00	0.00	0.00	0.01	0.01	0.02	0.02	0.02	0.02	0.02	
	Net Load (Normal Weather Corrected)	2.71	2.73	2.76	2.78	2.80	2.82	2.84	2.86	2.89	2.91	

Transformer Station		Near Term Forecast (MW)					Medium Term Forecast (MW)					Winter 10-Day LTR for TS / Planned Loading Limit for DS* (MW)
		2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	
	Net Load (Extreme Weather Corrected)	2.89	2.91	2.94	2.97	2.98	3.00	3.02	3.05	3.08	3.10	
Perrault Falls DS	Hydro One Distribution (Gross Forecast)	0.46	0.47	0.47	0.48	0.48	0.49	0.49	0.50	0.50	0.51	10.44
	DG (Incremental)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	CDM (Incremental)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	Net Load (Normal Weather Corrected)	0.46	0.47	0.47	0.48	0.48	0.49	0.49	0.49	0.50	0.50	
	Net Load (Extreme Weather Corrected)	0.49	0.50	0.50	0.51	0.51	0.52	0.52	0.53	0.53	0.54	
Slate Falls DS	Hydro One Distribution (Gross Forecast)	0.65	0.65	0.66	0.67	0.67	0.68	0.68	0.69	0.70	0.70	4.23
	DG (Incremental)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	CDM (Incremental)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	Net Load (Normal Weather Corrected)	0.65	0.65	0.66	0.67	0.67	0.67	0.68	0.69	0.69	0.70	
	Net Load (Extreme Weather Corrected)	0.69	0.70	0.70	0.71	0.71	0.72	0.72	0.73	0.74	0.74	
Ear Falls DS	Hydro One Distribution (Gross Forecast)	5.42	5.46	5.51	5.56	5.60	5.63	5.67	5.72	5.76	5.80	10.44
	DG (Incremental)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	CDM (Incremental)	0.00	0.00	0.01	0.02	0.02	0.03	0.04	0.04	0.04	0.04	
	Net Load (Normal Weather Corrected)	5.42	5.46	5.50	5.55	5.58	5.60	5.64	5.68	5.72	5.76	
	Net Load (Extreme Weather Corrected)	5.77	5.81	5.86	5.91	5.94	5.97	6.00	6.05	6.09	6.14	
West of Thunder Bay Sub-Region												
Barwick TS	Hydro One Distribution (Gross Forecast)	15.39	15.55	15.73	15.94	16.08	16.22	16.37	16.54	16.71	16.86	58.86
	DG (Incremental)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	CDM (Incremental)	0.00	0.01	0.02	0.05	0.07	0.09	0.10	0.10	0.10	0.11	
	Net Load (Normal Weather Corrected)	15.39	15.54	15.72	15.89	16.01	16.13	16.27	16.44	16.60	16.76	
	Net Load (Extreme Weather Corrected)	16.38	16.55	16.73	16.92	17.05	17.17	17.33	17.50	17.68	17.84	

Transformer Station		Near Term Forecast (MW)					Medium Term Forecast (MW)					Winter 10-Day LTR for TS / Planned Loading Limit for DS* (MW)
		2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	
Dryden TS	Hydro One Distribution (Gross Forecast)	18.05	18.32	18.62	18.95	19.21	19.46	19.73	20.01	20.30	20.57	56.97
	DG (Incremental)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	CDM (Incremental)	0.00	0.01	0.02	0.06	0.08	0.11	0.12	0.12	0.13	0.13	
	Net Load (Normal Weather Corrected)	18.05	18.32	18.60	18.89	19.12	19.35	19.60	19.89	20.17	20.45	
	Net Load (Extreme Weather Corrected)	19.22	19.50	19.81	20.11	20.36	20.60	20.87	21.18	21.48	21.77	
Fort Frances MTS	FFPC (Gross Forecast)	15.75	15.83	16.13	16.22	16.14	16.22	16.27	16.36	16.36	16.45	23.94
	DG (Incremental)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	CDM (Incremental)	0.00	0.01	0.02	0.05	0.07	0.09	0.10	0.10	0.10	0.10	
	Net Load (Normal Weather Corrected)	15.75	15.83	16.12	16.17	16.07	16.13	16.17	16.25	16.26	16.34	
	Net Load (Extreme Weather Corrected)	16.77	16.85	17.16	17.21	17.11	17.17	17.22	17.31	17.32	17.40	
Moose Lake TS	Atikokan Hydro (Gross Forecast)	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50	10.98
	DG (Incremental)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	CDM (Incremental)	0.00	0.00	0.01	0.02	0.03	0.04	0.04	0.04	0.04	0.04	
	Net Load (Normal Weather Corrected)	6.50	6.50	6.49	6.48	6.47	6.46	6.46	6.46	6.46	6.46	
	Net Load (Extreme Weather Corrected)	6.92	6.92	6.91	6.90	6.89	6.88	6.88	6.88	6.88	6.88	
Kenora MTS	Synergy North (Gross Forecast)	19.39	20.00	20.28	20.66	20.98	21.21	21.54	21.90	22.30	22.65	23.40
	DG (Incremental)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	CDM (Incremental)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	Net Load (Normal Weather Corrected)	19.39	20.00	20.28	20.66	20.98	21.21	21.54	21.90	22.30	22.65	
	Net Load (Extreme Weather Corrected)	20.64	21.30	21.59	22.00	22.33	22.58	22.93	23.32	23.74	24.12	
Agimak DS	Hydro One Distribution (Gross Forecast)	4.96	5.01	5.07	5.14	5.18	5.23	5.28	5.34	5.39	5.44	10.80
	DG (Incremental)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

