North of Sudbury Bulk Plan

August 20, 2026

Connecting Today.
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List of Abbreviations

ACCC	Aluminum Conductor Composite Core
ACSR	Aluminum Conductor Steel Reinforced
ACSS	Aluminum Conductor Steel Supported
APO	Annual Planning Outlook
BES	Bulk Electric System (NERC)
BESS	Battery Energy Storage System
BPS	Bulk Power System (NPCC)
CAD	Canadian Dollars
DER	Distributed Energy Resources
DS	Distribution Station
EA	Environmental Assessment
ELT1	Expedited Long-Term 1 RFP
EOL	End of Life
EWTW	East West Tie West
FN	Flow North
FS	Flow South
G/R	Generation Rejection
GS	Generation Station
HKI	Hunta Kapuskasing In
IBR	Inverter-based resources
IEP	Integrated Energy Plan
IRRP	Integrated Regional Resource Plan

I/S	In Service
KL	Kirkland Lake
KLI	Kirkland Lake In
kV	kilovolt
JCT	Junction
LGR	Load and Generation Rejection
LMC	Load Meeting Capability
L/R	Load Rejection
LT1	Long-Term 1 RFP
LT2	Long-Term 2 RFP
LT3	Long-Term 3 RFP
LTC	Leave to Construct
LTE	Long-Term Emergency
LV	Low Voltage
MECP	Ministry of Environment, Conservation and Parks
MISSE	Mississagi East
MISSW	Mississagi West
MVA	MegaVolt-Ampere (Apparent Power)
Mvar	MegaVolt-Ampere-Reactive (Reactive Power)
MW	Megawatt (Real/Active Power)
NERC	North American Electric Reliability Corporation
NPCC	Northeast Power Coordinating Council
N-1	Contingency involving the loss of a single element
N-2	Contingency involving the loss of two elements

N-1-1	Contingency involving the loss of one element, followed by the loss of another element
NE	Northeast
OEB	Ontario Energy Board
ORTAC	Ontario Resource and Transmission Assessment Criteria
O/S	Out of Service
P2D	Pathways to Decarbonization
PAI	Porcupine Ansonville In
PDN	Porcupine Dymond North
PHN	Porcupine Hunta North
POG	Powering Ontario's Growth
PTO	Provincial Territorial Organizations
RAS	Remedial Action Scheme
RFP	Request for Proposals
ROW	Right-of-Way
SIA	System Impact Assessment
SS	Switching Station
STE	Short-Term Emergency
TS	Transformer Station

Executive Summary

A reliable and affordable electricity system underpins economic development across Ontario. With electricity demand forecast to rise, the bulk transmission system requires new investments to support growing communities and expanding industries in every corner of the province.

Through a collaborative and robust planning process, the Independent Electricity System Operator (IESO) is driving and guiding the sector's future with a series of recommendations for transmission infrastructure.

The North of Sudbury Bulk Plan was initiated in response to rapidly increasing electricity demand, driven primarily by mining development and mineral processing, and new resources being connected to supply electricity to the grid. With the northeast also being served by aging infrastructure, critical investments are required to replace equipment nearing end of life to safeguard reliability. Together, these factors led to a focused bulk system assessment to ensure the transmission system can support near-term demand growth and long-term resource integration while preserving flexibility for future development and managing ratepayer risk.

As part of the analysis of the electricity system and its ability to accommodate growth and support economic development in the area north of Sudbury, the IESO evaluated a wide range of wires and non-wires solutions. Consequently, the North of Sudbury Bulk Plan proposes a series of recommendations to improve the resiliency of the northern transmission system, increase the ability to site and deliver new generation resources in northeast Ontario, and provide greater flexibility for future bulk system expansion and longer-term resource development.

These recommendations build on significant efforts in recent years to strengthen the electricity system north of Sudbury. This includes new transmission lines from Sudbury to Barrie and from Timmins to Wawa that are under development — along with the launch of the Northern Hydro Program, which will extend the life of existing hydroelectric facilities at lower cost; and the Second Long-Term Request for Proposals, which is competitively procuring new resources, including in northern Ontario.

Implementation-Ready

Implementation-ready actions are recommendations required by the early- to mid-2030s to improve reliability and enable near-term demand growth. These actions should proceed to immediate development and implementation given that transmission infrastructure development timelines range between 5–7 years.

These recommendations form the backbone of the North of Sudbury Bulk Plan and address reliability and operability needs that exist across the region. They include transmission line reinforcements, associated station expansions, and end-of-life reconductoring work to strengthen supply across the Kirkland Lake, Timmins–Iroquois Falls, Kapuskasing, and areas north and south of Timmins.

These investments are critical because the area currently depends on extensive operating measures to maintain adequate reliability — these existing measures are expected to continue to serve the area until recommendations are in-service. Once recommendations are fully implemented, reliance on operational measures will decrease, positioning the region for sustainable long-term growth.

Future-Ready

Future-ready actions support readiness for larger demand growth and evolving system conditions, which involves development activities to preserve flexibility (e.g., preliminary engineering and design, route or siting consideration, environmental approvals, and land rights) while deferring actual construction until conditions warrant. This approach preserves the ability to respond to future needs without committing ratepayers to full construction costs before needs are confirmed.

The North of Sudbury Bulk Plan identifies two reinforcements for which early development work should proceed to preserve readiness, help address long transmission lead times, and support economic development.

These recommendations include a new transmission line between Sudbury and Timmins to strengthen the principal bulk supply path into the region; and a new line between Fraserdale and Timmins that maintains longer-term options for further expansion of the bulk transmission system. In its assessments, the IESO identified that future load growth, such as new mining projects or other similarly sized facilities, could exceed the level addressed by the implementation-ready actions. These actions would further strengthen reliability and increase transfer capability, while also enabling the development of future supply resources — including renewables and hydroelectric resources — that could materialize in the future.

Staged Investment

The North of Sudbury Bulk Plan is designed to balance timely action on current reliability needs with prudent preparation for future requirements. The estimated cost of the recommended plan is approximately $6.2 billion[1] — $3.2 billion for implementation-ready actions and $3 billion for future-ready actions — staged to align larger future expenditures with the progression and confirmation of need, supporting reliability and growth while reducing the risk of building too early.

Given that the IESO is targeting the early-2030s for implementation-ready actions, project timelines are an important consideration. While this Plan focuses on identifying necessary infrastructure investments, the approach for selecting a developer and constructing the projects — which could include designating a transmitter or a competitive procurement — will be confirmed following completion of this Plan.

Engagement

Engagement on the North of Sudbury Bulk Plan was conducted throughout its development, including public webinars and targeted outreach to Indigenous communities, municipalities, and stakeholders. Feedback received emphasized the importance of reliable supply, support for economic development, interest in non-wires alternatives, and the need for long-term planning certainty. This input informed the evaluation of options and the development of the phased recommendations.

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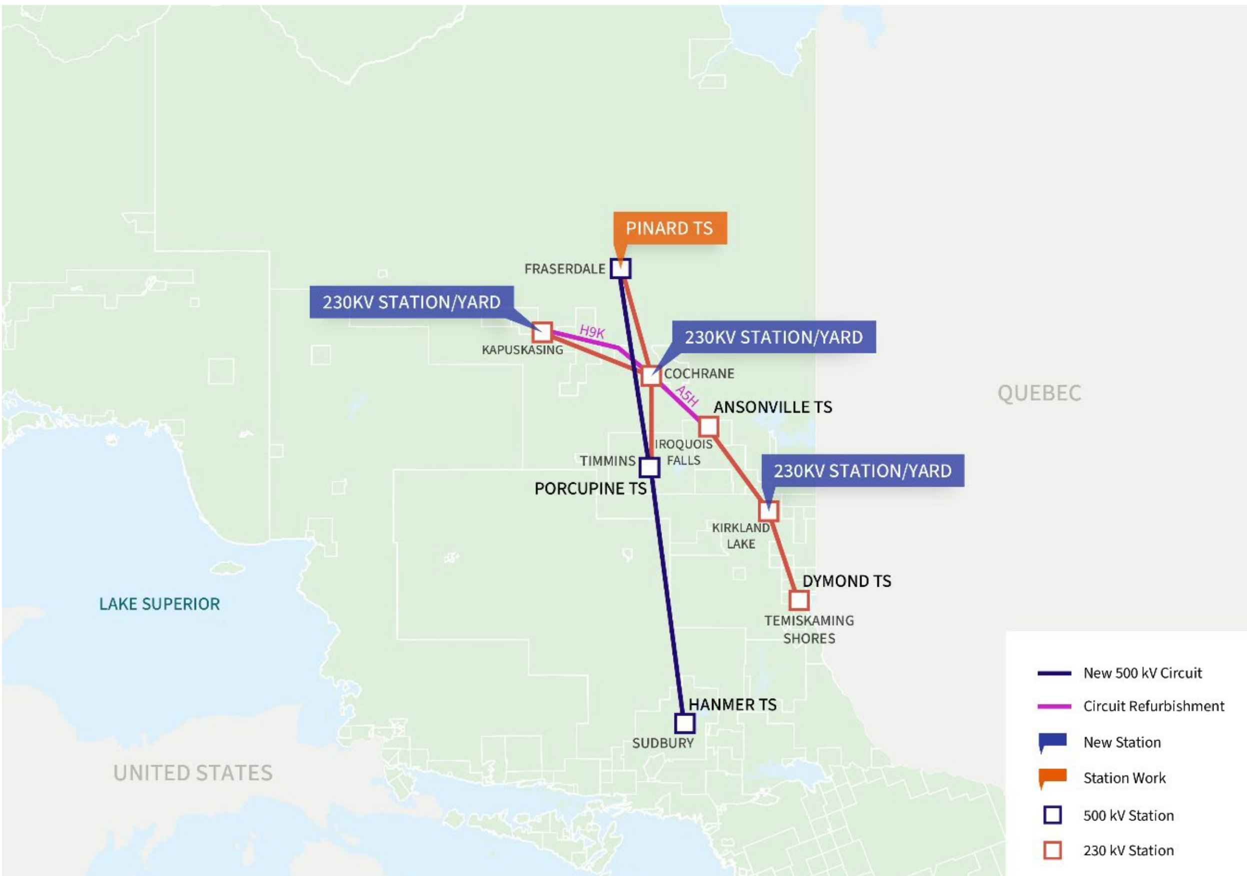
[1] All recommendations are in 2025 CAD with a range of -50% to +100%

Impact

The North of Sudbury Bulk Plan is a sequenced transmission strategy that strengthens system reliability in the northeast; allows new customers and supply resources to connect to the grid; maintains ratepayer value; and supports economic development across a large geographic area.

This is achieved through implementation-ready actions that address near-term needs, aligned with future-ready actions that preserve the ability to respond to larger developments as they materialize. As a result, the IESO's recommendations strengthen the northeastern bulk system by balancing timely action and future flexibility with sound investment timing.

Map of Recommendations



Summary of Recommendations

Table 1 | Implementation-Ready Actions

Recommendation	Solution Type	Needs Addressed	Expected In-Service
Kirkland Lake 230 kV Yard	New 230 kV Yard with Two 230/115 kV Autotransformers	Required to enable connection of 230 kV circuits South of Timmins	2033

Recommendation	Solution Type	Needs Addressed	Expected In-Service
Kirkland Lake 230 kV Yard to Dymond TS (Temiskaming Shores)	New 230 kV Single-Circuit Transmission	Improves reliability and enables demand South of Timmins	2033
Kirkland Lake 230 kV Yard to Ansonville TS (Iroquois Falls)	New 230 kV Single-Circuit Transmission	Improves reliability and enables demand South of Timmins	2033
Hunta SS 230 kV Yard (Cochrane District)	New 230 kV Yard with One 230/115 kV Autotransformer	Required to enable 230 kV circuits North of Timmins	2033
Kapuskasing 230 kV Yard (Kapuskasing)	New 230 kV Yard	Required to enable 230 kV circuit from Hunta SS (Cochrane District) to Kapuskasing	2033
Hunta SS to Pinard TS (Cochrane District)	New 230 kV Single-Circuit Transmission	Improves reliability and enables demand North of Timmins	2033
Hunta SS to Kapuskasing Yard	New 230 kV Single-Circuit Transmission	Improves reliability and enables demand North of Timmins	2033
Hunta SS to Porcupine TS (Timmins)	New 230 kV Double-Circuit Transmission	Improves reliability and enables demand North of Timmins	2033
Pinard TS Reconfiguration	New 230/115 kV Autotransformers	Required to enable new 230 kv circuit to Pinard	2033
New supply resources	New resources capable of voltage control	As a complement to transmission circuits, provides voltage control in strategically sited areas (Timmins 115 kV, Kirkland 115 kV and new circuits with the capability)	2033
Hunta SS to Carmichael Falls JCT (Fauquier) Reconductor	Reconductor existing 115 kV Single-Circuit Transmission (for EOL portions H9K)	Maintains connection for existing generators and loads	TBD

Recommendation	Solution Type	Needs Addressed	Expected In-Service
Hunta SS to Ansonville TS Reconductor	Reconductor existing 115 kV Single-Circuit Transmission (for EOL portions – A4H or A5H)	Consider reconductor at end of life, to maintains connection for existing generators and loads, determined through future planning	TBD
Pinard TS to Hunta SS Retirement	Existing 115kV Double-Circuit Transmission Retired (D2H, D3H)	Consider retirement at end of life for circuits no longer required, determined through future planning	TBD
Hunta SS to Ansonville TS Retirement	Existing 115kV Single-Circuit Transmission Retired (A5H or A4H)	Consider retirement at end of life of ~60km circuit no longer required, determined through future planning	TBD
Hunta SS to Timmins SS (Timmins)	Existing 115kV Double-Circuit Retirement	Consider retirement at end of life of circuits no longer required, depending on customer plans and through future planning	TBD

Table 2 | Future-Ready Actions

Recommendation	Solution Type	Needs Addressed	Expected In-Service
Hanmer TS (Sudbury) to Porcupine TS Reinforcement	New 500 kV Single-Circuit Transmission	May be required to enable increased demand growth South of Timmins	To be determined based on future planning triggers
Porcupine TS to Pinard TS Reinforcement	New 500 kV Single-Circuit Transmission	May be required to enable increased demand growth and generation North of Timmins	To be determined based on future planning triggers

1. Introduction and Planning Context

This North of Sudbury Bulk Plan (the Plan) presents the results of a study which the Independent Electricity System Operator (IESO) has undertaken to assess the reliability and adequacy of the bulk transmission system supplying the area north of Sudbury for the period up to and including 2050. The study area includes Timmins, Kapuskasing, Kirkland Lake, Iroquois Falls, Cochrane, and surrounding communities, as well as major mining and industrial facilities, Indigenous communities extending toward the James Bay region, and hydroelectric resources on the Abitibi and Mattagami river systems. The Plan has been undertaken in response to increasing electricity demand, industrial development, electrification, and broader interest in the future role of northern Ontario in supporting provincial electricity needs and economic growth.

In the area north of Sudbury, the combination of system characteristics and emerging growth drivers supports a broader assessment: the region is served by an electrically weak and highly radial transmission system; includes several electrically distinct but interconnected sub-areas; and is increasingly affected by growth in industrial and mining demand, electrification, and future resource development considerations. Accordingly, this plan considers needs and options across the northern system, while recognizing the importance of individual interfaces and localized constraints, and the need to enable timely and efficient supply connections to support anticipated growth and development.

1.1 Purpose of This Bulk Plan

The IESO has multiple planning studies underway to respond to transmission-related priorities identified through *Powering Ontario's Growth: Ontario's Plan for a Clean Energy Future*, the Minister's subsequent July 10, 2023 letter to the IESO, and *Energy for Generations: Ontario's Integrated Plan to Power the Strongest Economy in the G7*.

Powering Ontario's Growth outlines priorities and objectives for the continued transition of the electricity system, building on the earlier *Pathways to Decarbonization* report prepared by the IESO in 2022. The Minister's letter directed the IESO to advance work on known transmission bottlenecks and related system needs. *Energy for Generations* establishes the broader long-term policy direction for Ontario's energy system and underscores the importance of early planning activities to maintain a reliable and affordable supply of electricity for Ontario.

Together, these planning drivers support addressing known bottlenecks in the transmission system to enable the connection of new nuclear, hydroelectric, and renewable generation, while also accommodating higher electricity demand associated with electrification, mining and mineral processing, manufacturing, and other energy-intensive industrial uses.