Transformer Station		Near Term Forecast (MW)					Medium Term Forecast (MW)					Winter 10-Day LTR for TS / Planned Loading Limit for DS* (MW)
		2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	
	CDM (Incremental)	0.00	0.00	0.01	0.02	0.02	0.03	0.03	0.03	0.03	0.03	
	Net Load (Normal Weather Corrected)	4.96	5.01	5.07	5.12	5.16	5.20	5.25	5.30	5.36	5.41	
	Net Load (Extreme Weather Corrected)	5.28	5.34	5.39	5.45	5.50	5.54	5.59	5.65	5.70	5.76	
Burleigh DS	Hydro One Distribution (Gross Forecast)	4.07	4.10	4.14	4.18	4.21	4.23	4.26	4.29	4.32	4.35	10.44
	DG (Incremental)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	CDM (Incremental)	0.00	0.00	0.00	0.01	0.02	0.02	0.03	0.03	0.03	0.03	
	Net Load (Normal Weather Corrected)	4.07	4.10	4.14	4.17	4.19	4.21	4.23	4.26	4.30	4.32	
	Net Load (Extreme Weather Corrected)	4.34	4.37	4.40	4.44	4.46	4.48	4.51	4.54	4.57	4.60	
Clearwater Bay DS	Hydro One Distribution (Gross Forecast)	5.19	5.22	5.26	5.31	5.33	5.36	5.39	5.42	5.45	5.48	9.36
	DG (Incremental)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	CDM (Incremental)	0.00	0.00	0.01	0.02	0.02	0.03	0.03	0.03	0.03	0.03	
	Net Load (Normal Weather Corrected)	5.19	5.22	5.25	5.29	5.31	5.33	5.35	5.39	5.42	5.45	
	Net Load (Extreme Weather Corrected)	5.52	5.56	5.59	5.63	5.65	5.67	5.70	5.74	5.77	5.80	
Eton DS	Hydro One Distribution (Gross Forecast)	3.69	3.72	3.76	3.80	3.83	3.85	3.88	3.92	3.95	3.98	10.80
	DG (Incremental)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	CDM (Incremental)	0.00	0.00	0.00	0.01	0.02	0.02	0.02	0.02	0.02	0.02	
	Net Load (Normal Weather Corrected)	3.69	3.72	3.75	3.79	3.81	3.83	3.86	3.89	3.93	3.96	
	Net Load (Extreme Weather Corrected)	3.93	3.96	4.00	4.03	4.06	4.08	4.11	4.15	4.18	4.21	
Keewatin DS	Hydro One Distribution (Gross Forecast)	4.73	4.77	4.81	4.86	4.90	4.93	4.97	5.01	5.05	5.09	10.44
	DG (Incremental)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	CDM (Incremental)	0.00	0.00	0.01	0.01	0.02	0.03	0.03	0.03	0.03	0.03	
	Net Load (Normal Weather Corrected)	4.73	4.76	4.81	4.85	4.88	4.90	4.94	4.98	5.02	5.05	

Transformer Station		Near Term Forecast (MW)					Medium Term Forecast (MW)					Winter 10-Day LTR for TS / Planned Loading Limit for DS* (MW)
		2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	
	Net Load (Extreme Weather Corrected)	5.03	5.07	5.12	5.16	5.19	5.22	5.26	5.30	5.34	5.38	
Margach DS	Hydro One Distribution (Gross Forecast)	8.88	8.94	9.02	9.11	9.16	9.21	9.27	9.34	9.40	9.46	10.44
	DG (Incremental)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	CDM (Incremental)	0.00	0.00	0.01	0.03	0.04	0.05	0.06	0.06	0.06	0.06	
	Net Load (Normal Weather Corrected)	8.88	8.94	9.01	9.08	9.12	9.16	9.21	9.28	9.35	9.40	
	Net Load (Extreme Weather Corrected)	9.45	9.52	9.59	9.67	9.71	9.75	9.81	9.88	9.95	10.01	
Minaki DS	Hydro One Distribution (Gross Forecast)	0.70	0.70	0.71	0.71	0.72	0.72	0.73	0.73	0.74	0.74	10.80
	DG (Incremental)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	CDM (Incremental)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	Net Load (Normal Weather Corrected)	0.70	0.70	0.71	0.71	0.71	0.72	0.72	0.73	0.73	0.74	
	Net Load (Extreme Weather Corrected)	0.74	0.75	0.75	0.76	0.76	0.76	0.77	0.77	0.78	0.78	
Nestor Falls DS	Hydro One Distribution (Gross Forecast)	3.05	3.07	3.09	3.12	3.14	3.15	3.17	3.19	3.21	3.23	10.44
	DG (Incremental)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	CDM (Incremental)	0.00	0.00	0.00	0.01	0.01	0.02	0.02	0.02	0.02	0.02	
	Net Load (Normal Weather Corrected)	3.04	3.06	3.09	3.11	3.12	3.14	3.15	3.17	3.19	3.21	
	Net Load (Extreme Weather Corrected)	3.24	3.26	3.29	3.31	3.33	3.34	3.36	3.38	3.40	3.42	
Sam Lake DS	Hydro One Distribution (Gross Forecast)	20.87	22.93	24.30	25.28	26.25	28.69	30.12	31.09	32.07	33.04	21.60
	DG (Incremental)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	CDM (Incremental)	0.00	0.01	0.03	0.08	0.11	0.16	0.19	0.19	0.20	0.21	
	Net Load (Normal Weather Corrected)	20.87	22.92	24.27	25.20	26.14	28.53	29.93	30.90	31.87	32.84	
	Net Load (Extreme Weather Corrected)	22.22	24.41	25.85	26.83	27.83	30.37	31.87	32.90	33.93	34.96	
Sapawe DS	Hydro One Distribution (Gross Forecast)	3.78	3.81	3.85	3.90	3.93	3.96	3.99	4.02	4.06	4.09	4.32

Transformer Station		Near Term Forecast (MW)					Medium Term Forecast (MW)					Winter 10-Day LTR for TS / Planned Loading Limit for DS* (MW)
		2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	
	DG (Incremental)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	CDM (Incremental)	0.00	0.00	0.00	0.01	0.02	0.02	0.02	0.02	0.03	0.03	
	Net Load (Normal Weather Corrected)	3.78	3.81	3.85	3.89	3.91	3.93	3.96	4.00	4.03	4.07	
	Net Load (Extreme Weather Corrected)	4.03	4.06	4.10	4.14	4.16	4.19	4.22	4.26	4.29	4.33	
Shabaqua DS	Hydro One Distribution (Gross Forecast)	3.59	3.61	3.63	3.66	3.68	3.69	3.71	3.73	3.75	3.77	8.64
	DG (Incremental)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	CDM (Incremental)	0.00	0.00	0.00	0.01	0.02	0.02	0.02	0.02	0.02	0.02	
	Net Load (Normal Weather Corrected)	3.59	3.61	3.63	3.65	3.66	3.67	3.69	3.71	3.73	3.75	
	Net Load (Extreme Weather Corrected)	3.82	3.84	3.86	3.88	3.90	3.91	3.93	3.95	3.97	3.99	
Sioux Narrows DS	Hydro One Distribution (Gross Forecast)	4.38	4.41	4.45	4.49	4.52	4.54	4.57	4.61	4.64	4.67	10.80
	DG (Incremental)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	CDM (Incremental)	0.00	0.00	0.01	0.01	0.02	0.03	0.03	0.03	0.03	0.03	
	Net Load (Normal Weather Corrected)	4.38	4.41	4.44	4.48	4.50	4.52	4.54	4.58	4.61	4.64	
	Net Load (Extreme Weather Corrected)	4.66	4.69	4.73	4.77	4.79	4.81	4.84	4.87	4.91	4.94	
Valora DS	Hydro One Distribution (Gross Forecast)	0.82	0.83	0.84	0.86	0.87	0.88	0.90	0.91	0.92	0.94	4.32
	DG (Incremental)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	CDM (Incremental)	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	
	Net Load (Normal Weather Corrected)	0.82	0.83	0.84	0.86	0.87	0.88	0.89	0.91	0.92	0.93	
	Net Load (Extreme Weather Corrected)	0.87	0.88	0.90	0.91	0.92	0.94	0.95	0.96	0.98	0.99	
Vermilion Bay DS	Hydro One Distribution (Gross Forecast)	2.36	2.39	2.42	2.46	2.48	2.51	2.54	2.57	2.60	2.63	8.64
	DG (Incremental)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	CDM (Incremental)	0.00	0.00	0.00	0.01	0.01	0.01	0.02	0.02	0.02	0.02	