In the North of Sudbury area, these broader policy and planning drivers intersect with a transmission system that is electrically weak, long, and highly radial, and increasingly challenging to operate within planning requirements. This plan builds on earlier reinforcement work initiated through the 2025 Northern Ontario Bulk Plan, which recommended transmission reinforcement between Barrie and

Sudbury, by focusing more specifically on the transmission system supplying areas North of Sudbury; and responds to increasing electricity demand driven by mining and industrial development, placing additional pressure on an already constrained transmission system, and the presence of aging infrastructure approaching end of life. At the same time, the region is experiencing increased interest in renewable and hydroelectric development opportunities. Together, these factors support the need for a focused bulk system assessment to evaluate reliability needs, identify reinforcement requirements, and ensure the transmission system can support near-term demand growth and longer-term resource integration while balancing affordability, managing ratepayer risk, and preserving flexibility for future development.

1.2 Relationship With Other Planning Work

The IESO is responsible for planning electricity generation, electricity demand-side management (eDSM) and energy efficiency, and transmission in Ontario. In carrying out this function, the IESO undertakes activities to help ensure that the province continues to have adequate and reliable supply of resources and transmission to meet Ontario's electricity needs. These planning activities generally include regional and bulk system planning, which are separate but interrelated processes: regional planning addresses more localized system issues within the province's planning regions, while bulk system planning addresses broader provincial or inter-regional issues such as resource adequacy and transmission solutions needed to move electricity reliably and cost-effectively across the province. The IESO also undertakes regulatory compliance studies and reporting in accordance with NERC standards and NPCC criteria.

In February 2021, the bulk power system planning process was formalized through the High-Level Design Overview to make the development and implementation of bulk plans more consistent, timely, and transparent. As part of that process, the IESO uses the Annual Planning Outlook (APO) as the reporting vehicle to summarize forecast bulk system reliability issues over the long term. Since 2022, the APO has described how the IESO plans to address each identified bulk issue, whether through a bulk system study, resource procurement, or other planning activity. System issues identified in the APO that require a bulk system plan are included in the APO Schedule of Planning Activities, which communicates the timelines for initiating them.

1.2.1 APO Co-ordination

This bulk plan has been developed in co-ordination with the IESO's APO to align with province-wide assumptions related to demand growth, generation supply mix, electrification trends, and policy direction arising from *Powering Ontario's Growth* and *Pathways to Decarbonization*. The APO provides a consistent and transparent foundation for system assumptions and supports alignment across bulk, regional, and resource planning processes.

Recognizing uncertainties associated with industrial development, mining projects, and the timing and scale of electrification initiatives in northern Ontario, this bulk plan also allows for adjustment and sensitivity analysis beyond the APO baseline. Where appropriate, assumptions were refined to reflect region-specific information obtained through stakeholder engagement, System Impact Assessments, and known project developments. Multiple demand scenarios were assessed to evaluate system performance under a range of plausible future conditions. This is particularly important in the area north of Sudbury, where forecast uncertainty is strongly influenced by large industrial and mining projects and where the transmission consequences of locational changes in demand can be significant.

1.2.2 Regional Planning Co-ordination

Co-ordination between the North of Sudbury Bulk Plan and active or recently completed Integrated Regional Resource Plans (IRRPs) helped strengthen the analysis and outcomes of both processes. This included alignment of demand drivers and regional assumptions, including major industrial developments, mining activity, electrification trends, and population growth to ensure consistency between regional and bulk system assessments. It also included incorporating regional insights into bulk system modelling where IRRP analyses identified localized constraints, operational challenges, or emerging needs with implications for bulk transmission interfaces.

This Plan also benefited from co-ordination of engagement inputs, including feedback from municipal, Indigenous, and stakeholder engagement conducted through regional planning processes, where relevant. In turn, the findings of this bulk plan may also inform future regional planning discussions where bulk transmission capability affects local options or development potential. This co-ordinated approach helps ensure that regional and bulk planning activities are mutually reinforcing, avoids duplication of analysis, and supports more integrated planning outcomes for North of Sudbury.

1.3 Study Area and System Overview

North of Sudbury is defined by physical geography, and the electricity infrastructure that serves a large and interconnected part of northeast Ontario. The area includes municipalities and townships, Indigenous communities, Tribal Councils, Provincial Territorial Organizations (PTOs), Métis communities, and major mining and industrial loads whose electricity supply depends on the broader northern transmission system. Detailed community and engagement information is provided in Section 9 and the supporting materials.

The area has approximately 2,000 MW of generation, including hydroelectric, solar, and thermal (natural gas and biofuel) resources. Electricity demand in the area is driven largely by industrial and mining activity. The area has approximately 700 MW of peak coincident demand, with average annual growth projected at approximately 1.8–2 per cent based on the winter and summer reference demand forecast scenarios. However, due to the nature of large industrial demand this growth will materialize as larger discrete blocks rather than continuous growth.

While the total installed capacity of supply resources in the area is greater than peak demand, hydroelectric and other renewable resources are energy-limited and variable in nature. As a result, installed capacity does not necessarily translate into dependable all-hour supply, and transmission capability into and across the area remains a critical planning issue.

The transmission system connects the area north of Sudbury to the rest of the province by the following circuits:

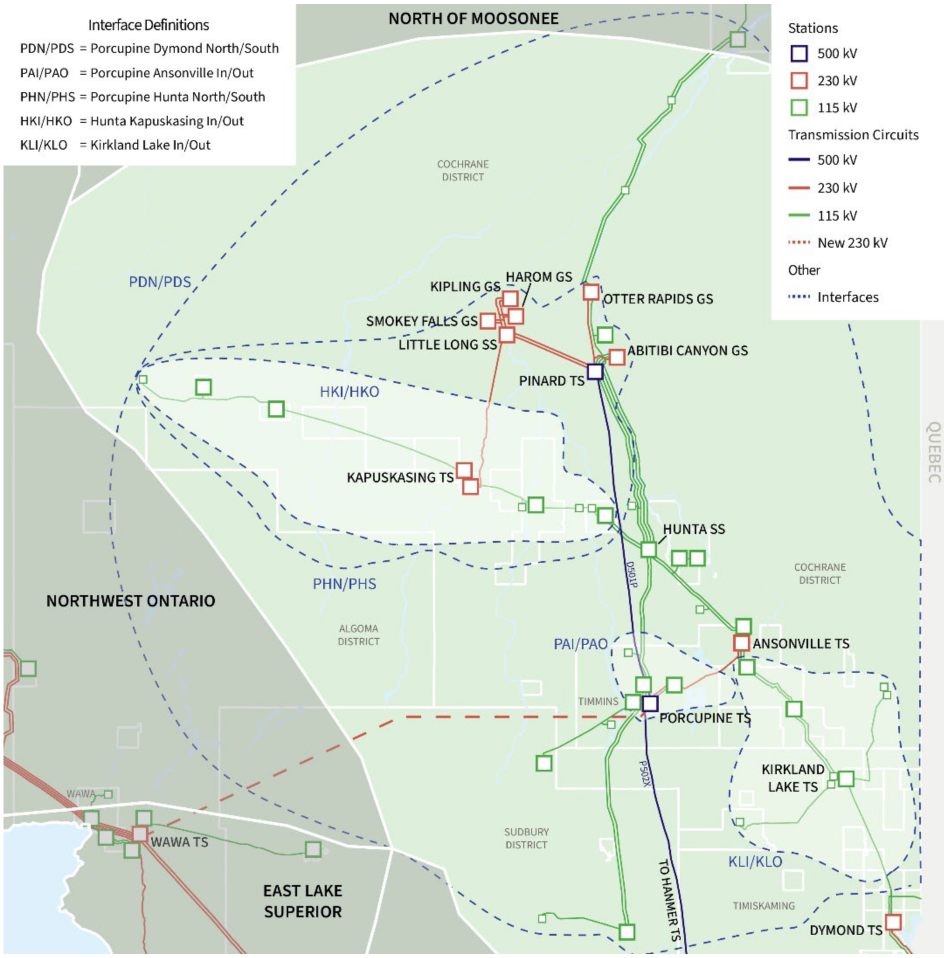
- 500 kV single-circuit P502X between Hanmer TS (Sudbury) and Porcupine TS (Timmins).
- 115 kV single-circuit D3K between Kirkland Lake TS and Dymond TS (Temiskaming Shores).
- A new single 230 kV circuit P503W built to 500 kV specifications (nomenclature as per the 2022 Northeast Bulk Plan and subject to change) between Wawa TS (Wawa) and Porcupine TS with an expected in-service date toward the end of 2030.

The major hydroelectric resources north of Sudbury are connected to a long 500 kV single-circuit system through radial 230 kV circuits. The 500 kV system is also in parallel with an underlying 115 kV transmission system originally built in the 1930s. The underlying 115 kV transmission system serves the majority of demand in the area. In addition, a small 230 kV corridor connects Ansonville TS (Iroquois Falls) and Porcupine TS. Together, these facilities form a transmission system that is weak, long, and highly radial, which is heavily dependent on a limited number of major elements to serve demand and maintain operability.

Figure 1 provides a geographic diagram of the area, including major transmission facilities, the principal transmission corridors, and the approximate boundaries of the electrical interfaces[2] used in this study. More detailed interface descriptions are provided Section 5 and in the supporting appendices.

[2] An interface is defined as a collection of circuits and/or transformers which form the boundary of an area. Usually associated with a MW flow limit which if exceeded would result in a criteria violation.

Figure 1 | Geographic Diagram of the Area North of Sudbury



1.4 Planning Framework Used in the Study

1.4.1 Plan Objectives and Approach

This bulk plan addresses the reliability needs that arise north of Sudbury due to anticipated industrial load growth, electrification, and limitations of the existing transmission system. To develop the plan, the IESO performed a technical assessment to assess the transfer capability of major transmission interfaces and identify bulk system needs north of Sudbury. The assessment had two main objectives:

- Examining the ability to reliably supply demand north of Sudbury, in accordance with planning criteria.
- Evaluating how additional transmission reinforcements could enable additional resources north of Sudbury, given the existing transmission limitations and established criteria.

These objectives reflect both the scale of forecast demand growth in the area and the fact that the existing system is already constrained by limited redundancy, aging infrastructure, and a high degree of operating intervention. In support of those objectives, the plan focuses on the following items:

- Supply capability north of Sudbury,
- The ability to enable new supply resources north of Sudbury,
- 115 kV transmission equipment identified as approaching end of life,
- Supply-mix uncertainties,
- Operability challenges related to voltage performance,
- Reducing long-term reliance on remedial action schemes, and
- Any additional needs that emerge through bulk planning analysis.

1.4.2 Purpose of Transmission Interfaces in Planning

When planning and operating the bulk electricity system, the IESO manages power flows to ensure that reliability criteria are met and that undesirable outcomes such as equipment damage, uncontrolled cascading outages, or widespread system separation are prevented. To support this objective, transmission interfaces are used in planning to represent the maximum allowable transfer of power between areas of the power system. An interface generally represents a defined grouping of transmission circuits, transformers, and associated facilities that connect one portion of the system to another. Rather than assessing individual lines in isolation, interfaces provide a practical means to evaluate system performance under a range of operating conditions, including peak demand, low-generation periods, and transmission contingencies.

In the North of Sudbury area, the use of interfaces is particularly important because of the weak and radial configuration of the transmission network, the extensive reliance on hydroelectric generation, the high concentration of large industrial and mining loads, and the significant and growing use of remedial action schemes to maintain system operability. As a result, many interface limits in this area are driven not only by thermal capability, but also by voltage performance, system stability, and operability considerations. These characteristics underpin the need for a comprehensive bulk system assessment.

For the purposes of this plan, the principal interfaces are used as follows:

- Porcupine Dymond North (PDN) represents the broad regional bulk supply path into the area north of Sudbury.
- Porcupine Ansonville In (PAI) represents the Timmins–Iroquois Falls area.
- Porcupine Hunta North (PHN) represents the area north of Timmins.
- Hunta Kapuskasing In (HKI) represents the Kapuskasing area.
- Kirkland Lake In (KLI) represents the Kirkland Lake area.

Together, these interfaces provide the basis for assessing both broader regional supply requirement and localized sub-area needs within the study area. More detailed interface definitions, including circuit composition and geographic diagrams, are provided in the supporting appendices.

1.4.3 Planning Criteria

The assessment of transfer capability and system needs in this Bulk Plan is conducted in accordance with applicable reliability standards, including:

- North American Electric Reliability Corporation (NERC) standards,
- Northeast Power Coordinating Council (NPCC) criteria, and
- Ontario Resource and Transmission Assessment Criteria (ORTAC), where applicable.

In portions of North of Sudbury designated as NPCC-impactive, the more stringent planning requirements apply. In all cases, the assessment adopts the most restrictive applicable criterion to ensure system reliability.

At a high level, the assessment considers thermal loading, voltage performance, and stability margins under the applicable planning contingencies. These criteria are used to determine how much power can be transferred into and within the study area while maintaining acceptable system performance under both all-elements-in-service and outage conditions.

For North of Sudbury, the practical significance of these criteria is heightened by the weak and radial nature of the transmission system, the energy-limited characteristics of much of the internal generation, and the historical reliance on remedial action schemes to maintain operability. Key objectives of this bulk plan are therefore to identify where reliability criteria are not met; reduce long-term reliance on remedial action schemes; and identify solutions to improve the inherent robustness and operability of the transmission system. Detailed criteria, assumptions, and methodological parameters are documented in the supporting appendices.

1.5 How This Plan Is Organized

This Plan outlines the IESO's plan to maintain a reliable, affordable, sustainable electricity supply to support North of Sudbury; and is structured as follows:

- Section 2 outlines the demand outlook and planning scenarios.
- Section 3 provides an overview of the existing supply and system operability context.
- Section 4 provides an overview of the existing remedial action schemes in the focus area and their expected usage.
- Section 5 analyzes the transmission system capability for the existing system, discusses the issues, and identifies the bulk system needs.
- Section 6 evaluates the options, including wires options and non-wires alternatives.
- Section 7 concludes the study findings and recommends a preferred solution.
- Section 8 provides an overview of the engagement activities to date.
- Section 9 describes the future resource enablement north of Pinard TS.

2. Demand Outlook Scenarios

This section describes the electricity demand outlook for North of Sudbury over the study period. Its purpose is to establish the scale, location, timing, and uncertainty of expected demand growth that will place pressure on the bulk transmission system. The demand outlook presented here provides the foundation for subsequent assessments of system reliability, operability, and transmission needs.

The section begins with the broader APO-based provincial growth context used across the bulk plans and then describes the regional demand outlook for North of Sudbury. It focuses on what demand is expected to occur and why, rather than how the transmission system responds to that demand. The translation of demand into reliability needs and transmission constraints is addressed in subsequent sections using the planning framework described in Section 1.

2.1 APO Co-Ordination and Provincial Growth Context

The APO forecasts electricity demand, assesses the reliability of the electricity system, identifies capacity and energy needs, and explores the province's ability to meet them. The first step in the APO is developing a demand forecast that represents how electricity usage in Ontario may evolve over the next 25 years. In the 2026 APO, multiple demand scenarios were presented to better reflect the range of uncertainties in factors such as electrification, economic development, and government policy and their impact on electricity demand. APO analysis is conducted yearly to ensure that planning information is up to date and that changes in economic drivers, policy, and industry are reflected.

The majority of load growth in the northeast is due to growth in the industrial sector, particularly in the mining subsector, with some growth from electric vehicle demand as well. Population is projected to remain relatively constant, and other industrial loads, such as pulp and paper, are expected to continue to decline slowly over the forecast period.

This bulk plan began in 2024, and as such the 2024 APO was used as the basis for this forecast. The mining forecast used in this plan was developed in 2024, and formed the basis of the mining forecast in the 2025 APO. In terms of the changes between outlooks, the demand in the northeast is similar in both the 2024 APO and the 2026 APO. Compared to the 2024 APO, the 2026 APO has less demand from electric vehicles province wide, and slower near-term demand due to changing economic conditions. The 2026 APO, and the supporting methodology and demand forecasting module can be found on the IESO website.

2.2 Regional Context for Demand Growth

Within the broader APO-based provincial planning context, North of Sudbury electricity demand is shaped by underlying community and commercial needs — as well as concentration of large industrial facilities, existing and potential mining developments, mineral processing opportunities, and broader electrification trends. As a result, the demand outlook in this region is more project-driven and more location-sensitive than in many other parts of the province.

Industrial load forms a large component of electricity demand North of Sudbury, particularly in the mining and mineral processing subsectors. Significant demand growth is forecast over the study period, driven by electrification, mining development, mineral processing, and other industrial developments. Provincial and federal policy direction supporting economic development, critical minerals, and decarbonization is expected to influence electricity use in the area over time. These drivers do not affect all parts of the study area in the same way. In some locations, demand growth is concentrated around existing industrial corridors and major stations, while in others the timing and scale of development remain uncertain and highly dependent on individual project decisions.