Transformer Station		Near Term Forecast (MW)					Medium Term Forecast (MW)					Winter 10-Day LTR for TS / Planned Loading Limit for DS* (MW)
		2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	
	Net Load (Normal Weather Corrected)	2.36	2.39	2.42	2.45	2.47	2.49	2.52	2.55	2.58	2.61	
	Net Load (Extreme Weather Corrected)	2.51	2.54	2.57	2.61	2.63	2.66	2.68	2.72	2.75	2.78	
Crilly DS	Hydro One Distribution (Gross Forecast)	1.95	1.97	1.99	2.02	2.04	2.05	2.07	2.09	2.11	2.13	2.16
	DG (Incremental)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	CDM (Incremental)	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	
	Net Load (Normal Weather Corrected)	1.95	1.97	1.99	2.01	2.03	2.04	2.06	2.08	2.10	2.12	
	Net Load (Extreme Weather Corrected)	2.08	2.10	2.12	2.14	2.16	2.17	2.19	2.21	2.24	2.26	
Kenora DS	Hydro One Distribution (Gross Forecast)	6.18	6.24	6.32	6.40	6.46	6.51	6.58	6.64	6.71	6.77	10.80
	DG (Incremental)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	CDM (Incremental)	0.00	0.00	0.01	0.02	0.03	0.04	0.04	0.04	0.04	0.04	
	Net Load (Normal Weather Corrected)	6.18	6.24	6.31	6.38	6.43	6.48	6.54	6.60	6.67	6.73	
	Net Load (Extreme Weather Corrected)	6.58	6.65	6.72	6.79	6.85	6.90	6.96	7.03	7.10	7.17	
Whitedog DS	Hydro One Distribution (Gross Forecast)	2.22	2.25	2.27	2.31	2.33	2.35	2.38	2.41	2.43	2.46	2.88
	DG (Incremental)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	CDM (Incremental)	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.02	0.02	
	Net Load (Normal Weather Corrected)	2.22	2.24	2.27	2.30	2.32	2.34	2.37	2.39	2.42	2.45	
	Net Load (Extreme Weather Corrected)	2.36	2.39	2.42	2.45	2.47	2.49	2.52	2.55	2.58	2.60	
Thunder Bay Sub-Region												
Birch TS	Synergy North (Gross Forecast)	72.42	72.94	73.26	73.89	74.50	74.74	75.15	75.75	76.38	76.86	100.44
	DG (Incremental)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	CDM (Incremental)	0.01	0.02	0.08	0.23	0.32	0.43	0.47	0.47	0.47	0.48	
	Net Load (Normal Weather Corrected)	72.41	72.91	73.17	73.67	74.18	74.31	74.69	75.28	75.90	76.38	

Transformer Station		Near Term Forecast (MW)					Medium Term Forecast (MW)					Winter 10-Day LTR for TS / Planned Loading Limit for DS* (MW)
		2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	
	Net Load (Extreme Weather Corrected)	77.10	77.63	77.91	78.44	78.98	79.12	79.52	80.15	80.81	81.32	
Fort Williams TS	Synergy North (Gross Forecast)	79.01	79.36	79.51	79.94	80.38	80.46	80.71	81.12	81.56	81.86	98.46
	DG (Incremental)	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	
	CDM (Incremental)	0.01	0.03	0.09	0.25	0.35	0.46	0.50	0.50	0.51	0.51	
	Net Load (Normal Weather Corrected)	75.19	75.53	75.62	75.89	76.23	76.20	76.41	76.82	77.25	77.55	
	Net Load (Extreme Weather Corrected)	80.06	80.42	80.51	80.80	81.16	81.13	81.35	81.79	82.25	82.57	
Port Arthur TS #1	Synergy North + H1 Dx (Gross Forecast)	39.14	39.51	39.78	40.23	40.68	40.88	41.22	41.68	42.16	42.54	55.26
	DG (Incremental)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	CDM (Incremental)	0.01	0.01	0.05	0.12	0.18	0.23	0.26	0.26	0.26	0.27	
	Net Load (Normal Weather Corrected)	39.13	39.50	39.73	40.10	40.50	40.65	40.97	41.42	41.90	42.28	
	Net Load (Extreme Weather Corrected)	41.66	42.06	42.30	42.70	43.12	43.28	43.62	44.10	44.61	45.01	
Murillo DS	Hydro One Distribution (Gross Forecast)	20.09	20.27	20.46	20.67	20.81	20.93	21.07	21.21	21.35	21.47	11.70
	DG (Incremental)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	CDM (Incremental)	0.00	0.01	0.02	0.06	0.09	0.12	0.13	0.13	0.13	0.13	
	Net Load (Normal Weather Corrected)	20.09	20.26	20.44	20.61	20.72	20.81	20.93	21.08	21.22	21.33	
	Net Load (Extreme Weather Corrected)	21.39	21.57	21.76	21.94	22.06	22.16	22.29	22.44	22.59	22.72	
Nipigon DS	Hydro One Distribution (Gross Forecast)	3.89	3.92	3.96	4.01	4.04	4.07	4.11	4.15	4.19	4.22	10.44
	DG (Incremental)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	CDM (Incremental)	0.00	0.00	0.00	0.01	0.02	0.02	0.03	0.03	0.03	0.03	
	Net Load (Normal Weather Corrected)	3.89	3.92	3.96	4.00	4.02	4.05	4.08	4.12	4.16	4.20	
	Net Load (Extreme Weather Corrected)	4.14	4.18	4.22	4.25	4.28	4.31	4.35	4.39	4.43	4.47	
Red Rock DS	Hydro One Distribution (Gross Forecast)	4.46	4.46	4.47	4.49	4.49	4.49	4.49	4.50	4.50	4.50	8.64

Transformer Station		Near Term Forecast (MW)					Medium Term Forecast (MW)					Winter 10-Day LTR for TS / Planned Loading Limit for DS* (MW)
		2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	
	DG (Incremental)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	CDM (Incremental)	0.00	0.00	0.01	0.01	0.02	0.03	0.03	0.03	0.03	0.03	
	Net Load (Normal Weather Corrected)	4.46	4.46	4.47	4.47	4.47	4.46	4.46	4.47	4.47	4.48	
	Net Load (Extreme Weather Corrected)	4.75	4.75	4.76	4.76	4.76	4.75	4.75	4.76	4.76	4.77	

Appendix B: Northwest Ontario Region Non-Coincident Summer Load Forecast

* LTR/PLL based on 0.9 power factor

Transformer Station		Near Term Forecast (MW)					Medium Term Forecast (MW)					Summer 10-Day LTR for TS / Planned Loading Limit for DS* (MW)
		2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	
Greenstone-Marathon Sub-Region												
Longlac TS	Hydro One Distribution (Gross Forecast)	10.40	11.93	12.50	15.46	15.56	15.66	15.76	11.68	11.80	11.91	42.84
	DG (Incremental)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	CDM (Incremental)	0.07	0.08	0.10	0.17	0.19	0.23	0.26	0.22	0.24	0.26	
	Net Load (Normal Weather Corrected)	10.33	11.85	12.40	15.29	15.36	15.43	15.50	11.46	11.55	11.64	
	Net Load (Extreme Weather Corrected)	10.96	12.57	13.15	16.22	16.30	16.36	16.44	12.15	12.25	12.35	
Manitouwadge TS	Hydro One Distribution (Gross Forecast)	5.44	5.50	5.58	5.66	6.49	6.55	6.60	6.67	6.73	6.79	37.53
	DG (Incremental)	8.00	8.00	8.00	8.00	0.00	0.00	0.00	0.00	0.00	0.00	
	CDM (Incremental)	0.03	0.04	0.04	0.06	0.08	0.10	0.11	0.13	0.14	0.15	
	Net Load (Normal Weather Corrected)	-2.60	-2.54	-2.47	-2.41	6.41	6.44	6.49	6.53	6.58	6.63	
	Net Load (Extreme Weather Corrected)	-2.76	-2.70	-2.62	-2.56	6.80	6.84	6.88	6.93	6.98	7.03	
Beardmore DS #2	Hydro One Distribution (Gross Forecast)	0.65	0.66	0.67	0.67	0.68	0.69	0.69	0.70	0.71	0.71	8.46
	DG (Incremental)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	CDM (Incremental)	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	
	Net Load (Normal Weather Corrected)	0.65	0.65	0.66	0.67	0.67	0.68	0.68	0.69	0.69	0.70	
	Net Load (Extreme Weather Corrected)	0.69	0.69	0.70	0.71	0.71	0.72	0.72	0.73	0.74	0.74	
Jellicoe DS #3	Hydro One Distribution (Gross Forecast)	0.30	0.30	0.30	0.31	0.31	0.31	0.31	0.32	0.32	0.32	1.71
	DG (Incremental)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	CDM (Incremental)	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	

Transformer Station		Near Term Forecast (MW)					Medium Term Forecast (MW)					Summer 10-Day LTR for TS / Planned Loading Limit for DS* (MW)
		2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	
	Net Load (Normal Weather Corrected)	0.30	0.30	0.30	0.30	0.31	0.31	0.31	0.31	0.31	0.31	
	Net Load (Extreme Weather Corrected)	0.31	0.32	0.32	0.32	0.32	0.33	0.33	0.33	0.33	0.33	
Manitouwadge DS #1	Hydro One Distribution (Gross Forecast)	0.76	0.77	0.78	0.79	0.00	0.00	0.00	0.00	0.00	0.00	6.75
	DG (Incremental)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	CDM (Incremental)	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	
	Net Load (Normal Weather Corrected)	0.76	0.76	0.77	0.78	0.00	0.00	0.00	0.00	0.00	0.00	
	Net Load (Extreme Weather Corrected)	0.80	0.81	0.82	0.82	0.00	0.00	0.00	0.00	0.00	0.00	
Marathon DS	Hydro One Distribution (Gross Forecast)	4.38	4.45	4.51	4.59	4.64	4.68	4.73	4.79	4.85	4.90	7.74
	DG (Incremental)	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	
	CDM (Incremental)	0.03	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	0.11	
	Net Load (Normal Weather Corrected)	4.33	4.39	4.45	4.51	4.55	4.59	4.63	4.68	4.72	4.77	
	Net Load (Extreme Weather Corrected)	4.60	4.66	4.72	4.79	4.83	4.87	4.91	4.96	5.01	5.06	
Pic DS	Hydro One Distribution (Gross Forecast)	5.89	5.96	6.05	6.14	6.19	6.25	6.31	6.37	6.44	6.50	8.46
	DG (Incremental)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	CDM (Incremental)	0.04	0.04	0.05	0.07	0.08	0.09	0.10	0.12	0.13	0.14	
	Net Load (Normal Weather Corrected)	5.85	5.92	6.00	6.07	6.12	6.16	6.20	6.25	6.31	6.36	
	Net Load (Extreme Weather Corrected)	6.21	6.28	6.36	6.44	6.49	6.53	6.58	6.63	6.69	6.75	
Schreiber Winnipeg DS	Hydro One Distribution (Gross Forecast)	2.27	2.30	2.33	2.37	2.38	2.40	2.42	2.45	2.47	2.49	6.75
	DG (Incremental)	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	
	CDM (Incremental)	0.01	0.02	0.02	0.03	0.03	0.04	0.04	0.05	0.05	0.05	
	Net Load (Normal Weather Corrected)	2.25	2.27	2.30	2.33	2.34	2.35	2.37	2.39	2.41	2.42	
	Net Load (Extreme Weather Corrected)	2.38	2.41	2.44	2.47	2.48	2.50	2.52	2.53	2.55	2.57	

Transformer Station		Near Term Forecast (MW)					Medium Term Forecast (MW)					Summer 10-Day LTR for TS / Planned Loading Limit for DS* (MW)
		2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	
White River DS	Hydro One Distribution (Gross Forecast)	7.44	7.53	7.63	7.74	7.81	7.87	7.93	8.01	8.08	8.15	11.25
	DG (Incremental)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	CDM (Incremental)	0.05	0.05	0.06	0.08	0.10	0.12	0.13	0.15	0.17	0.18	
	Net Load (Normal Weather Corrected)	7.39	7.48	7.57	7.66	7.71	7.75	7.80	7.86	7.91	7.97	
	Net Load (Extreme Weather Corrected)	7.84	7.94	8.03	8.12	8.18	8.22	8.28	8.33	8.40	8.45	
North of Dryden Sub-Region												
Red Lake TS	Hydro One Distribution (Gross Forecast)	19.12	19.39	19.69	19.99	20.24	20.48	20.74	21.00	21.27	21.53	50.67
	DG (Incremental)	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	
	CDM (Incremental)	0.12	0.13	0.16	0.21	0.25	0.30	0.34	0.40	0.44	0.47	
	Net Load (Normal Weather Corrected)	19.00	19.26	19.52	19.77	19.98	20.18	20.39	20.60	20.83	21.06	
	Net Load (Extreme Weather Corrected)	20.16	20.43	20.71	20.97	21.19	21.40	21.63	21.85	22.10	22.34	
Cat Lake MTS	Hydro One Distribution (Gross Forecast)	1.05	1.06	1.07	1.08	1.09	1.10	1.11	1.12	1.13	1.14	2.70
	DG (Incremental)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	CDM (Incremental)	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.03	
	Net Load (Normal Weather Corrected)	1.04	1.05	1.06	1.07	1.08	1.08	1.09	1.10	1.11	1.11	
	Net Load (Extreme Weather Corrected)	1.10	1.12	1.13	1.14	1.14	1.15	1.16	1.17	1.17	1.18	
Crow River DS	Hydro One Distribution (Gross Forecast)	1.61	1.63	1.65	1.67	1.68	1.70	1.71	1.72	1.74	1.75	7.74
	DG (Incremental)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	CDM (Incremental)	0.01	0.01	0.01	0.02	0.02	0.02	0.03	0.03	0.04	0.04	
	Net Load (Normal Weather Corrected)	1.60	1.62	1.64	1.65	1.66	1.67	1.68	1.69	1.70	1.71	
	Net Load (Extreme Weather Corrected)	1.70	1.72	1.73	1.75	1.76	1.77	1.78	1.79	1.81	1.82	
Perrault Falls DS	Hydro One Distribution (Gross Forecast)	0.73	0.74	0.75	0.76	0.77	0.78	0.79	0.79	0.80	0.81	7.74