The locational aspect of demand growth is particularly important in this study because the transmission system north of Sudbury is weak, long, and highly radial, and made up of several electrically distinct but interconnected sub-areas. A given amount of new demand can have materially different transmission impacts depending on where it connects. Growth in the Timmins–Iroquois Falls area, for example, places pressure on different facilities and interfaces than growth in the Kirkland Lake area, the Kapuskasing area, or the area north of Timmins. For that reason, the demand outlook is not only considered at the regional level, but also examined through the interface structure used throughout this bulk plan.

There is substantial uncertainty regarding the timing, scale, and exact location of many potential future projects. Although external mining-resource information reviewed during the study indicates that there are numerous projects in various stages of exploration and development, not all of those projects have advanced to the point where credible electricity demand information is available. The Plan, therefore, uses a scenario-based approach that reflects both expected growth and the possibility of higher levels of development, while avoiding the assumption that every potential project will proceed within the study horizon.

Taken together, these regional characteristics indicate that the North of Sudbury demand outlook is not a matter of simply forecasting higher peak demand. Rather, it relates to how industrial and resource-driven growth may emerge across a constrained and geographically dispersed transmission system, and how that growth translates into different regional and local-area needs over time. The following section describes the demand scenarios developed for the study and the forecast views used to represent demand within the principal study interfaces.

2.3 Demand Scenarios Used in the Plan

To reflect the uncertainty associated with industrial development in the area north of Sudbury, the bulk plan uses two demand outlook scenarios intended to provide a practical planning range for assessing transmission needs under both expected and higher-growth conditions. The use of multiple scenarios is particularly important in this plan because large industrial and mining projects can materially affect both the magnitude and the location of future demand, and because the northern transmission system is highly sensitive to locational changes in load.

Reference Demand Scenario

The Reference Demand Scenario incorporates existing loads, facilities for which a System Impact Assessment (SIA) has been completed, and the project has reached an advanced stage of commitment[3], as well as other known developments. For projects with greater uncertainty, demand assumptions are adjusted using a structured discounting approach to reflect uncertainty and project timing. This approach recognizes that, while many projects may be credible from a planning perspective, not all potential developments will proceed on the timelines initially contemplated. Accordingly, the Reference Demand Scenario represents a reasonable estimate of expected growth for bulk planning purposes, while complementary scenarios are used to assess higher-growth outcomes.

High-Growth Demand Scenario

The High-Growth Demand Scenario builds on the Reference Demand Scenario and includes additional large industrial projects without discounting. It is intended to test the transmission system under a more aggressive development outlook and to assess the extent to which the recommended transmission strategy preserves flexibility if demand materializes more quickly or at greater scale than assumed in the Reference Demand Scenario. In this respect, the High-Growth Demand Scenario is not a separate prediction of what will occur, but rather a planning case used to test the robustness of the transmission plan under a stronger growth outcome.

These scenarios were developed using information available to the IESO through the planning process, including completed or anticipated SIAs, inquiries related to connection studies, regional planning forecasts, stakeholder engagement, and the 2025 APO. The scenarios therefore reflect both region-specific project information and the broader provincial growth narrative described earlier in this section. As new project information becomes available over time, the demand outlook and the timing of identified needs may change, and should be revisited through future planning updates.

It is important to note that this plan does not assume that every exploration-stage project or early-development concept in the region will proceed within the planning horizon. External resource and exploration information reviewed during the study indicates that there are numerous projects in different stages of development, but only those projects for which the IESO had documented electricity demand information or other credible planning inputs were incorporated into the scenarios. This approach is intended to avoid overstating future demand while still recognizing the strong development potential of the region.

The two scenarios are used throughout the plan to test transmission capability, load-meeting capability, and option performance under a range of plausible outcomes. In practice, they help distinguish between needs that arise under the study's expected growth outlook and needs that emerge only under a stronger development case. The following section presents the forecast demand views used in the plan at the regional and interface levels.

Figure 2 illustrates the regional peak coincident demand forecast for the Reference Demand Scenario and High-Growth Demand Scenario used throughout this study.

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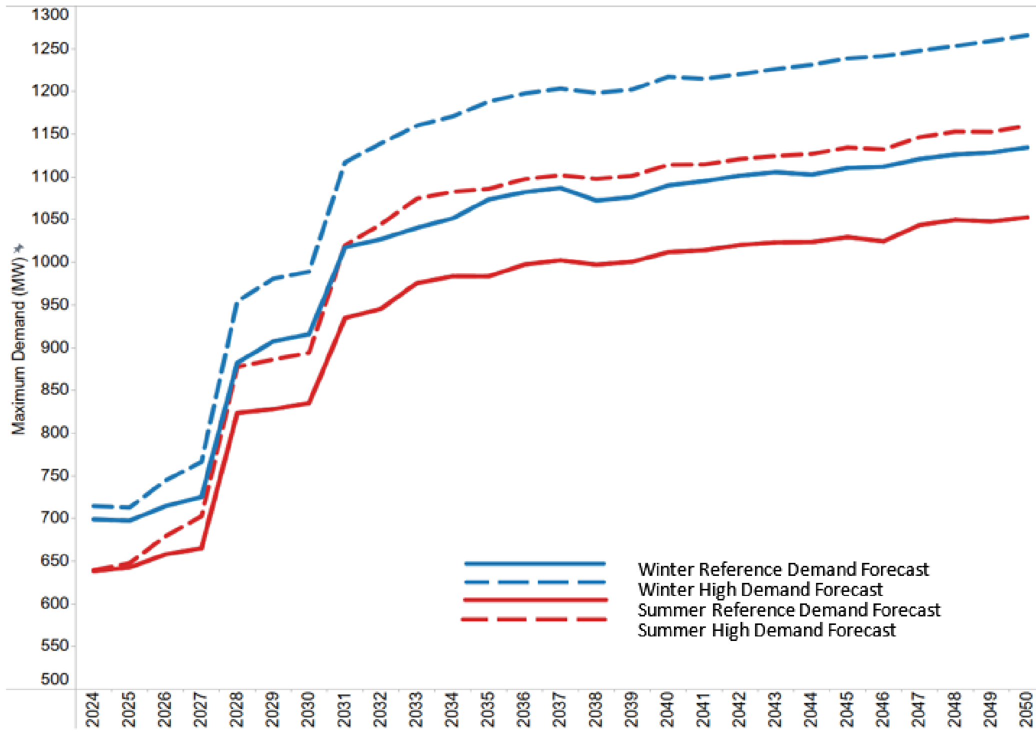
[3] As per IESO Market Manual Part 1.4 Connection Assessment and Approval

Figure 2 | Peak Coincident Demand Forecast North of Sudbury



2.4 Forecast Demand Views Used in the Plan

The forecast views used in this plan correspond to the principal interfaces identified in Section 1 and defined in the supporting appendices. These include the broad regional Porcupine Dymond North (PDN) view, together with the more localized Porcupine Ansonville In (PAI), Porcupine Hunta North (PHN), Hunta Kapuskasing In (HKI), and Kirkland Lake In (KLI) views. Together, these forecast views provide a practical way to assess where demand is expected to emerge and how that demand affects both bulk and local transmission capability.

The interface-based demand forecasts are based on coincident peak demand for the relevant areas and are used throughout the study to test transmission capability, load-meeting capability, and option performance. Because several of the interfaces overlap and some are nested within others, the demand values shown for the different forecast views are not mutually exclusive. Rather, they represent different analytical views of the same underlying demand outlook, presented in a way that aligns with the transmission-planning framework used in the study.

The detailed forecast figures used in the plan are provided in the supporting appendices.

2.5 Key Planning Implications of Demand Outlook

Unlike regions dominated by residential and commercial loads, North of Sudbury exhibits a relatively flat daily demand profile due to the predominance of industrial loads. Overnight demand remains high, and differences between daytime and nighttime loading are modest.

Seasonal demand patterns differ from southern Ontario. Extreme and normal weather peak demands are similar in magnitude, reflecting the limited temperature sensitivity of industrial operations. These temporal characteristics increase the importance of assessing system performance during overnight hours and under outage conditions, particularly where supply resources are energy-limited in nature.

While demand is described in this section in geographic and economic terms, subsequent sections apply the demand scenarios and characteristics described here consistently across all analyses.

3. Resource Outlook Scenarios

This section describes the existing supply serving the area north of Sudbury and the resource characteristics relevant to the bulk planning assessment. Its purpose is to establish the scale, composition, location, and operating characteristics of the supply that contributes to meeting electricity demand in the study area. Together with the demand outlook described in Section 2, these supply characteristics form the basis for the assessment of transfer capability, load-meeting capability, reliability needs, and resource enablement.

This section focuses on what supply is available to the study area and how it behaves under the planning assumptions used in the plan. In the area north of Sudbury, the distinction between installed or contracted capacity and dependable all-hour supply is particularly important because hydroelectric generation dominates the resource mix and much of that generation is energy limited. For this reason, the bulk plan considers not only the quantity of installed supply in the region, but also the degree to which it can be relied upon under the different conditions assessed in later sections.

3.1 APO Co-ordination and Provincial Resource Context

The APO provides a view of future electricity conditions and serves as a common foundation for understanding Ontario's electricity system capability and requirements. The outlook describes factors that influence these needs, and actions required to prepare for a reliable, affordable, and sustainable electricity future within the IESO's Resource Adequacy Framework, bulk transmission plans, and electricity demand-side management programming. The APO provides electricity sector stakeholders, governments at all levels, Indigenous communities, and electricity consumers, amongst others, with data and analyses to help make more informed decisions with the information available.

The APO is conducted yearly, and is an iterative process by design that allows the process to capture evolving economic and system conditions and to make adjustments as circumstances change.

The process also makes use of the best available information on the electricity demand forecast, supply outlook, and transmission outlook. Together, this information is used to inform industry-wide modelling tools to conduct assessments on resource adequacy, transmission and operability. These assessments evaluate the electricity system's ability to meet current and future system requirements.

The supply assumptions underpinning the APO reflect existing resources through the end of their contract term, as well as resources committed through an IESO procurement or a known government policy at the time of development. Nuclear and hydroelectric resources continue to constitute a significant share of the base supply mix. By the mid-2030s, a substantial portion of resources currently contracted are expected to reach the end of their contract term, including a significant amount of natural gas-fired generation.

As the APO establishes a common, province-wide planning foundation, this enables bulk system studies to assess regional transmission needs within a shared understanding of provincial resource conditions, while allowing region-specific characteristics to be examined in greater detail. Within that common context, the bulk plan recognizes the unique characteristics of the northern electricity system.

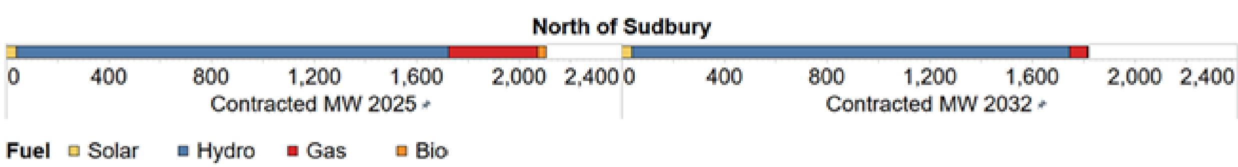
3.2 Regional Supply Context

Within the broader APO-based provincial resource context, North of Sudbury has a distinct supply profile characterized by a high concentration of hydroelectric generation, supplemented by smaller amounts of thermal and renewable resources, and a transmission system that materially affects how that supply contributes to reliability. In aggregate, the installed or contracted generation capacity in the area significantly exceeds peak demand. However, that does not mean that the area has sufficient dependable all-hour supply under all study conditions.

As of 2032, hydroelectric generation accounts for the vast majority of installed capacity in the region and is predominantly made up of run-of-river or peaking facilities with limited storage capability as shown in Figure 3. The lack of long-duration water storage, together with variations in water availability and operating patterns, results in large differences between installed hydroelectric capability and the amount of generation that can be depended upon in all hours of the day and under all system conditions. This is one of the defining characteristics of the supply outlook in the area north of Sudbury and is central to the transmission planning assessment.

Thermal and renewable resources play an important but limited role in the regional supply mix. Thermal resources offer dependable capability while under contract, particularly in electrically weaker parts of the system, while renewable resources such as solar contribute energy during daylight hours only. However, neither resource type fully offset variability and energy limitations associated with the hydro-dominated supply mix in the region, particularly during overnight periods or under outage conditions. As a result, the bulk plan must consider both the quantity and the operating characteristics of existing supply when assessing reliability needs.

Figure 3 | Contracted Supply Mix in 2025 vs 2032



Supply Assumptions Used in the Plan

For the purposes of this bulk plan, a distinction is made between installed or contracted generation capacity and dependable generation, defined as the generation that can be reasonably relied upon under the planning conditions being assessed.

Energy-limited and variable resources, including hydroelectric and renewable generation, are modelled based on their expected availability under applicable planning conditions in accordance with the IESO's transmission security outlook methodology. These resources are represented using historical performance-based availability levels intended to reflect high-confidence output that can be depended upon:

- Under all elements in service, energy-limited resources are modelled at levels available approximately 98 per cent of the time
- Under conditions where one or more transmission elements are out of service, these resources are modelled at levels available approximately 85 per cent of the time

Non-energy-limited resources are modelled at their seasonal installed capability.

Availability beyond contract expiration is not assumed for purposes of this assessment, recognizing the uncertainty associated with future procurement and system requirements. These modelling assumptions establish a consistent basis for evaluating the interaction between supply, demand, and transmission capability across the study area.

3.3 Implications of Existing Supply for the Plan

The characteristics of the supply mix serving North of Sudbury have important implications for system reliability and transmission planning.

First, the presence of significant installed capacity does not, by itself, ensure that demand can be reliably met under all conditions. The energy-limited and variable nature of hydroelectric generation means that dependable supply can be materially lower than installed capability, particularly during extended periods of reduced water availability or under outage conditions.

Second, the most limiting system conditions are not necessarily aligned with peak demand. Due to the relatively flat demand profile of the region and the variability of hydroelectric generation, periods of greatest system stress often occur when reduced generation availability coincides with elevated demand. In these conditions, the gap between demand and available generation, rather than peak demand alone, drives the need to bring power into this region from other parts of the province through the transmission system.

Third, the ability of the transmission system to deliver dependable supply into and within the region is a critical determinant of reliability. Even where adequate generation exists at a regional level, transmission limitations may prevent that supply from being effectively utilized to meet load under contingency conditions.

Taken together, these factors mean that the planning challenge in the area north of Sudbury is not simply one of ensuring sufficient installed capacity, but of ensuring that dependable supply can be delivered to load under both normal and outage conditions, in accordance with applicable planning criteria. The supply assumptions described in this section provide the foundation for the transmission capability and load-meeting capability assessments presented in the sections that follow.

4. Remedial Action Schemes

This section describes the existing reliance on remedial action schemes (RAS) in North of Sudbury and explains why that reliance is an important consideration in the bulk planning assessment. Its purpose is to outline the role that RAS currently plays in maintaining the operability of the northern transmission system and why this operating posture is relevant to the identification of reliability needs and the assessment of reinforcement options. Detailed examples of the major schemes in use North of Sudbury are provided in Appendix E.