Transformer Station		Near Term Forecast (MW)					Medium Term Forecast (MW)					Summer 10-Day LTR for TS / Planned Loading Limit for DS* (MW)
		2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	
	DG (Incremental)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	CDM (Incremental)	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	
	Net Load (Normal Weather Corrected)	0.73	0.74	0.75	0.76	0.76	0.77	0.77	0.78	0.79	0.79	
	Net Load (Extreme Weather Corrected)	0.77	0.78	0.79	0.80	0.81	0.81	0.82	0.83	0.83	0.84	
Slate Falls DS	Hydro One Distribution (Gross Forecast)	0.39	0.40	0.40	0.41	0.41	0.41	0.42	0.42	0.42	0.43	3.15
	DG (Incremental)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	CDM (Incremental)	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	
	Net Load (Normal Weather Corrected)	0.39	0.39	0.40	0.40	0.40	0.41	0.41	0.41	0.41	0.42	
	Net Load (Extreme Weather Corrected)	0.41	0.42	0.42	0.43	0.43	0.43	0.43	0.44	0.44	0.44	
Ear Falls DS	Hydro One Distribution (Gross Forecast)	4.84	4.89	4.95	5.01	5.04	5.07	5.10	5.14	5.18	5.22	7.74
	DG (Incremental)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	CDM (Incremental)	0.03	0.03	0.04	0.05	0.06	0.07	0.08	0.10	0.11	0.11	
	Net Load (Normal Weather Corrected)	4.81	4.86	4.91	4.95	4.97	4.99	5.02	5.04	5.07	5.10	
	Net Load (Extreme Weather Corrected)	5.11	5.15	5.20	5.25	5.28	5.30	5.32	5.35	5.38	5.41	
West of Thunder Bay Sub-Region												
Barwick TS	Hydro One Distribution (Gross Forecast)	11.53	11.67	11.84	12.01	12.12	12.23	12.35	12.47	12.60	12.72	56.70
	DG (Incremental)	3.56	3.56	3.56	3.56	3.56	3.56	3.56	3.56	3.56	3.56	
	CDM (Incremental)	0.07	0.08	0.09	0.13	0.15	0.18	0.20	0.24	0.26	0.28	
	Net Load (Normal Weather Corrected)	7.89	8.04	8.18	8.33	8.41	8.49	8.58	8.68	8.78	8.88	
	Net Load (Extreme Weather Corrected)	8.37	8.52	8.68	8.83	8.92	9.01	9.11	9.21	9.32	9.42	
Dryden TS	Hydro One Distribution (Gross Forecast)	12.84	13.05	13.29	13.55	13.73	13.90	14.09	14.30	14.50	14.69	54.18
	DG (Incremental)	1.43	1.43	1.43	1.43	1.43	1.43	1.43	1.43	1.43	1.43	

Transformer Station		Near Term Forecast (MW)					Medium Term Forecast (MW)					Summer 10-Day LTR for TS / Planned Loading Limit for DS* (MW)
		2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	
	CDM (Incremental)	0.08	0.09	0.11	0.15	0.17	0.20	0.23	0.27	0.30	0.32	
	Net Load (Normal Weather Corrected)	11.33	11.54	11.76	11.97	12.12	12.27	12.43	12.60	12.77	12.94	
	Net Load (Extreme Weather Corrected)	12.02	12.24	12.47	12.70	12.86	13.02	13.19	13.36	13.55	13.73	
Fort Frances MTS	FFPC (Gross Forecast)	12.25	12.31	12.11	12.17	12.26	12.32	12.31	12.37	12.40	12.46	23.94
	DG (Incremental)	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	
	CDM (Incremental)	0.08	0.08	0.10	0.13	0.15	0.18	0.20	0.23	0.25	0.27	
	Net Load (Normal Weather Corrected)	12.12	12.18	11.96	11.99	12.05	12.09	12.06	12.09	12.09	12.13	
	Net Load (Extreme Weather Corrected)	12.86	12.92	12.69	12.72	12.79	12.82	12.79	12.82	12.83	12.87	
Moose Lake TS	Atikokan Hydro (Gross Forecast)	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	9.63
	DG (Incremental)	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	
	CDM (Incremental)	0.04	0.04	0.05	0.06	0.08	0.09	0.10	0.11	0.12	0.13	
	Net Load (Normal Weather Corrected)	5.95	5.94	5.94	5.92	5.91	5.90	5.89	5.87	5.86	5.85	
	Net Load (Extreme Weather Corrected)	6.31	6.31	6.30	6.28	6.27	6.25	6.24	6.23	6.22	6.21	
Kenora MTS	Synergy North (Gross Forecast)	17.24	17.54	17.78	17.90	18.20	18.61	18.61	18.91	19.24	19.57	21.69
	DG (Incremental)	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	
	CDM (Incremental)	0.11	0.12	0.14	0.19	0.23	0.27	0.31	0.36	0.40	0.43	
	Net Load (Normal Weather Corrected)	17.05	17.34	17.55	17.63	17.89	18.25	18.22	18.47	18.76	19.06	
	Net Load (Extreme Weather Corrected)	18.09	18.40	18.62	18.70	18.97	19.36	19.33	19.59	19.90	20.22	
Agimak DS	Hydro One Distribution (Gross Forecast)	2.48	2.51	2.54	2.57	2.59	2.61	2.64	2.66	2.69	2.71	8.46
	DG (Incremental)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	CDM (Incremental)	0.02	0.02	0.02	0.03	0.03	0.04	0.04	0.05	0.06	0.06	
	Net Load (Normal Weather Corrected)	2.46	2.49	2.52	2.54	2.56	2.57	2.59	2.61	2.63	2.65	