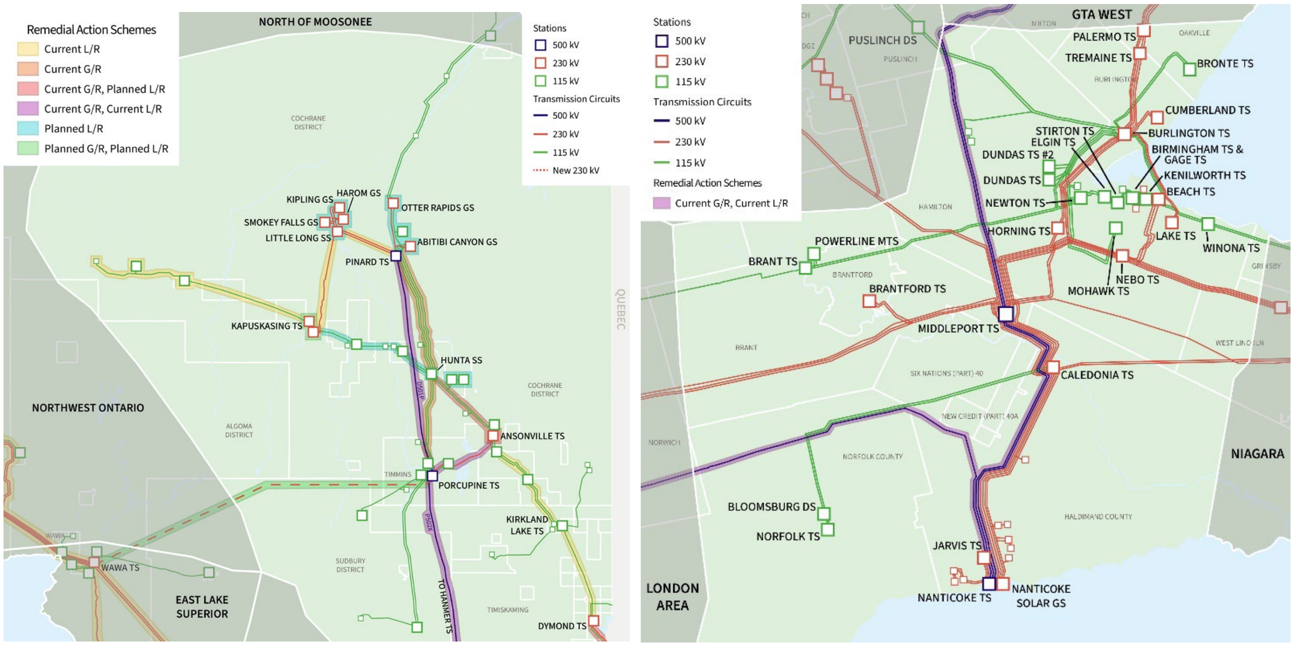
In the area North of Sudbury, RAS are used extensively to manage thermal loadings, voltage performance, and system stability following contingencies. The existing suite of schemes includes combinations of load rejection, generation rejection, switching of reactive devices, and cross-tripping actions totaling over 400 unique selections. These schemes have developed over time to allow the existing transmission system remain operable under a range of system conditions. While RAS remain an important operational tool, the extent of its use in the northern system also indicates underlying transmission limitations and is therefore a key consideration in the bulk planning context.

4.1 Extent of Reliance and Planning Significance

The extent of reliance on RAS in North of Sudbury reflects the limited inherent strength and redundancy of the existing transmission system under assessed planning conditions. Under many contingency conditions, acceptable system performance is achieved only through the coordinated operation of multiple RAS actions across a wide geographic area.

The issue is not that RAS should never be used — it is a legitimate operating tool and will continue to have a role in the system. The concern is the degree to which the existing northern system depends on these measures as a routine operating posture. In practical terms, the current operating framework relies on RAS to a greater extent than is typically assumed when planning long-term bulk transmission configurations. This is particularly important in a region where the transmission system is electrically weak, long, and highly radial, and increasingly exposed to growth in both load and resource development. Figure 4 provides a visual comparison of the geographic extent of remedial action scheme coverage North of Sudbury relative to a stronger southern Ontario corridor. A high-level summary of the principal schemes is provided in Appendix E.

Figure 4 | Comparison of RAS Coverage North of Sudbury and a Stronger Southern Ontario Corridor



4.2 Relationship to Planning Criteria and Operability

The planning significance of RAS is closely tied to the applicable reliability criteria. The North of Sudbury Bulk Plan is conducted in accordance with NERC, NPCC, and ORTAC requirements, which place limits on the extent to which load or generation rejection can be used as part of the planning solution. In particular, ORTAC allows only judicious use of such measures, and the amount of load rejection that can be relied upon under certain outage conditions is limited. In the area North of Sudbury, several existing operating schemes already make material use of those allowances, and in some local areas the system is effectively operating at or above the limits of current planning expectations.

Accordingly, the bulk plan is assessing whether the system can continue to be operated acceptably in real time and whether it remains appropriate to continue relying on that operating posture as demand grows and outages become more difficult to manage. If acceptable performance depends on increasingly frequent or wide-ranging use of remedial action schemes, then the underlying transmission system is no longer providing sufficient inherent robustness. As a result, one of the objectives of the bulk plan is to identify reinforcement strategies that reduce long-term dependence on intervention-based operation and improve the inherent operability of the northern system.

4.3 Implications for the Bulk Plan

The existing reliance on RAS provides important context for both the reliability needs assessment and the options assessment that follow. In the needs assessment, it helps explain why the existing system can appear operable under certain conditions while still exhibiting significant underlying weakness when assessed against applicable planning criteria and dependable supply assumptions. In the options assessment, it becomes a key differentiator between portfolios, as stronger portfolios do not just improve transmission capability, they also reduce dependence on intervention-based operating practices and improve resilience under outages.

The bulk plan is not simply responding to load growth or to one specific interface shortfall, but also to an operating posture that has become increasingly complex and increasingly dependent on remedial action schemes.

5. Transmission System Capability and Emerging Reliability Needs

This section evaluates the ability of the existing bulk transmission system north of Sudbury to reliably supply electricity demand under current conditions and over the study period. Building on the demand outlook described in Section 2, the existing supply characteristics described in Section 3, and the operating reliance on remedial action schemes described in Section 4, the analysis focuses on how much electricity can be delivered into and within the study area while meeting the applicable planning standards. The purpose of the section is to identify where the existing transmission system is unable to provide sufficient load-meeting capability to serve forecast demand reliably and where transmission limitations are already shaping system operability.

The assessment is performed using the set of transmission interfaces introduced earlier in the report. For each interface, the plan considers three key components:

- Transmission capability, representing the maximum amount of power that can be transferred across the interface while meeting planning criteria.
- Internal dependable supply, representing the generation within the area bounded by the interface that can be relied upon under the relevant study conditions.
- Load-meeting capability (LMC), representing the combined ability of transmission capability and internal dependable supply to serve demand within the interface.

A reliability need is identified when forecast demand exceeds the load-meeting capability of the relevant area. The analysis considers both all-elements-in-service conditions and outage conditions, consistent with the applicable planning criteria. In the area North of Sudbury, this is particularly important because many interfaces are limited by thermal capability, and by voltage performance, stability, operability, and the energy-limited characteristics of internal hydroelectric generation. Detailed interface capability tables, load-meeting capability figures, and representative operating examples are provided in the supporting Appendix F.

5.1 Porcupine Dymond North (PDN) Interface

The PDN interface represents the principal bulk northward supply path into North of Sudbury and is the dominant regional constraint in the plan. It is the broadest and most important interface because it reflects the ability of the transmission system to deliver power into the entire northern area from the rest of the province. Limitations on the PDN interface therefore affect not only the regional bulk supply capability, but also the downstream ability to serve the Timmins, Kapuskasing, Kirkland Lake, and north of Timmins sub-areas.

Under existing conditions, the PDN interface is constrained by a combination of thermal, voltage, and operability limitations. The most limiting contingencies involve the loss of the principal bulk path, particularly P502X (from Porcupine near Timmins, to Hanmer near Sudbury), after which the remaining parallel paths north of Sudbury are insufficient to maintain high transfer levels without criteria violations. The new P503W (from Porcupine to Wawa) circuit improves the regional supply path, but does not fundamentally eliminate the regional limitation. As a result, PDN capability remains materially lower than that required to serve forecast demand reliably under the assessed conditions.

When transmission capability across PDN is combined with dependable internal generation north of the interface, the resulting load-meeting capability remains insufficient under both the Reference and High-Growth demand scenarios. The identified need is not confined to a single peak hour. It appears in both summer and winter, in both daytime and overnight periods, and becomes more severe under outage conditions. This reflects the combination of a relatively flat industrial demand profile, reduced dependable hydroelectric output during overnight periods, and the limited redundancy of the regional bulk supply path.

Planned outages in the local area are increasingly difficult to manage without curtailment, and the area has historically depended on extensive remedial action schemes to remain operable under some conditions.

The PDN results show that the area North of Sudbury has a clear regional bulk need that is not expected be resolved through local operating measures alone. They also show that the northern system has evolved beyond the operating posture for which it was originally designed, particularly given the scale of growth now expected and the current dependence on remedial action schemes to maintain operability.

5.2 Porcupine Ansonville In (PAI)

The PAI interface represents the Timmins–Iroquois Falls local-area supply need. It captures one of the study area’s most significant present and future growth areas and reflects the capability of the local transmission and transformation network serving that area. Although the Timmins–Iroquois Falls area is electrically closer to major transmission facilities than some of the more remote northern areas, it remains constrained by the strength of the local transmission configuration and the ability of Porcupine TS and associated facilities to maintain reliable supply under contingency conditions.

Under all-elements-in-service conditions, the PAI interface is primarily limited by thermal capability associated with the 500/230 kV transformation at Porcupine TS. Under outage conditions, the local-area capability deteriorates more sharply, and the system may require the maximum 150 MW of load rejection permitted under ORTAC in the Timmins 115 kV area, together with other cross tripping schemes to remain operable. This means that, even though the identified needs in PAI are more modest than the broad regional PDN need, the local area is already relying heavily on allowable operating measures during critical contingencies.

The resulting reliability need in the PAI area is driven primarily by outage conditions rather than by all-elements-in-service conditions. Minor but persistent needs emerge as local thermal generation contracts expire and their contribution to the load meeting capability is no longer assumed, particularly under high-growth scenarios. Because the area is also expected to remain a focal point for mining and industrial development, strengthening local capability in Timmins–Iroquois Falls is important not only for reliability, but also for preserving flexibility for future development.

5.3 Porcupine Hunta North (PHN)

The PHN interface represents the area north of Timmins and captures a part of the system that is both electrically weak and strongly influenced by internal hydroelectric facilities and limited transmission corridors. Under existing conditions, PHN capability is constrained by thermal, voltage, and stability-related limitations, particularly for contingencies involving D501P and the remaining H9K path. The area is also highly sensitive to the interaction between internal generation and transmission capability. During periods of high hydroelectric output, flows can reverse and place the interface in a materially different operating state than during low-output conditions, which can still result in criteria exceedances and limit the ability to reliably supply demand within planning criteria.

The PHN needs assessment shows that this area cannot simply be treated as a surplus hydroelectric region. When transmission capability is combined with dependable internal generation, the resulting load-meeting capability remains insufficient under both the reference and high-growth scenarios, particularly during overnight periods and outage conditions. As with PDN, the identified need is not driven by a short-duration peak condition, but by sustained demand levels across many hours of the day. This is driven by the combination of relatively flat industrial demand, reduced dependable hydroelectric output during overnight periods, and the sensitivity of the area to contingencies affecting the limited transmission paths north of Timmins. Planned outages in the local area are already increasingly difficult to manage without curtailment, and the area has historically depended on extensive remedial action schemes to remain operable under some conditions.

The PHN results are important for two reasons. First, they identify a local-area reliability need north of Timmins. Second, they establish that the area's future role in supporting additional generation or resource development depends materially on transmission reinforcement, not just on the presence of hydroelectric facilities.

Accordingly, the PHN interface represents both an existing reliability need and a constraint on future resource development that cannot be addressed without transmission reinforcement.

5.4 Hunta Kapuskasing In (HKI)

The HKI interface represents the Kapuskasing area and captures a localized reliability need that persists even in the absence of major forecast demand growth. Unlike some other parts of the study area, the significance of HKI lies less in large step-change demand growth and more in the persistence of a legacy local-area weakness. Under existing conditions, the area is constrained by the weak configuration of the local system and by the dependence of the Kapuskasing area on a limited number of supply paths, particularly through H9K when the principal local path is unavailable.

The HKI interface exhibits needs under both winter and summer conditions. Under all-elements-in-service conditions, the local capability remains modest. Under outage conditions, the area becomes highly sensitive to the loss of local supply paths, generation, or reactive support. Planned outages in the local area are already increasingly difficult to manage without curtailment, and the area has historically depended on extensive remedial action schemes to remain operable under some conditions.

The HKI results demonstrate that the North of Sudbury Bulk Plan is not solely driven by future growth; it is also about addressing long-standing local reliability limitations where feasible. The Kapuskasing need, therefore, remains an important part of the overall plan, even though its demand-growth outlook is more modest than that of Timmins, Kirkland Lake, or the broader area North of Sudbury.

Accordingly, the HKI interface represents a persistent local-area reliability need driven by inherent system weakness, which remains sensitive to outage conditions and must be addressed as part of the broader transmission reinforcement strategy.

5.5 Kirkland Lake In (KLI)

The KLI interface represents the supply capability into the Kirkland Lake area, which is one of the most electrically remote parts of the study region. Recent upgrades to facilities such as A8K and A9K, together with improved local power-factor conditions, have enhanced the capability of the KLI interface relative to earlier conditions. Even with those improvements, however, the area remains constrained by a combination of thermal and voltage limitations that depend on season and contingency conditions.

The KLI results show that this area remains vulnerable to the loss of key local supply elements, particularly D3K and Ansonville T2. Under all-elements-in-service conditions, winter needs emerge as local thermal generation contracts expire and reduce available dependable supply, and summer needs also appear under stronger demand-growth assumptions. Under outage conditions, the local-area capability deteriorates further, and outage planning becomes more difficult and increasingly relies on extensive remedial action schemes to remain operable under some conditions. Unlike some of the broader regional interfaces, KLI is less influenced by the overnight decline of internal hydroelectric generation and more by the remoteness and configuration of the local transmission system.

The KLI findings are important because they show that broader upstream reinforcement does not, by itself, eliminate all local-area weaknesses in electrically remote parts of the northern system. The Kirkland Lake area therefore highlights that transmission capability and local system conditions must both be considered when assessing the ability to reliably serve demand.

Accordingly, the KLI interface represents a persistent local-area reliability need driven by system remoteness and limited supply paths, which remains sensitive to contingency conditions and must be addressed alongside broader system reinforcement.

5.6 Need Summary

Taken together, the interface assessments in this section show that the existing transmission system north of Sudbury does not have sufficient capability to reliably meet forecast demand under the applicable planning criteria across all assessed conditions without continued heavy reliance on operating measures and remedial action schemes. The identified needs include both a broad regional bulk supply need on the PDN interface and a set of localized needs within the PAI, PHN, HKI, and KLI areas. These needs arise under different conditions and drivers across the system. Some are most pronounced under outage conditions, some persist across both daytime and overnight periods, and some reflect long-standing local-area limitations more than forecast demand growth alone.

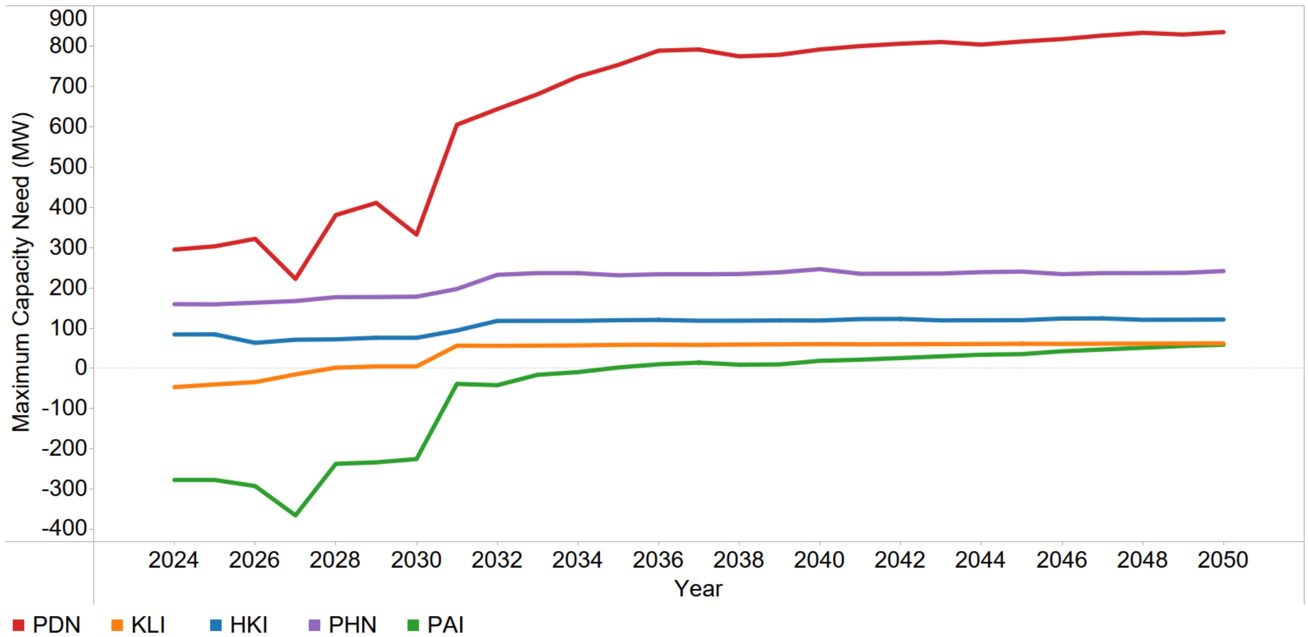
Table 3 summarizes the existing system transmission capability for the principal study interfaces under all-elements-in-service and one-element-out conditions. These values provide a high-level reference point for understanding the scale of the system's present transfer limitations across the study area.

Table 3 | Summary of Existing System Interface Transfer Capability

Interface	All Elements in Service – Summer (MW)	All Elements in Service – Winter (MW)	One Element Out – Summer (MW)	One Element Out – Winter (MW)
HKI	60	70	60	60
KLI	150	155	80	105
PAI	350	545	275	270
PDN	440	480	100	140
PHN	70	85	65	80

Figure 5 summarizes the most stressed condition for each interface and the corresponding reliability need identified in this section for the reference forecast, using forecast values for all years. The figure is intended to highlight where the northern system is most vulnerable under the study assumptions and to distinguish between the broad regional bulk need and the more localized sub-area needs. Positive values in the figure indicate that forecast demand exceeds load-meeting capability under the specified conditions, reflecting the magnitude of the identified reliability need. Negative values indicate that load-meeting capability is higher than the forecast demand, meaning the system is capable of supplying the demand under those conditions.

Figure 5 | Summary of Most Stressed Conditions and Emerging Reliability Needs by Interface



These summary views reinforce two central conclusions of the section. First, the North of Sudbury reliability problem cannot be addressed through a single reinforcement or local operating measure. Second, the system's present operating posture is already highly constrained and leaves limited room for continued growth under the assessed planning conditions without substantial transmission reinforcement, particularly under outage conditions and periods of reduced internal generation availability.

6. Evaluation of Options

This section evaluates the options available to address the transmission capability limitations and reliability needs identified in Section 5. The assessment includes both non-wires alternatives and wires-based transmission portfolios, and evaluates their ability to improve reliability, reduce long-term reliance on remedial action schemes, support forecast demand growth, preserve flexibility for future resource development, and align with the applicable planning standards. Because the identified needs arise across multiple electrically distinct but interconnected parts of the system, this section focuses on how different solutions perform using the interface structure introduced earlier in this plan, with the objective of identifying portfolios that provide the most effective overall system performance.

The section proceeds in three steps. First, it considers whether non-wires alternatives could reasonably address the identified needs as standalone solutions. Second, it describes the wires-based portfolios developed for the study and compares how those portfolios perform with respect to the identified needs. Third, it draws together the comparative findings and identifies which portfolios best align with the study objectives. Detailed option-performance tables, figures, and representative operating examples are provided in the supporting technical appendices.

6.1 Non-Wires Alternatives (NWA)

Non-wires alternatives were assessed to determine whether the identified reliability needs North of Sudbury could be addressed without major transmission reinforcement. The options considered included combinations of generation, storage, demand response, and other resource measures. These alternatives were reviewed in the context of the demand outlook, the characteristics of existing supply, and the transmission limitations identified in Section 5.

As standalone solutions, non-wires alternatives were screened out. North of Sudbury is fundamentally transmission-limited, and additional resources without associated transmission reinforcement would not adequately address the underlying transmission constraints identified in Section 5. In several parts of the study area, adding resources without strengthening the transmission system would either increase dependence on remedial action schemes, create additional congestion, or leave the system unable to deliver dependable supply to where it is needed under the applicable planning conditions.

This conclusion applies across the principal categories of non-wires alternatives considered in the study. Natural gas generation can provide dependable capacity, but as a standalone alternative it does not resolve the underlying transmission bottlenecks across the northern system and may require significant local transmission reinforcement to be effective in the right places. Wind and solar generation can contribute useful energy, but their production profiles do not align well with the sustained, all-hour nature of the identified needs and, in the case of solar, provide little support during overnight periods when the system is often most stressed. Energy storage can help shift energy and manage shorter-duration constraints, but by itself does not provide a complete solution to the persistent transmission limitations identified across the study area. Demand response can reduce or shift some demand, but the industrial and mining loads driving the study area's growth are not easily treated as broadly interruptible or dispatchable in a way that would reliably replace the need for transmission reinforcement.

The deliverability of new resources is also a limiting factor. As reflected in the IESO's preliminary connection guidance for the second Long-Term (LT2) Request for Proposals (RFP), many circuits in this region have little or no available capacity for new energy or capacity resources without additional transmission reinforcement. This means that even where non-wires resources may be attractive in principle, their ability to contribute meaningfully is often constrained by the same transmission system limitations that give rise to the identified reliability needs. A representative view of these deliverability constraints is shown in Figure 6.

Figure 6 | LT2 RFP Window 1— Energy Circuit Capacity and Limitations

For these reasons, the Plan concludes that non-wires alternatives are not sufficient as standalone solutions for the needs identified North of Sudbury. This does not mean they have no role, rather, complementary resource measures such as re-contracted thermal generation, renewable resources, storage, hydroelectric redispatch, and permissible load rejection may still play an important supporting role in combination with transmission reinforcement. However, the needs identified in Section 5 necessitate a wires-based transmission solution as the primary backbone of the plan.

6.2 Wires Options

Because the identified needs in North of Sudbury are fundamentally transmission-related and arise across multiple electrically distinct but interconnected parts of the system, the Plan developed and assessed a set of wires-based transmission portfolios. These portfolios combine new circuits, reconductored circuits, station upgrades, and transformation additions in different ways to address the range of transmission capability limitations, as described in Section 5.

Rather than assessing individual projects in isolation, the analysis considers portfolios of reinforcements that can be evaluated consistently across the study interfaces. This approach allows for a more complete understanding of how different reinforcement strategies address the identified needs. The following subsections describe how those portfolios were developed and how their performance was compared.

6.2.1 Developing Wires Options

At a high level, the portfolios combine reinforcements south of Porcupine TS with reinforcements north of Porcupine TS. South-of-Porcupine options were developed to improve the principal transfer path into the area North of Sudbury. North-of-Porcupine options were developed to address the transmission limitations affecting the Timmins–Iroquois Falls area, the area north of Timmins, the Kapuskasing area, and the Kirkland Lake area, as identified in Section 5.

South-of-Porcupine option families are defined as follows:

- Options "A" include a new 230 kV path intended to improve transfer capability in the region, including toward the Kirkland Lake area.
- Options "B" include a new 500 kV circuit between Hanmer TS and Porcupine TS, intended to transfer capability into the region.
- Options "C" combine the A and B reinforcements, providing the additional 230 kV path and the new 500 kV bulk reinforcement.

North-of-Porcupine option families are defined as follows:

- "1" options focus on reconductoring or refurbishing the identified 115 kV circuits north of Porcupine TS to improve reliability and extend asset life.
- "2" options rebuild the identified 115 kV circuits north of Porcupine TS as 230 kV facilities, increasing the capability of the northern local-area interfaces.
- "3" options combine the 1 option with a new 500 kV circuit between Pinard TS and Porcupine TS, intended to improve both reliability and longer-term resource enablement north of Pinard TS.
- "4" options combine the 2 option with a new 500 kV circuit between Pinard TS and Porcupine TS, representing the most extensive northern reinforcement considered in the study.

Portfolios were formed by combining one south-of-Porcupine option with one north-of-Porcupine option. For example, "A2" combines the A reinforcement south of Porcupine TS with the "2" reinforcement north of Porcupine TS, while B2, C2, and C4 represent progressively stronger combinations of reinforcement across the system.

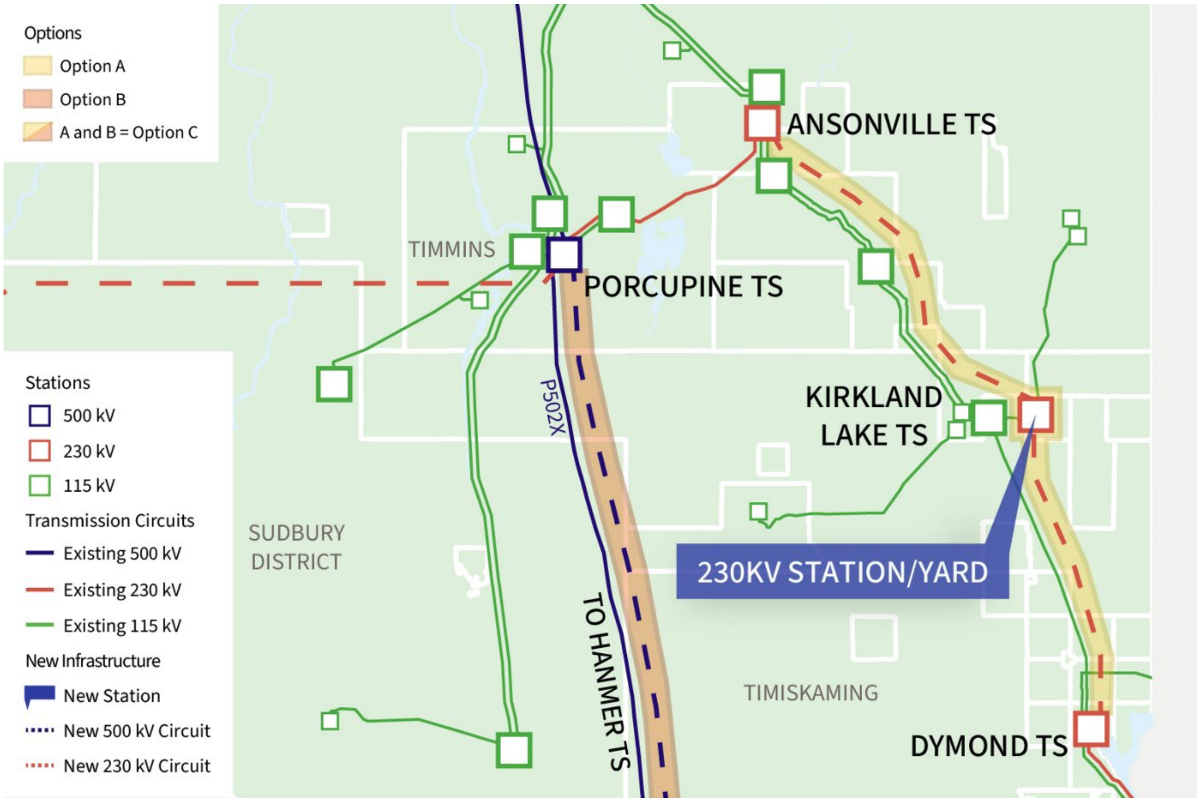
The portfolios were developed to make practical use of the major stations and corridors already present in the northern system, including Hanmer TS, Porcupine TS, Pinard TS, Dymond TS, Spruce Falls TS, Hunta SS, and Ansonville TS. They also reflect the fact that several 115 kV facilities north of Porcupine TS are approaching end of life and would require reconductoring, rebuilding, or replacement as part of any durable long-term solution. Planning level cost estimates were developed for each portfolio to support comparison of the relative scale of investment required.

For the purposes of the comparison, the portfolios were assessed on a standardized basis. For northward capability, the comparison excludes certain ORTAC allowances, including the 150 MW of load rejection permitted for some planning events, in order to reduce reliance on load-rejection-based remedial action schemes when comparing inherent transmission performance. For southward capability, the comparison excludes gains that depend on generation-rejection-based remedial action schemes, so that the portfolios can be compared on a common transmission basis, independent of intervention-based operating measures.

The assessed portfolios differ in both geographic scope and reinforcement type. Some focus on strengthening the system south of Porcupine TS, while others address limitations north of Porcupine TS, and combined portfolios include reinforcements in both parts of the system. Figure 7 and Figure 8 illustrate these reinforcement strategies geographically, while Table 4 summarizes the specific facilities, voltage levels, approximate lengths, and portfolio combinations assessed in this plan.

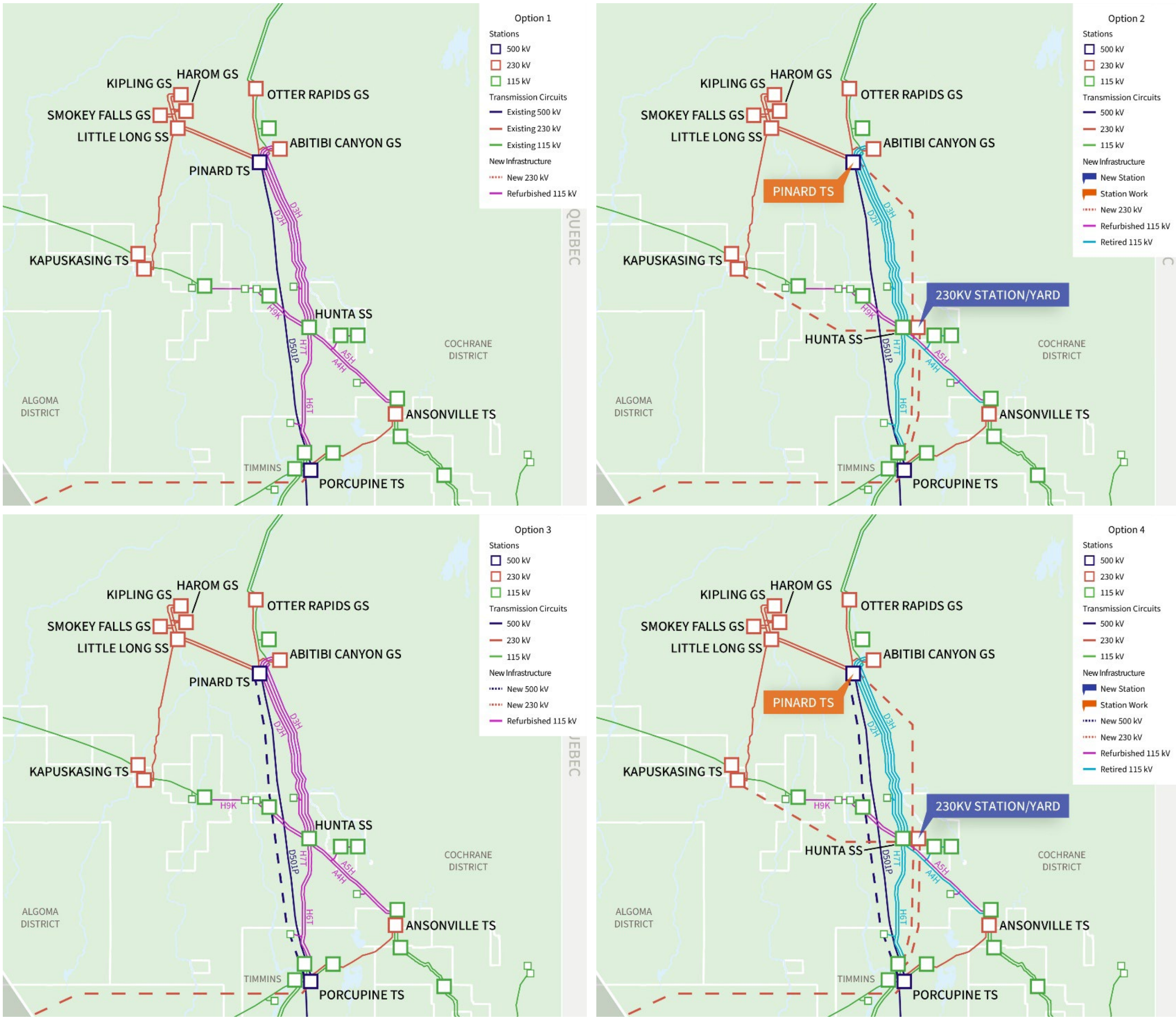
The following sections compare how the assessed portfolios perform against the identified needs under both northward and southward flow conditions.

Figure 7 | Transmission Reinforcements Assessed South of Porcupine TS



Note: these diagrams do not reflect any potential routing of new circuits only the start and end points.

Figure 8 | Transmission Reinforcements Assessed North of Porcupine TS



Note: these diagrams do not reflect any potential new routing of circuits only the start and end points.