Transformer Station		Near Term Forecast (MW)					Medium Term Forecast (MW)					Summer 10-Day LTR for TS / Planned Loading Limit for DS* (MW)
		2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	
	Net Load (Extreme Weather Corrected)	2.61	2.64	2.67	2.70	2.71	2.73	2.75	2.77	2.79	2.81	
Burleigh DS	Hydro One Distribution (Gross Forecast)	2.40	2.42	2.45	2.48	2.49	2.50	2.52	2.54	2.56	2.57	7.74
	DG (Incremental)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	CDM (Incremental)	0.02	0.02	0.02	0.03	0.03	0.04	0.04	0.05	0.05	0.06	
	Net Load (Normal Weather Corrected)	2.38	2.40	2.42	2.45	2.46	2.47	2.48	2.49	2.50	2.52	
	Net Load (Extreme Weather Corrected)	2.52	2.55	2.57	2.59	2.61	2.62	2.63	2.64	2.65	2.67	
Clearwater Bay DS	Hydro One Distribution (Gross Forecast)	4.25	4.29	4.33	4.37	4.40	4.42	4.44	4.47	4.49	4.52	6.93
	DG (Incremental)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	CDM (Incremental)	0.03	0.03	0.03	0.05	0.06	0.07	0.07	0.08	0.09	0.10	
	Net Load (Normal Weather Corrected)	4.23	4.26	4.29	4.33	4.34	4.35	4.37	4.38	4.40	4.42	
	Net Load (Extreme Weather Corrected)	4.48	4.52	4.55	4.59	4.60	4.62	4.63	4.65	4.67	4.69	
Eton DS	Hydro One Distribution (Gross Forecast)	1.73	1.74	1.76	1.79	1.80	1.81	1.83	1.84	1.86	1.87	8.46
	DG (Incremental)	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	
	CDM (Incremental)	0.01	0.01	0.01	0.02	0.02	0.03	0.03	0.03	0.04	0.04	
	Net Load (Normal Weather Corrected)	1.69	1.71	1.72	1.74	1.75	1.76	1.77	1.78	1.79	1.81	
	Net Load (Extreme Weather Corrected)	1.79	1.81	1.83	1.85	1.86	1.87	1.88	1.89	1.90	1.92	
Keewatin DS	Hydro One Distribution (Gross Forecast)	3.86	3.90	3.95	4.00	4.03	4.05	4.08	4.12	4.15	4.18	7.74
	DG (Incremental)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	CDM (Incremental)	0.02	0.03	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.09	
	Net Load (Normal Weather Corrected)	3.84	3.88	3.92	3.96	3.98	3.99	4.02	4.04	4.06	4.09	
	Net Load (Extreme Weather Corrected)	4.07	4.11	4.16	4.20	4.22	4.24	4.26	4.28	4.31	4.34	
Margach DS	Hydro One Distribution (Gross Forecast)	6.40	6.46	6.53	6.61	6.65	6.68	6.73	6.77	6.82	6.86	7.74

Transformer Station		Near Term Forecast (MW)					Medium Term Forecast (MW)					Summer 10-Day LTR for TS / Planned Loading Limit for DS* (MW)
		2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	
	DG (Incremental)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	CDM (Incremental)	0.04	0.04	0.05	0.07	0.08	0.10	0.11	0.13	0.14	0.15	
	Net Load (Normal Weather Corrected)	6.36	6.42	6.48	6.54	6.56	6.58	6.61	6.65	6.68	6.71	
	Net Load (Extreme Weather Corrected)	6.75	6.81	6.87	6.93	6.96	6.99	7.02	7.05	7.09	7.12	
Minaki DS	Hydro One Distribution (Gross Forecast)	1.02	1.04	1.07	1.09	1.11	1.13	1.15	1.17	1.19	1.21	8.46
	DG (Incremental)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	CDM (Incremental)	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.03	
	Net Load (Normal Weather Corrected)	1.02	1.04	1.06	1.08	1.10	1.11	1.13	1.15	1.17	1.19	
	Net Load (Extreme Weather Corrected)	1.08	1.10	1.12	1.15	1.16	1.18	1.20	1.22	1.24	1.26	
Nestor Falls DS	Hydro One Distribution (Gross Forecast)	1.96	1.98	2.00	2.02	2.03	2.04	2.05	2.07	2.08	2.09	7.74
	DG (Incremental)	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	
	CDM (Incremental)	0.01	0.01	0.02	0.02	0.03	0.03	0.03	0.04	0.04	0.05	
	Net Load (Normal Weather Corrected)	1.94	1.96	1.98	1.99	2.00	2.01	2.01	2.02	2.03	2.04	
	Net Load (Extreme Weather Corrected)	2.06	2.08	2.10	2.12	2.12	2.13	2.14	2.15	2.16	2.17	
Sam Lake DS	Hydro One Distribution (Gross Forecast)	11.34	11.47	11.63	11.79	11.89	11.99	12.09	12.21	12.33	12.44	16.92
	DG (Incremental)	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	
	CDM (Incremental)	0.07	0.08	0.09	0.13	0.15	0.18	0.20	0.23	0.25	0.27	
	Net Load (Normal Weather Corrected)	11.26	11.39	11.52	11.66	11.73	11.80	11.88	11.97	12.06	12.15	
	Net Load (Extreme Weather Corrected)	11.95	12.08	12.22	12.36	12.45	12.52	12.61	12.70	12.80	12.89	
Sapawe DS	Hydro One Distribution (Gross Forecast)	3.08	3.12	3.15	3.20	3.22	3.24	3.27	3.30	3.33	3.35	3.42
	DG (Incremental)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	CDM (Incremental)	0.02	0.02	0.03	0.03	0.04	0.05	0.05	0.06	0.07	0.07	

Transformer Station		Near Term Forecast (MW)					Medium Term Forecast (MW)					Summer 10-Day LTR for TS / Planned Loading Limit for DS* (MW)
		2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	
	Net Load (Normal Weather Corrected)	3.06	3.09	3.13	3.16	3.18	3.20	3.22	3.24	3.26	3.28	
	Net Load (Extreme Weather Corrected)	3.25	3.28	3.32	3.35	3.37	3.39	3.41	3.43	3.46	3.48	
Shabaqua DS	Hydro One Distribution (Gross Forecast)	3.50	3.52	3.56	3.60	3.62	3.64	3.66	3.68	3.71	3.73	6.75
	DG (Incremental)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	CDM (Incremental)	0.02	0.02	0.03	0.04	0.05	0.05	0.06	0.07	0.08	0.08	
	Net Load (Normal Weather Corrected)	3.47	3.50	3.53	3.55	3.57	3.58	3.59	3.61	3.63	3.64	
	Net Load (Extreme Weather Corrected)	3.68	3.71	3.74	3.77	3.78	3.80	3.81	3.83	3.85	3.87	
Sioux Narrows DS	Hydro One Distribution (Gross Forecast)	2.29	2.31	2.34	2.36	2.38	2.39	2.41	2.42	2.44	2.46	8.46
	DG (Incremental)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	CDM (Incremental)	0.01	0.02	0.02	0.03	0.03	0.04	0.04	0.05	0.05	0.05	
	Net Load (Normal Weather Corrected)	2.27	2.29	2.31	2.33	2.34	2.35	2.36	2.37	2.39	2.40	
	Net Load (Extreme Weather Corrected)	2.41	2.43	2.45	2.47	2.48	2.49	2.50	2.52	2.53	2.54	
Valora DS	Hydro One Distribution (Gross Forecast)	0.47	0.48	0.49	0.50	0.51	0.52	0.52	0.53	0.54	0.55	3.42
	DG (Incremental)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	CDM (Incremental)	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	
	Net Load (Normal Weather Corrected)	0.47	0.48	0.49	0.50	0.50	0.51	0.51	0.52	0.53	0.53	
	Net Load (Extreme Weather Corrected)	0.50	0.51	0.52	0.53	0.53	0.54	0.55	0.55	0.56	0.57	
Vermilion Bay DS	Hydro One Distribution (Gross Forecast)	2.20	2.23	2.27	2.30	2.33	2.35	2.38	2.41	2.44	2.46	6.75
	DG (Incremental)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	CDM (Incremental)	0.01	0.01	0.02	0.02	0.03	0.03	0.04	0.05	0.05	0.05	
	Net Load (Normal Weather Corrected)	2.19	2.22	2.25	2.28	2.30	2.32	2.34	2.36	2.39	2.41	
	Net Load (Extreme Weather Corrected)	2.32	2.35	2.39	2.42	2.44	2.46	2.48	2.51	2.53	2.56	