Table 4 | Transmission Reinforcements Included in the Assessed Portfolios

Description	From / To or Station or Circuit	Voltage (kV)	Distance (km)	A1	A2	B1	B2	B3	C1	C2	C3	C4
Portfolio Short Description				S2N411	S2N2	S5N411	S5N2	S5N5	S52N411	S52N2	S52N5	S52N52
New Single-Circuit Transmission Line	Hanmer TS to Porcupine TS + Inline Reactor	500	209			✓	✓	✓	✓	✓	✓	✓
New Single-Circuit Transmission Line	Ansonville TS to Kirkland Lake Area	230	90	✓	✓				✓	✓	✓	✓
New Single-Circuit Transmission Line	Dymond TS to Kirkland Lake Area	230	75	✓	✓				✓	✓	✓	✓
Transmission Line Refurbishment	D3K - Dymond TS to Kirkland Lake TS	115	75			✓	✓	✓				
Transmission Line Refurbishment	H6T/H7T/A4H/A5H/D2H/D3H - (North of Timmins / Iroquois Falls)	115	630	✓		✓		✓	✓		✓	
Transmission Line Refurbishment	H9K – Hunta SS to Carmichael Falls Jct.	115	60	✓	✓	✓	✓	✓	✓	✓	✓	✓
New Single-Circuit Transmission Line	Hunta SS to Kapuskasing Area	230	90		✓		✓			✓		✓
New Single-Circuit Transmission Line	Hunta SS to Pinard TS	230	90		✓		✓			✓		✓
New Double-Circuit Transmission Line	Hunta SS to Porcupine TS	230	70		✓		✓			✓		✓
Transmission Line Retirement	H6T/H7T/A4H/D2H/D3H - (North of Timmins / Iroquois Falls)	115	570		✓		✓			✓		✓
Transmission Line Refurbishment	A5H – Hunta SS to Ansonville TS	115	60		✓		✓			✓		✓
New Single-Circuit Transmission Line	Pinard TS to Porcupine TS + Inline Reactor	500	155					✓			✓	✓
New 230 kV yard + Autotransformers	Kirkland Lake Area – 2 x 125 MVA	230/115	N/A	✓	✓				✓	✓	✓	✓
New 230 kV yard + Autotransformers	Hunta SS 1 x 125 MVA	230/115	N/A		✓		✓			✓		✓
New Autotransformers	Pinard TS – 2 x 125 MVA	230/115	N/A		✓		✓			✓		✓
Estimated Cost (Billions 2025 CAD)	Planning-level Estimate (-50+100%)			1.7	3.2	2.3	3.8	3.7	3.3	4.8	4.7	6.2

Table 4 notes:

- All 230 kV conductors are assumed to be 1192 54/19 kcmil ACSR, or equivalent-ampacity ACCC / ACSS conductor with SCont=1059 A , SLTE=1415 A, SSTE=1900 A, Wcont,=1316 A, WLTE=1599 A, WSTE=2041 A.
- All 115 kV conductors are assumed to be 411 15/7 kcmil ACSR, or equivalent-ampacity ACCC / ACSS conductor with SCont=524 A , SLTE=686 A, SSTE=725 A, Wcont,=645 A, WLTE=774 A, WSTE=810 A.
- Where A4H is retired, existing facilities are assumed to be re-terminated to A5H.
- Circuit and transformer terminations are assumed to require corresponding station work at existing stations.
- Distances are approximate and subject to change based on routing.

6.2.2 Comparing Wires Portfolios

The assessed wires portfolios are compared on a common analytical basis so that their relative effect on reliability, operability, and future flexibility can be evaluated consistently across the area North of Sudbury. Since the identified needs include a range of transmission capability limitations across the study area, no single comparison metric is sufficient on its own. The plan, therefore, compares the portfolios using a combination of transmission capability, load-meeting capability, residual need, operability, and resource-enablement considerations.

For northward performance, the comparison considers how each portfolio changes transmission capability across the principal study interfaces and how that capability translates into load-meeting capability when combined with dependable internal supply. This is particularly important in North of Sudbury because improved transmission capability does not always eliminate the identified need on its own. In several parts of the system, especially under outage conditions and during periods of reduced hydroelectric output, complementary measures may still be required in addition to transmission reinforcement.

For southward performance, the comparison considers how each portfolio changes export capability out of the northern area and the extent to which the portfolio preserves flexibility for future generation development North of Sudbury, including future hydroelectric and renewable resources. This comparison is important because one of the objectives of the study is not only to address emerging reliability needs, but also to preserve optionality for future resource enablement where practical.

The comparison also considers the degree to which each portfolio reduces long-term reliance on remedial action schemes and improves the inherent operability of the system. Portfolios that increase transfer capability but continue to rely heavily on intervention-based operating measures are less attractive than portfolios that improve both capability and inherent system robustness. Planning-level cost estimates are also considered as part of the comparison in order to understand the relative scale of investment associated with each reinforcement strategy.

The detailed technical results supporting that comparison are presented in the sections that follow and in the supporting appendices.

6.2.3 Screening Wires Portfolios

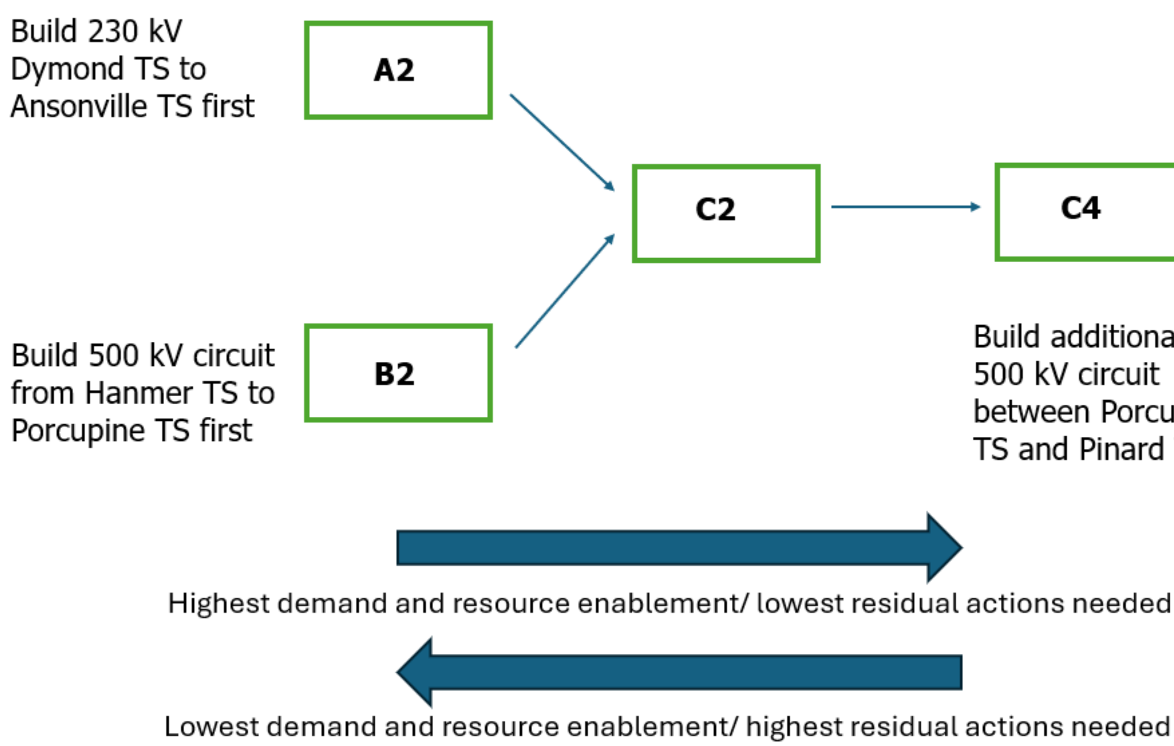
The assessed wires portfolios were screened to identify which reinforcement strategies provide an appropriate overall fit with the needs identified in Section 5 and the broader objectives of the bulk study. The screening did not rely on a single comparison metric. Instead, it considered whether each portfolio could improve transmission capability, reduce the identified reliability needs, support operability under the applicable planning conditions, reduce long-term dependence on remedial action schemes, and preserve flexibility for future demand growth and resource development. Planning-level cost estimates were also considered in order to understand the relative scale of investment associated with the stronger and weaker reinforcement strategies.

A number of portfolios were screened out because, although they provided some transmission benefit, they did not sufficiently address the identified needs across the study area or left residual shortfalls under key conditions. In general, the lower-capability portfolios either provided only limited improvement to the principal transfer path into the area North of Sudbury, or they improved selected local interfaces while leaving other important needs insufficiently addressed. In several cases, those lower-capability portfolios also continued to depend more heavily on complementary measures such as load rejection, hydro redispatch, or additional dependable resources in order to remain viable under outage conditions.

On this basis, four portfolios were retained as the most suitable candidates for further consideration: A2, B2, C2, and C4. These portfolios were identified as the combinations that best meet planning standards, materially reduce the identified needs across the principal study interfaces, support future hydroelectric and renewable resource development north of Pinard TS, and preserve flexibility for larger industrial and resource development projects in the region. They also provide the greatest overall reduction in reliance on intervention-based operating measures when compared with the other assessed portfolios.

The retained portfolios differ in both scope and strength; however, they form a sequential chain of progressively increasing reinforcement levels. Figure 9 illustrates the relationship between the retained portfolios and the progression of reinforcement capability across the system.

Figure 9 | Sequential Nature of Remaining Transmission Options



The following sections compare the retained portfolios in greater detail. The intent of that comparison is to identify how the retained portfolios differ in their treatment of residual need, local-area weakness, cost, operability, and future optionality.

6.2.4 Northward Capability and Load-Meeting Capability Comparison

The retained wires portfolios were compared with respect to their ability to improve northward transmission capability into North of Sudbury and to reduce the load-meeting capability shortfalls identified in Section 5. This comparison considered both the principal transfer limitations represented by the PDN interface and the other interface limitations represented by PAI, PHN, HKI, and KLI interfaces. The purpose of the comparison is to assess how the retained portfolios differ in transmission capability and residual need under the assessed demand scenarios and planning conditions.

At the more localized sub-areas, the retained portfolios differ in how they address the identified needs within each sub-area. All four retained portfolios materially improve capability in the Timmins–Iroquois Falls, north of Timmins, Kapuskasing, and Kirkland Lake areas compared with the existing system. However, the portfolios that rebuild the identified 115 kV circuits north of Porcupine TS as 230 kV facilities provide a greater local-area improvement than portfolios that rely only on reconductoring or more limited upgrades. This is particularly important for the PAI, PHN, and HKI interfaces, where the higher-capability 230 kV north-of-Porcupine reinforcement materially changes both transmission capability and the extent of residual need.

All portfolios were able to meet the reference forecasts for all in service conditions without the need for any residual actions, and the same is true for the higher growth forecast in most cases as shown in Table 5. For cases where portfolios do not fully meet the forecast under outage conditions, the gap can be addressed through limited residual measures such as well-defined remedial action schemes, hydroelectric redispatch, or limited additional supply resources where applicable.

Table 5 | Summary of Ability to Meet Regional 2050 Forecast Without Residual Needs 2050 for the Localized Sub-Areas

		Reference Forecast				Higher Growth Forecast			
	Interface	**A2**	**B2**	**C2**	**C4**	**A2**	**B2**	**C2**	**C4**
All I/S	PAI	✓	✓	✓	✓	✓	✓	✓	✓
	PHN	✓	✓	✓	✓	✓	✓	✓	✓
	HKI	✓	✓	✓	✓	N/A[4]	N/A	N/A	N/A
	KLI	✓	✓	✓	✓	✓	-	✓	✓
Outage	PAI	✓	✓	✓	✓	×	×	×	✓
	PHN	✓	✓	✓	✓	×	×	×	✓

[4] N/A as no higher growth forecast exists for this area, see supporting appendix D.

Interface	Reference Forecast A2	Reference Forecast B2	Reference Forecast C2	Reference Forecast C4	Higher Growth Forecast A2	Higher Growth Forecast B2	Higher Growth Forecast C2	Higher Growth Forecast C4
HKI	×	×	×	×	×	×	×	×
KLI	×	×	×	×	×	×	×	×

When assessing broader supply into North of Sudbury, the largest improvements in northward capability are associated with portfolios that include a new 500 kV circuit between Hanmer TS (Sudbury) and Porcupine TS. Portfolios B2, C2, and C4 all increase the capability of the PDN interface relative to the existing system and to A2, which relies on a 230 kV south-of-Porcupine reinforcement. Of these retained portfolios, C2 and C4 provide the largest overall increase in transmission capability. A2 improves regional performance relative to the existing system, but its capability remains lower than the 500 kV-based portfolios, particularly under outage conditions. This results in residual actions required for A2 in order to meet the reference forecast as shown in Table 6.

The magnitude of residual needs for portfolio A2 implementation considerations due to several factors:

- The complexity and scale of remedial action schemes required.
- Considerations associated with sustained reliance on specific resource types to address residual needs, including operational constraints and longer-term system flexibility.
- The logistical and market impact of redispatching hydroelectric generation during all elements in service, as well as running gas turbines during off peak hours.
- A potential risk of over-procuring resources should large loads not materialize and/or adjust their energy consumption patterns at times of system peak.

For portfolios B2, C2 and C4 these residual needs are reduced in magnitude and occur primarily under outage conditions, where they are more readily addressed through hydroelectric redispatch, simpler and more well-defined remedial action schemes, and targeted resource measures where required.

Table 6 | Summary of Residual MW Needs North of the PDN Interface by Portfolio

	Year	Reference Forecast A2	Reference Forecast B2	Reference Forecast C2 /C4	Higher Growth Forecast A2	Higher Growth Forecast B2	Higher Growth Forecast C2/C4
All I/S	2035	334	-	-	450	-	-
	2040	374	-	-	498	-	-
	2045	394	-	-	519	-	-
	2050	417	-	-	546	-	-

	Year	Reference Forecast			Higher Growth Forecast		
		A2	B2	C2 /C4	A2	B2	C2/C4
Outage	2035	569	459	259	686	576	376
	2040	607	497	297	731	621	421
	2045	627	517	317	752	642	442
	2050	650	540	340	779	669	469

It is important to interpret these results in the context of the demand assumptions used in the study. The identified residual needs are largely driven by forecast growth associated with prospective mining developments, the timing and scale of which remain subject to uncertainty. As a result, the comparison reflects not only the relative technical capability of the portfolios, but also the extent to which each portfolio responds to higher-end demand outcomes under the assessed scenarios.

For the other retained portfolios, complementary measures including permissible load rejection, hydroelectric redispatch, re-contracted or new dependable generation, and new renewable resources remain important in addressing the residual needs under certain conditions. These measures support the reinforced transmission system but do not replace the need for underlying transmission capability.

Taken together, the northward comparison indicates that the retained portfolios form a clear progression in transmission capability. A2 provides meaningful improvement at the lowest retained scope, B2 provides a greater improvement in overall system capability but does not provide sufficient benefit to the Kirkland Lake area, while C2 and C4 provides a much more robust improvement on the PDN interface.

6.2.5 Southward Capability and Resource-Enablement Comparison

The retained wires portfolios were compared with respect to their ability to improve southward transmission capability and to preserve flexibility for future resource development north of Sudbury. This comparison is important because one of the objectives of the bulk plan is to address emerging reliability needs, as well as preserve optionality for future hydroelectric and renewable generation development where practical. In North of Sudbury, that longer-term flexibility is strongly influenced by how much power can be transferred south out of the area under normal configurations.

At the more localized level, all retained portfolios improve export capability from the Kirkland Lake, Kapuskasing, Timmins–Iroquois Falls, and north of Timmins by strengthening the local transmission paths through which power would be transferred. These improvements increase the ability of the system to accommodate additional resources within these areas, subject to location-specific and operational considerations.

At a broad regional level, the largest increases in southward capability are associated with portfolios that include a new 500 kV circuit between Hanmer TS (Sudbury) and Porcupine TS. Portfolios B2, C2, and C4, therefore, provide greater export capability across the principal bulk southward interface than A2, which relies on 230 kV reinforcement south of Porcupine TS. In general, the 500 kV-based portfolios reduce the extent to which upstream constraints limit the movement of power from the northern system to the rest of the province. However, portfolios with 500 kV circuits typically present a higher degree of complexity in allowing for the direct connection of new resources as illustrated in LT2 RFP guidance documents.

Under portfolio A2, the system continues to rely to a greater extent on intervention-based operating measures during certain operating conditions, particularly when internal generation output is high relative to available southward transfer capability.

For portfolios B2, C2, and C4, reliance on intervention-based operating measures is reduced in relative terms as additional transmission capability increases the range of operating conditions that can be accommodated without intervention.

This comparison is particularly important in the context of future hydroelectric development north of Pinard TS. As shown in the supporting appendices, the weaker portfolios do not provide enough transmission strength to support the full development of the Moose River Basin hydro potential. The stronger retained portfolios preserve materially greater optionality, with C4 providing the broadest long-term enablement capability. At the same time, these southward capability results should be interpreted as bulk-level indicators of enablement potential rather than as project-specific connection limits. The actual amount of generation that can be enabled will continue to depend on resource location, technology type, control characteristics, local connection arrangements, and the extent to which a balanced mix of resources is developed across the northern system.

Detailed southward capability tables and supporting resource-enablement results are provided in the supporting appendices. Taken together with the northward comparison described in Section 6.2.4, the southward comparison shows that the strongest retained portfolios are those that address the identified reliability needs, and preserve the greatest flexibility for long-term growth and resource development North of Sudbury.