Transformer Station		Near Term Forecast (MW)					Medium Term Forecast (MW)					Summer 10-Day LTR for TS / Planned Loading Limit for DS* (MW)
		2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	
Crilly DS	Hydro One Distribution (Gross Forecast)	0.92	0.93	0.95	0.96	0.97	0.98	0.99	0.99	1.00	1.01	1.71
	DG (Incremental)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	CDM (Incremental)	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	
	Net Load (Normal Weather Corrected)	0.92	0.93	0.94	0.95	0.96	0.96	0.97	0.98	0.98	0.99	
	Net Load (Extreme Weather Corrected)	0.97	0.98	1.00	1.01	1.01	1.02	1.03	1.04	1.04	1.05	
Kenora DS	Hydro One Distribution (Gross Forecast)	3.59	3.64	3.69	3.74	3.78	3.81	3.85	3.89	3.93	3.96	8.46
	DG (Incremental)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	CDM (Incremental)	0.02	0.02	0.03	0.04	0.05	0.06	0.06	0.07	0.08	0.09	
	Net Load (Normal Weather Corrected)	3.57	3.61	3.66	3.70	3.73	3.75	3.78	3.81	3.84	3.88	
	Net Load (Extreme Weather Corrected)	3.79	3.83	3.88	3.93	3.96	3.98	4.01	4.04	4.08	4.11	
Whitedog DS	Hydro One Distribution (Gross Forecast)	1.03	1.05	1.06	1.08	1.09	1.10	1.11	1.13	1.14	1.15	2.25
	DG (Incremental)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	CDM (Incremental)	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.03	
	Net Load (Normal Weather Corrected)	1.03	1.04	1.05	1.07	1.08	1.09	1.10	1.11	1.12	1.13	
	Net Load (Extreme Weather Corrected)	1.09	1.10	1.12	1.13	1.14	1.15	1.16	1.17	1.18	1.19	
Thunder Bay Sub-Region												
Birch TS	Synergy North (Gross Forecast)	68.59	68.85	69.18	69.22	69.92	70.74	71.28	71.69	72.26	72.62	91.98
	DG (Incremental)	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	
	CDM (Incremental)	0.43	0.45	0.55	0.74	0.88	1.04	1.18	1.36	1.48	1.59	
	Net Load (Normal Weather Corrected)	68.01	68.25	68.48	68.33	68.90	69.55	69.96	70.19	70.63	70.88	
	Net Load (Extreme Weather Corrected)	72.15	72.41	72.65	72.49	73.09	73.79	74.22	74.46	74.93	75.19	
Fort Williams TS	Synergy North (Gross Forecast)	70.56	70.92	71.34	71.48	72.28	73.17	73.82	74.36	75.05	75.54	90.36

Transformer Station		Near Term Forecast (MW)					Medium Term Forecast (MW)					Summer 10-Day LTR for TS / Planned Loading Limit for DS* (MW)
		2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	
	DG (Incremental)	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	
	CDM (Incremental)	0.44	0.47	0.57	0.77	0.91	1.08	1.22	1.41	1.54	1.66	
	Net Load (Normal Weather Corrected)	70.07	70.41	70.72	70.67	71.32	72.04	72.55	72.90	73.46	73.83	
	Net Load (Extreme Weather Corrected)	74.33	74.69	75.02	74.97	75.66	76.43	76.97	77.33	77.93	78.33	
Port Arthur TS #1	Synergy North + H1 Dx (Gross Forecast)	33.89	34.25	34.57	34.92	35.23	35.53	35.88	36.21	36.57	36.89	46.80
	DG (Incremental)	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	
	CDM (Incremental)	0.21	0.23	0.28	0.37	0.44	0.52	0.59	0.69	0.75	0.81	
	Net Load (Normal Weather Corrected)	33.63	33.97	34.25	34.50	34.74	34.96	35.24	35.48	35.77	36.04	
	Net Load (Extreme Weather Corrected)	35.67	36.04	36.33	36.59	36.85	37.08	37.38	37.64	37.95	38.23	
Murillo DS	Hydro One Distribution (Gross Forecast)	9.82	9.92	10.04	10.16	10.22	10.28	10.35	10.42	10.48	10.54	8.73
	DG (Incremental)	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	
	CDM (Incremental)	0.06	0.07	0.08	0.11	0.13	0.15	0.17	0.20	0.22	0.23	
	Net Load (Normal Weather Corrected)	9.63	9.73	9.83	9.92	9.97	10.00	10.05	10.09	10.14	10.18	
	Net Load (Extreme Weather Corrected)	10.22	10.32	10.43	10.53	10.58	10.61	10.66	10.71	10.76	10.80	
Nipigon DS	Hydro One Distribution (Gross Forecast)	2.46	2.49	2.52	2.56	2.58	2.60	2.63	2.65	2.68	2.71	7.74
	DG (Incremental)	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	
	CDM (Incremental)	0.02	0.02	0.02	0.03	0.03	0.04	0.04	0.05	0.06	0.06	
	Net Load (Normal Weather Corrected)	2.44	2.47	2.49	2.52	2.54	2.56	2.58	2.60	2.62	2.64	
	Net Load (Extreme Weather Corrected)	2.59	2.62	2.65	2.68	2.69	2.71	2.73	2.75	2.78	2.80	
Red Rock DS	Hydro One Distribution (Gross Forecast)	3.13	3.13	3.14	3.15	3.16	3.16	3.16	3.16	3.16	3.16	6.75
	DG (Incremental)	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	
	CDM (Incremental)	0.02	0.02	0.03	0.03	0.04	0.05	0.05	0.06	0.06	0.07	

Transformer Station		Near Term Forecast (MW)					Medium Term Forecast (MW)					Summer 10-Day LTR for TS / Planned Loading Limit for DS* (MW)
		2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	
	Net Load (Normal Weather Corrected)	2.97	2.97	2.98	2.98	2.97	2.97	2.96	2.96	2.96	2.95	
	Net Load (Extreme Weather Corrected)	3.15	3.15	3.16	3.16	3.16	3.15	3.14	3.14	3.14	3.13	

Appendix C: Winter 2029 Load Forecast & Dependable Hydro Generation Breakdown by Sub-Region

Sub-Region	Load (MW)	Dependable Generation @ 98% (MW)	Dependable Generation @ 85% (MW)
Thunder Bay Sub-Region	454	115	188
West of Thunder Bay Sub-Region	244	24	46
North of Dryden Sub-Region (Including First Nation Communities)	130	46	59
Greenstone-Marathon Sub-Region	145	6	26
Total	973	191	318