6.2.6 Preferred Strategy

The screening and comparison of the assessed portfolios indicate that the appropriate approach for North of Sudbury is a phased wires-based reinforcement plan built around the retained portfolios with higher transmission capability. The analysis shows that lower capability portfolios do not adequately address the identified reliability needs across the study area or provide sufficient flexibility for future resource development. By contrast, the retained portfolios A2, B2, C2, and C4 each provide improvements in transmission capability, with C2 and C4 providing the highest overall levels of transmission capability and system flexibility when both reliability and longer-term considerations are taken into account.

From a reliability perspective, the appropriate approach must address both the principal transmission capability limitations north of Sudbury, including the more localized needs in the Timmins–Iroquois Falls, north of Timmins, Kapuskasing, and Kirkland Lake areas. The comparison of retained portfolios shows that solutions relying only on more limited reinforcement continue to leave residual needs under all transmission elements in service and under outage conditions. Portfolios with higher transmission capability reduce these residual shortfalls, improve operability, and reduce long-term dependence on remedial action schemes. However, the analysis also shows that transmission reinforcement alone does not always eliminate all shortfalls under all conditions. Complementary measures, including permissible load rejection, hydroelectric redispatch, re-contracted or new dependable generation, and new renewable resources, remain relevant in combination with wires reinforcement under certain conditions.

It is also important to consider these results in the context of the demand assumptions used in the study. A significant portion of the forecast growth is driven by prospective mining developments, for which the timing and scale remain subject to uncertainty. While higher-capability portfolios reduce residual needs under these forecast conditions, advancing these reinforcements to construction in advance of confirmed demand carries a risk of overbuilding and associated impacts to electricity rates. The comparison therefore supports an approach that strengthens the system in the near term while preserving the ability to advance additional reinforcement as demand commitments become more certain.

From a long-term system perspective, the appropriate approach should also preserve flexibility for future industrial and supply resource development north of Sudbury. In that regard, portfolios that include higher capability 500 kV reinforcement south of Porcupine TS, and potentially north of Porcupine TS, provide greater flexibility than portfolios that rely only on 230 kV reinforcement. The analysis therefore supports a strategy that proceeds first with the near-term 230 kV reinforcements and local-area improvements, while preserving a clear path to subsequent 500 kV reinforcement as larger demand commitments or future hydroelectric development materialize.

7. Conclusion and Recommendations

This section presents the recommended plan for addressing the transmission capability limitations and reliability needs identified in Section 5 and evaluated in Section 6. The recommended plan is based on a phased wires-based reinforcement strategy that addresses near-term reliability needs while preserving flexibility for larger future demand growth and future generation development north of Sudbury. The purpose of this section is to identify the preferred path forward, explain how that path should be staged over time, and describe the role of complementary measures in supporting reliability and optionality over the study horizon.

The analysis in the previous section demonstrates that the lower capability portfolios do not adequately address the identified needs across the study area or provide sufficient flexibility for future growth and resource development. By contrast, the retained portfolios A2, B2, C2, and C4 provide clear improvements in transmission capability, operability, and long-term system flexibility. The recommended plan, therefore, proceeds from the conclusion that the area North of Sudbury requires substantial transmission reinforcement as the backbone of the solution, while recognizing that complementary measures may remain necessary under certain conditions or as the system evolves over time.

The plan identifies several transmission reinforcements that are ready for implementation and require near-term action to address pressing reliability needs. Given the urgency of several of these projects, timely advancement will be a key consideration in determining the appropriate implementation approach. While this report sets out the recommended investments, the specific implementation approach, which may include designation or competitive transmission procurements, will be determined following completion of the plan.

7.1 Phased Reinforcement Strategy

The recommended strategy is phased in its approach and includes implementation-ready actions that are recommended in the near term; and future-ready actions that enable system readiness for the long term, such as conducting development work for transmission circuits that may be needed in the future.

The implementation-ready recommendations are actions that should proceed in the near term, including construction of 230 kV circuits across the region.

The future-ready projects include near-term advancement of development work for the 500 kV reinforcements between Hanmer TS (Sudbury) and Porcupine TS and between Porcupine TS and Pinard TS. Although construction of those facilities remains conditional on future demand growth, resource development outcomes, and future planning assessments, advancing development work now is appropriate in order to preserve flexibility, improve implementation readiness, manage the risk of overbuilding and associated cost exposure, and reduce the time required to respond when future system conditions warrant additional reinforcement.

Accordingly, the recommended strategy is a staged transmission development path that combines:

- Implementation-ready actions to address existing and emerging reliability needs, and
- Future-ready actions that advance development of higher-capability reinforcement tied to larger future load commitments and/or supply resource development.
- Implementation-ready actions are recommended in the near term, and required across multiple planning scenarios. The timing and sequencing of future-ready and future-consideration actions will depend on how demand growth, development commitments, and broader system conditions evolve over time. Development actions preserve flexibility while enabling implementation-ready reinforcements to proceed as illustrated in Figure 10, which categorizes recommended actions as implementation-ready, future-ready, and longer-term future-considerations based on their dependency on the progression and firming of underlying system needs.

Figure 10 | Sequenced Approach to Transmission Development

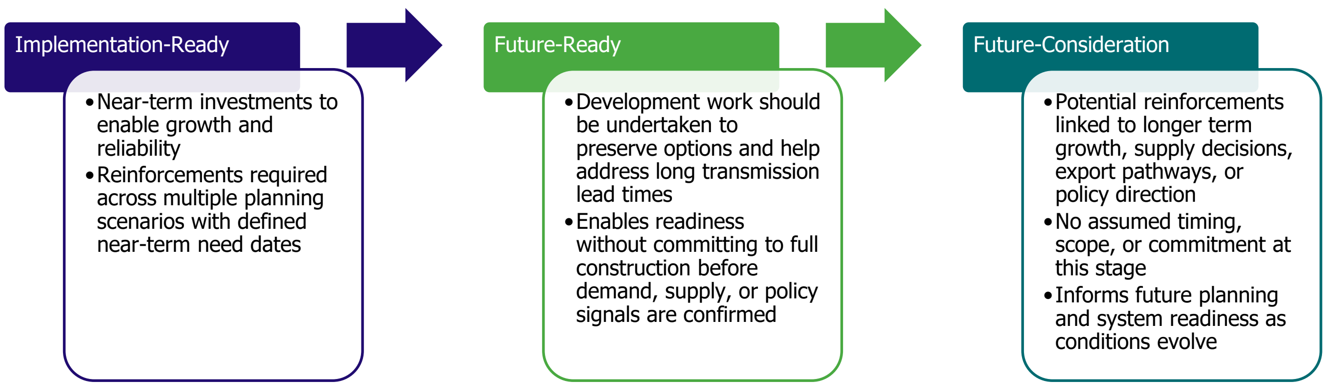


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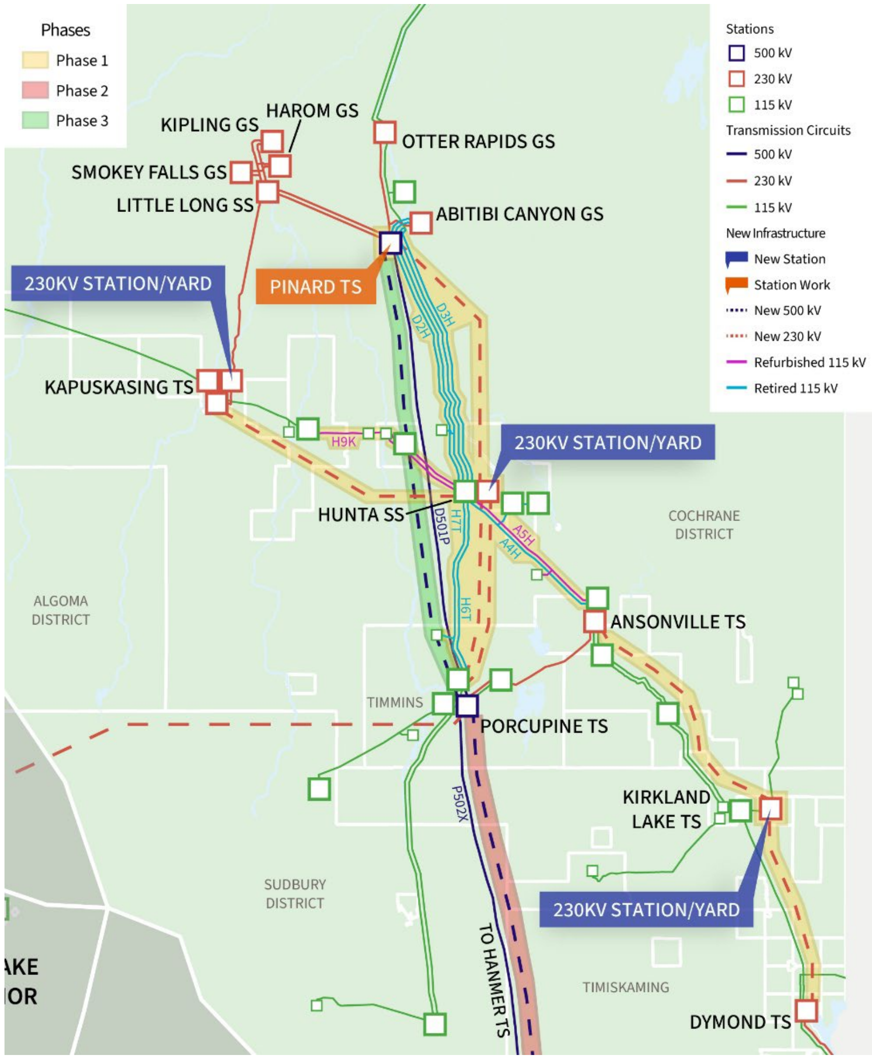
Figure 11 provides a geographic overview of the recommended strategy while the subsequent sections provide additional details.

Figure 11 | Geographic Diagram of the Recommended Strategy



Note: these diagrams do not reflect any potential routing of new circuits only the start and end points.

7.2 Actionable Recommendations

Recognizing that long-term system needs North of Sudbury are influenced by evolving demand growth, resource development, and broader system conditions, the actionable recommendations in this plan are grouped based on their level of readiness and the degree of certainty associated with their need. This approach ensures that reinforcements required to address current and near-term reliability needs are advanced in a timely manner, while longer-term actions are identified in a way that preserves flexibility and aligns their advancement with the realization of future system conditions.

The IESO recommends proceeding with the following actions to address identified transmission system needs.

Implementation-Ready

Implementation-ready actions represent reinforcements required to address identified transmission capability limitations within the study horizon. These actions include near-term 230 kV and local-area reinforcements that are required to materially improve reliability in North of Sudbury.

The existing transmission system currently depends on extensive operating measures and remedial action schemes to maintain reliability. The recommended reinforcements reduce reliance on these measures while improving transmission capability and operability across the region to meet planning criteria. The identified limitations are not only future problems associated with long-term growth, they also currently exist in the form of limited transmission capability, localized system limitations, outage sensitivity, and persistent shortfalls under certain conditions.

These actions also improve reliability in the Iroquois Falls to Temiskaming Shores corridor and the Timmins area by strengthening supply paths into the region, particularly where demand growth in the Kirkland Lake area has increased reliance on remedial action schemes and local generation sites.

These implementation-ready actions form the backbone of the recommended plan and address reliability and operability needs that exist across the region under both the Reference Demand Scenario and the High-Growth Demand Scenario, while also reducing long-term dependence on RAS and improving outage operability.

Implementation-ready actions include the principal 230 kV reinforcements, station expansions, reconductoring work, autotransformer additions, and selected circuit retirements identified through the option assessment. These actions include new or expanded 230 kV facilities serving the Kirkland Lake, Timmins, Temiskaming Shores, Hunta, and Kapuskasing areas; as well as associated station modifications and updates to RAS where required to align the operating posture with the reinforced system.

From a reliability perspective, these implementation-ready actions form the critical foundation of the plan. They improve transmission capability into North of Sudbury and address the key local-area limitations identified in the PAI, PHN, HKI, and KLI interfaces, while reducing the degree to which the northern system depends on intervention-based operation to remain operable.

These actions also enable additional system capability. In addition to addressing existing reliability needs, these actions strengthen the transmission system needed to connect and supply new industrial and mining loads North of Sudbury. However, as described in Section 6.2.4, larger industrial developments may require additional operating measures or further transmission reinforcement to meet the reference forecast under applicable planning criteria.

These actions also support up to approximately 430 MW of hydroelectric development under the near-term configuration, subject to project-specific assessments and connection requirements. However, under certain operating conditions, including periods of high generation output, constraints may remain and additional operating measures may be required. These conditions are further complicated by the uncertainty in timing of large load connections, consumption patterns, and evolving supply resource conditions.

RAS remain an important operational tool within the limits of applicable planning standards; however, their use must be considered alongside system capability and evolving operating conditions. In this sense, these implementation-ready actions represent both the immediate reliability foundation of the recommended plan and an initial step toward future system development in the region.

However, these actions are not intended to address all long-term growth scenarios. Under higher demand outcomes, expanded resource development, or growth beyond the levels supported under near-term conditions, additional transmission reinforcement will be required. These actions are complemented by future-ready development activities described below, which preserve the ability to advance additional reinforcement as needed. The target in-service date is approximately 2033, consistent with typical development and construction timelines in Ontario. Planning level estimates of the above work indicate a cost of $3.2 billion in 2025 CAD with a range of -50/+100%.

Future-Ready

Future-ready actions include advancement of development activities for higher-capability transmission reinforcement to preserve flexibility and reduce lead-time risk. These activities may include preliminary engineering and design, route or siting considerations, environmental approvals, land rights acquisition, and other work required to preserve implementation readiness. These actions support readiness for larger demand growth and evolving system conditions, while deferring construction until those conditions warrant

Future-ready actions include near-term advancement of development activities for the 500 kV reinforcements between Hanmer TS (Sudbury) and Porcupine TS and between Porcupine TS and Pinard TS. Advancing this work does not imply immediate construction; rather, it reflects the role of these reinforcements as key future pathways for increasing transmission capability and supporting larger-scale system development.

Advancing development for both segments preserves implementation readiness across the broader northern system. While the Porcupine–Pinard reinforcement is more closely tied to longer-term system evolution, progressing development activities in parallel with the Hanmer–Porcupine segment helps reduce overall schedule risk and avoids piecemeal development should additional reinforcement be required.

Future-ready actions include development of a new 500 kV circuit between Hanmer TS (Sudbury) and Porcupine TS, approximately 209 km in length.

In the option assessment, this reinforcement was a key differentiator between the lower-capability and higher-capability portfolios. It significantly increases northward transmission capability, reduces residual need under outage conditions, and significantly improves southward capability and overall system flexibility and minimizes the use of RAS for generation rejection.

This reinforcement represents the next step in strengthening transmission capability beyond the implementation-ready actions and supports a broader range of demand growth and system conditions.

Future-ready actions also include development of a new 500 kV circuit between Pinard TS and Porcupine TS, approximately 160 km in length.

This reinforcement enhances the ability of the transmission system to connect and accommodate supply resources in the area north of Pinard TS, including potential hydroelectric development in the Moose River Basin. It improves southward transfer capability from this region and supports the integration of additional generation under conditions where local transmission limitations may otherwise constrain development.

While more closely associated with specific resource development opportunities, maintaining this reinforcement within the future-ready category preserves a viable pathway for advancing these resources if development progresses beyond the levels supported by the implementation-ready configuration. Advancing development activities in parallel with other future-ready reinforcements helps ensure that this pathway can be progressed efficiently if required.

Planning-level cost estimates for full implementation of these reinforcements are approximately $1.6 billion (2025 CAD) for the Hanmer TS–Porcupine TS circuit and $1.4 billion (2025 CAD) for the Porcupine TS–Pinard TS circuit, each with a range used in planning estimates of -50 per cent to +100 per cent. These estimates reflect the cost of constructing the facilities and are provided to illustrate the scale of potential future investment. Development activities being advanced at this stage represent a subset of this scope, and detailed cost estimates for development work will be established as part of subsequent project progression.

7.3 Role of Complementary Measures

The recommended plan is structured around transmission reinforcement as the primary backbone to address needs. At the same time, the plan shows that complementary measures remain relevant in combination with wires reinforcement under certain conditions. Depending on system conditions, the stage of system development, and the realization of future demand growth, those measures may include permissible load rejection under ORTAC, hydroelectric redispatch, re-contracted thermal generation, new dispatchable generation, and new renewable resources such as solar, particularly where supported by local transmission capability and appropriate voltage support.