Appendix D: Lists of Step-Down Transformer Stations

Sub-Region	Station	Voltage (kV)	Supply Circuits
North of Dryden	EAR FALLS TS	115/44	M3E, E4D, E1C, E2R
	RED LAKE TS	115/44	E2R
	CAT LAKE MTS	115/25	E1C
	CROW RIVER DS	115/25	C2M
	PERRAULT FALLS DS	115/12.5	E4D
	SLATE FALLS DS	115/24.9	E1C
Greenstone-Marathon	LONGLAC TS	115/44	A4L
	MANITOUWADGE TS	115/44	M2W
	MARATHON TS	230/115	T1M, W21M, M23L, M2W, M24L, W22M
	BEARDMORE DS #2	115/25	A4L
	JELICOE DS #3	115/12.5	A4L
	MANITOUWADGE DS #1	115/12.5	M2W
	MARATHON DS	115/25	T1M
	PIC DS	115/25	M2W
	SCHREIBER WINNIPEG DS	115/12.5	A5A
	WHITE RIVER DS	115/25	M2W
West of Thunder Bay	BARWICK TS	115/44	K6F
	DRYDEN TS	230/115	K3D, D26A, E4D, D5D, K23D, M2D
	FORT FRANCES TS	232/115	K24F, F25A, K6F, F1B, F2B, F3M
	KENORA TS	230/115	K24F, K7K, K21W, K23D, K22W
	MACKENZIE TS	230/115	D26A, A22L, A3M, F25A, A21L, N93A
	MOOSE LAKE TS	115/44	A3M, M1S, M2D, B6M
	FORT FRANCES MTS	115/12.47	F1B
	KENORA MTS	115/12.5	15M1
	AGIMAK DS	115/25	29M1
	BURLEIGH DS	115/12.5	F1B

Sub-Region	Station	Voltage (kV)	Supply Circuits
	CLEARWATER BAY DS	115/25	SK1
	ETON DS	115/12.48	K3D
	KEEWATIN DS	115/12.5	SK1
	MARGACH DS	115/25	K6F
	MINAKI DS	115/25	K4W
	NESTOR FALLS DS	115/13.2	K6F
	SAM LAKE DS	115/26.4	K3D
	SAPAWE DS	115/12.5	B6M
	SHABAQUA DS	115/12.5	B6M
	STOUX NARROWS DS	115/12.5	K6F
	VALORA DS	115/25	29M1
	VERMILION BAY DS	115/12.5	K3D
Thunder Bay	BIRCH TS	115/28.4	Q9B, P7B, Q8B, Q5B, R2LB, P3B, Q4B, R1LB, B6M
	FORT WILLIAM TS	115/25	Q5B, Q4B
	LAKEHEAD TS	230/115	A22L, M23L, A21L, R2LB, L4P, M24L, A7L, R1LB, A8L, L3P
	PORT ARTHUR TS #1	115/25	P7B, P1T, A6P, L4P, P3B, P5M, L3P
	MURILLO DS	115/26.40	B6M
	NIPIGON DS	115/4.16	57M1
	RED ROCK DS	115/12.5	56M1

Appendix E: Lists of Transmission Circuits

Circuit(s)	Location	Voltage (kV)
D26A	Mackenzie x Dryden	230
F25A	Mackenzie x Fort Frances	230
K23D	Dryden x TCPL Vermill Bay x Kenora	230
K24F	Fort Frances x Kenora	230
N93A	Mackenzie x Marmion Lake x Atikokan	230
K21W, K22W	Kenora x Whiteshell (Manitoba Hydro)	230
A21L, A22L	Mackenzie x Lakehead	230
M23L, M24L	Marathon x Lakehead	230
15M1	Kenora x Rabbit Lake	115
29M1	Ignace x Camp Lake x Valora x Matabi	115
A3M	Mackenzie x Moose Lake	115
B6M	Moose Lake x Sapawe x Shabaqua x Stanley x Murillo x Birch	115
D5D	Dryden x Domtar Dryden	115
F1B	Fort Frances x Burleigh	115
F3M	Fort Frances x Internat Fls (Minnesota Power)	115
K2M	Kenora x Norman	115
K3D	Dryden x Sam Lake x Eton x Vermilion Bay x Rabbit Lake	115
K4W	White Dog x Minaki x Rabbit Lake	115
K6F	Fort Frances x Ainsworth x Nestor Falls x Sioux Narrows x Rabbit Lake	115
K7K	Kenora x Weyerhaeuser Ken x Rabbit Lake	115
M1S	Moose Lake x Valerie Falls x Mill Creek	115
M2D	Moose Lake x Ignace x Dryden	115
SK1	Rabbit Lake x Keewatin x Forgie	115
W3C	White Dog x Caribou Falls	115
56M1	Nipigon x Red Rock	115
57M1	Reserve x Nipigon	115
A6P	Alexander x Port Arthur	115
L3P, L4P	Lakehead x Port Arthur	115
P3B, P7B	Port Arthur x Birch	115
P5M	Port Arthur x Conmee	115
Q4B, Q5B, Q8B, Q9B	Thunder Bay x Birch	115
R1LB, R2LB	Lakehead x Pine Portage x Birch	115
S1C	Silver Falls x Lac Des Iles x Conmee	115
A1B	Aguasabon x Terrace Bay	115
A4L	Alexander x Nipigon x Beardmore x Jellicoe x Roxmark x Longlac	115
A5A	Alexander x Minnova x Schreiber x Aguasabon	115

Circuit(s)	Location	Voltage (kV)
C1A, C2A, C3A	Alexander x Cameron Falls	115
GA1	Upper White River x Lower White River	115
M2W	Marathon x Black River x Umbata Falls x Hemlo Mine x White River	115
R9A	Alexander x Pine Portage	115
E1C	Ear Falls x Selco x Slate Falls x Cat Lake x Pickle Lake	115
C2M	Pickle Lake x Crow River x Musselwhite	115
E2R	Ear Falls x Balmer x Red Lake	115
E4D	Ear Falls x Scout Lake x Dryden	115
M3E	Manitou Falls x Ear Falls	115
T1M	Terrace Bay x Marathon	115

Appendix F: Lists of LDCs in the Northwest Ontario Region

Company	Connection Type
Atikokan Hydro Inc.	Transmission
Fort Frances Power Corporation	Transmission
Hydro One Networks Inc. (Distribution)	Transmission
Sioux Lookout Hydro Inc.	Distribution
Synergy North	Transmission

Appendix G: 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
EOL	End-Of-Life
FFPC	Fort Frances Power Corporation
GS	Generating Station
HV	High Voltage
IESO	Independent Electricity System Operator
IRRP	Integrated Regional Resource Plan
Jct	Junction
kV	Kilovolt
LDC	Local Distribution Company
LMC	Load Meeting Capability
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

Acronym	Description
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
SA	Scoping Assessment
SIA	System Impact Assessment
SPS	Special Protection Scheme
SS	Switching Station
STG	Steam Turbine Generator
TS	Transformer Station