These measures do not replace the need for transmission reinforcement. Rather, they support the reinforced system by helping to close residual shortfalls that may persist under outage conditions, higher demand scenarios, or particular time-of-day conditions such as overnight periods of reduced hydroelectric output. In this respect, the recommended plan should be understood as a wires-based strategy supported by complementary resources, rather than a transmission-only or resource-only solution.

The recommended plan includes consideration of additional supply resources in specific areas of the region. With transmission reinforcements recommended in this plan, there are residual needs in the Kirkland Lake area that are predominately voltage related. These needs could be addressed with supply resources that match the profile of demand in the area. As part of the study analysis, demand and generation conditions suggested it may be a prime location for transmission-connected solar facilities capable of providing voltage support at all hours. There is value in expanding deployment of supply resources capable of providing voltage control in the identified areas (Timmins 115 kV, Kirkland 115 kV and new circuits with the capability). This includes identifying opportunities to guide the development, within the IESO’s existing Resource Adequacy Framework, of supply resources in these areas, with resource quantities remaining subject to deliverability assessments in the region.

Additional operational flexibility and reliability could be gained from continued use of existing thermal facilities with a focus on quick start simple cycle units to be used during outages. These resources could be used during unplanned outages, particularly during periods of low hydroelectric production and/or low solar output. This approach would not rely on operating the thermal facilities for a significant portion of the time and would eliminate operational challenges associated with long start up times.

7.4 Implementation and Decision Points

The phased recommended plan requires a clear implementation and monitoring framework. Implementation-ready actions should proceed as the immediate foundation of the plan because the identified reliability needs already exist and continue to grow under both the Reference Demand Scenario and the High-Growth Demand Scenario.

Future-ready actions should be tied to defined decision points, including the advancement of large industrial projects, major new connection requests, changes to the demand outlook, future progress in hydroelectric development north of Pinard TS, and future planning assessments.

Advancement of development activities for future 500 kV reinforcements is recommended in the near term as part of the implementation of this plan. By contrast, the decision to proceed to physical construction of those facilities remains dependent on the demand- and generation-related trigger conditions described in this section.

This distinction preserves implementation readiness while avoiding commitment to full build-out before the system needs are sufficiently certain.

The recommended plan is intended to be implemented through clearly defined decision points tied to evolving system conditions. If major new load commitments advance more quickly than expected, the need for additional transmission reinforcement may arise earlier. Similarly, accelerated development of supply resources north of Pinard TS may advance the timing of further reinforcement. Conversely, if demand growth or resource development materializes more slowly, the staged approach allows the timing of investment to remain aligned with demonstrated system need. These developments will be monitored through the APO Schedule of Planning Activities to support timely reassessment of needs and appropriate sequencing of investments.

7.5 Recommended Plan Technical Details

The recommended plan for North of Sudbury consists of a staged transmission reinforcement strategy consisting of implementation-ready and future-ready actions. The implementation-ready actions address existing reliability needs that are already present in the northern system today. Future-ready actions preserve the transmission paths needed to respond to larger future demand growth and future generation development when those conditions materialize.

7.5.1 Implementation-Ready Technical Scope

These implementation-ready actions are required in the near term because the existing transmission system is insufficient to reliably serve North of Sudbury under applicable planning conditions and are outlined in Table 7.

The reliability needs appear with present day conditions and require timely reinforcement. While it is recognized that achieving an in-service date immediately may present challenges, the IESO expects the transmitter to initiate work at the earliest opportunity and to establish a project schedule that reflects the critical nature of the need date.

Table 7 | Implementation-Ready Actions in Detail

Category	Facility/Circuit	Location/Extent	Scope/Description
New Station Infrastructure	Kirkland Lake 230 kV yard	Kirkland Lake Area	New 230 kV yard with two 230/115 kV autotransformers, each with ≥ 125 MVA continuous rating. Yard may be located outside existing Kirkland Lake TS and must be connected to the existing yard with conductors with ampacity ≥ autotransformer rating. The autotransformers must have the ability to connect tertiary reactors if required in the future.
New Transmission Line	Kirkland Lake 230 kV-Dymond TS	~ 75 km	New 230 kV single-circuit transmission with conductor rating ≥ 1192 kilo-circular mils (kcmil) Aluminum Conductor Steel Reinforced (ACSR)
New Transmission Line	Kirkland Lake 230 kV-Ansonville TS	~ 90 km	New 230 kV single-circuit transmission with conductor rating ≥ 1192 kcmil ACSR
New Station Infrastructure	Hunta SS-230 kV Yard	Hunta SS	New 230 kV yard with one 230/115 kV autotransformer, minimum 125 MVA continuous rating. The autotransformer must have the ability to connect a tertiary reactor if required in the future.
New Station Infrastructure	Kapuskasing 230 kV Yard	Kapuskasing Area	New 230 kV yard
New Transmission Line	Hunta SS – Pinard TS	~ 90 km	New 230 kV single-circuit transmission with conductor rating ≥ 1192 kcmil ACSR Routing should consider cost effective options, including

Category	Facility/Circuit	Location/Extent	Scope/Description
			reuse of D2H or D3H ROWs, as these circuits will no longer be required
New Transmission Line	Hunta SS – Kapuskasing Area	~ 90 km	New 230 kV single-circuit transmission with conductor rating ≥ 1192 kcmil ACSR
New Transmission Line	Hunta SS – Porcupine TS	~ 70 km	New 230 kV double-circuit transmission with conductor rating ≥ 1192 kcmil ACSR
Station Upgrade	Pinard TS	Pinard TS	Install two 230/115 kV autotransformers, each with ≥ 125 MVA continuous rating, to connect the 230 kV and 115 kV yards
Supply side resources	New solar resources in the region capable of voltage control	Timmins 115, Kirkland Lake 115, new circuits	To provide voltage control in the region
Reconductor (EOL)	H9K	Hunta SS – Carmichael Falls JCT (~60 km)	Consider at EOL, reconductor all sections at end of life with conductors ≥ 411 kcmil ACSR
Reconductor (EOL)	A4H (or A5H)	Hunta SS – Ansonville TS (~60 km)	Consider at EOL, reconductor all sections at end of life with conductors ≥ 411 kcmil ACSR
Circuit Retirement	D2H & D3H	Pinard TS – Hunta SS (~ 360 km)	Consider at EOL, retirement of all sections except ~4 km of D2H between Calder SS and Hunta SS; replacement deferred as circuits are no longer required
Circuit Retirement	A5H (or A4H)	~60 km	Consider at EOL, retire one circuit; reterminate all facilities onto the remaining circuit
Circuit Retirement Option	H6T & H7T – Option 1	If Kidd Creek Mine remains in service	Consider at EOL, retire ~50 km of H7T (Hunta SS–Kidd Creek Mine), reterminate La Forest Road to H7T, and retire all of H6T (~75 km)

Category	Facility/Circuit	Location/Extent	Scope/Description
Circuit Retirement Option	H6T & H7T – Option 2	If Kidd Creek Mine closes	Consider at EOL, retire H6T (~65 km) between Laforest Rd Jct and Hunta SS and retire all of H7T (~75 km)
Circuit Retirement Option	H6T & H7T – Option 3	If Kidd Creek Mine closes (Alternative)	Consider at EOL, retire H6T and H7T (~75 km) and supply La Forest Road DS from Timmins TS
Reconductor (Residual)	Remaining non-retired	As applicable	Reconductor any remaining sections approaching EOL using appropriately sized conductors for radial operation

Planning-level station layouts associated with the recommended near-term works are provided in the supporting appendices. Alternative physical arrangements may also be acceptable, subject to detailed engineering review and IESO approval.

The construction of the implementation-ready facilities will also require changes to the existing remedial action scheme framework in the area. Several contingency-based schemes currently monitor the status of existing circuits, transformers, generators, and breakers and would require modification if the new facilities are to be incorporated while those schemes remain in service. The principal schemes affected include:

- Kirkland Lake RAS at Kirkland Lake TS;
- Kapuskasing RAS at Kapuskasing TS;
- Porcupine RAS at Porcupine TS;
- the broader Northeast LGR RAS located across multiple stations; and
- the Moose River Generation Rejection RAS at Pinard TS.

At the time of connection assessment and implementation of these facilities, continued need for the affected remedial action schemes will be re-evaluated per the IESO's connection assessment process.

In parallel with the transmission investments identified above, supply side resources required to support reliability in the North of Sudbury area are expected to be enabled through the IESO's existing Resource Adequacy Framework and associated long-term (LT) procurement mechanisms. This includes guiding the development of resources such as solar generation. These procurement activities will be co-ordinated through the IESO-led processes (e.g., LT procurement programs and connection assessment) and will be subject to deliverability assessment and system needs at the time of procurement.

7.5.2 Future-Ready Technical Scope

In parallel with implementation-ready actions, the recommended plan also includes initiating development work now for the two future 500 kV reinforcements:

- The 500 kV line between Hanmer TS and Porcupine TS, and
- the 500 kV line between Porcupine TS and Pinard TS.

These reinforcements would require accompanying station work with planning-level station layouts provided in the supporting appendices.

Advancing this development work does not imply that both lines should be constructed immediately. These reinforcements represent key investments for increasing transmission system capability, supporting large industrial load growth, and enabling supply resource development north of Pinard TS. Advancing development work now will preserve flexibility, improve implementation readiness, and reduce the time required to proceed should system conditions warrant construction.

8. Community and Stakeholder Engagement

The goal of the IESO's engagement activities is to help build awareness and understanding of the electricity planning process and offer opportunities for input, which is a critical part of ensuring recommended actions meet the needs of not just the provincial electricity system, but of communities across the province. Providing stakeholders and communities with opportunities for input into the planning process enables the IESO to better understand their views and perspectives, helping lay the foundation for sound decision-making and successful implementation of plan recommendations.

As part of the planning process, the IESO engages with key audiences such as Indigenous communities, municipalities, market participants, customers, sector stakeholders, and other interested parties.

The IESO uses a formalized process for bulk system planning to enhance transparency and provide opportunities for purposeful engagement and input. As part of that work, defining how communities and stakeholders can participate in the electricity planning process and be kept informed has been identified as a critical component of the process design. This section outlines the engagement principles and the activities that were employed along the development path of the North of Sudbury Bulk Plan.

8.1 Engagement Principles

The IESO's External Relations Engagement Framework is built on a series of key principles that respond to the needs of the electricity sector, communities and the broader economy. These principles ensure that diverse and unique perspectives are valued in the IESO's processes and decision-making. The IESO is committed to engaging with purpose with external audiences to foster trust and build understanding about the critical work to ensuring Ontario's electricity system remains reliable, affordable and sustainable.

The IESO applies these principles to every engagement, ensuring that we honour our commitment to partners:

- **Purposeful** – Initiate meaningful conversations that move the sector forward
- **Inclusive** – Invite many voices and diverse perspectives to the table
- **Timely** – Seek input and insight when it can have the most impact
- **Accessible** – Ensure we meet people where they are on their energy journey
- **Traceable** – Allow everyone to follow the path that is being taken
- **Transparent** – Show how engagement helped shape the final outcome

8.2 Engagement Approach

To build awareness and understanding with stakeholders and communities about these planning activities, the IESO implemented a broad range of tactics, including:

- a dedicated engagement webpage on the IESO's website to make information widely available related to the North of Sudbury bulk plan (i.e., engagement opportunities, meeting materials, webinar recordings, feedback submissions and responses);
- quarterly public webinars with notices published in the weekly IESO Bulletin;
- targeted meetings with municipalities and Indigenous communities throughout the development of the plan to share preliminary options, answer questions, and understand local perspectives; and
- feedback opportunities were regularly made available and, where feasible, suggestions were incorporated into the plan — to help ensure transparency, the IESO provided responses to submitted feedback and posted it to the engagement webpage

8.3 Engagement Activities: Stakeholders, Municipalities, and Indigenous Communities

The following provides an overview of key engagements with stakeholders, municipalities and Indigenous Communities over the course of the development of the plan:

Table 8 | Summary of Engagements

Date	Engagement
	Q2 2025
May 29, 2025	**Public Engagement Webinar #1** — to introduce the North of Sudbury Bulk Plan and provide an overview of its focus and provide context, including system background, drivers for growth, and what needs and opportunities the plan will address. A targeted meeting was held in June with Timmins to discuss electricity planning in the region.
	Q3 2025
Sept. 30, 2025	**Public Engagement Webinar #2** — to provide information about the demand forecasts and existing generation forecasts; findings from the needs study and the objectives of the options analysis.
	Q4 2025
Oct. 8, 2025	**Indigenous Community Webinar** — to provide information about the demand forecasts and existing generation forecasts; findings from the needs study and the objectives of the options analysis.

Q2 2026	
May 20, 2026	**Public Engagement Webinar #3** — to share the draft recommendations and provide an opportunity for feedback before issuing the final report. A targeted meeting was held in May with municipalities in the region to present draft recommendations to those most directly affected, and to gather feedback for consideration.

The IESO's engagement efforts resulted in strong participation from stakeholders, municipalities, and Indigenous communities. Notably, more than 1,000 attendees from municipalities and Indigenous communities, whose perspectives and interests are connected to these recommendations, took part in one or more engagement activities throughout the plan's development. As an essential part of engagement efforts, the feedback the IESO received along the plan's development provided a range of views, helping to shape the plan's recommendations.

Themes that emerged from this feedback included:

- growing electricity demand and economic development;
- transmission system scope and reliability;
- role of storage, non-wires alternatives, and emerging technologies;
- planning uncertainty and timing of investments; and
- engagement, transparency, and ongoing input.

Through these engagement activities, stakeholders and communities were able to deepen their understanding of the process, including policy direction, constraints, considerations, and options. All background information, including engagement meeting presentations, recorded webinars, detailed feedback submissions, and responses to comments are available on the IESO's North of Sudbury Bulk Planning engagement webpage.

8.4 Engaging With Indigenous Communities

The IESO remains committed to an ongoing, effective dialogue with Indigenous communities to help shape long-term planning across Ontario. This engagement was part of a broader commitment to fostering respectful relationships, ensuring transparency, and supporting informed participation in bulk electricity system planning. Throughout the development of this plan, the IESO's engagement with Indigenous communities included inviting Indigenous communities to participate in online information sessions held on May 29, 2025, Sept. 30, 2025, Oct. 8, 2025, and May 20, 2026 as well as Indigenous-focused meetings that were held those same days, in order to provide additional opportunities to ask questions and provide input.

To share information about the bulk planning activities and invite participation in the engagement process, outreach was made to the following Indigenous communities:

- Apitipi Anicinapek Nation (Wahgoshig First Nation)
- Atikameksheng Anishnawbek First Nation
- Attawapiskat
- Batchewana First Nation
- Beaverhouse First Nation
- Brunswick House First Nation
- Chapleau Cree First Nation
- Chapleau Ojibwe First Nation
- Constance Lake First Nation
- Fort Albany
- Flying Post First Nation
- Garden River First Nation
- Kashechewan
- Matachewan First Nation
- Mattagami First Nation
- Michipicoten First Nation
- Missanabie Cree
- Moose Cree First Nation
- Nipissing First Nation
- Temagami First Nation
- Taykwa Tagamou First Nation
-

The Tribal Councils and PTOs invited to participate in engagement activities:

- Anishinabek Nation
- Nishnawbe Aski Nation
- MoCreebec Council of the Cree Nation

The Métis communities invited to participate in engagement activities:

- Métis Nation of Ontario
- Red Sky Métis Independent Nation

Detailed non-confidential feedback submitted to the IESO and the IESO's responses can be viewed on the North of Sudbury Bulk Planning engagement webpage . At a high level, the IESO received the following feedback:

- Indigenous communities have a strong interest in opportunities for equity participation, economic benefits, and long-term value creation associated with the plan. Feedback emphasized the importance of ongoing relationship-building and co-development, rather than one-time engagement, and indicated a desire to be meaningfully involved throughout planning and implementation.
- Indigenous communities sought information about how the bulk plan integrates with the upstream Sudbury–Barrie Line, including potential implications and opportunities arising from that connection.

- Feedback highlighted concerns regarding potential impacts to Treaty and Indigenous rights, with particular emphasis on the need for a comprehensive assessment of cumulative effects**.** Nations are seeking clarity on the timing and manner in which the Crown's duty to consult arises, separate from the IESO's bulk planning process, while emphasizing the importance of early, ongoing, and transparent IESO engagement with Indigenous communities.

8.4.1 Indigenous Participation and Engagement in Transmission Development

Indigenous engagement during the bulk planning process assists the IESO in its assessment of various options to address future power system needs. By conducting bulk planning, the IESO determines the most reliable and cost-effective option after it has engaged with stakeholders and Indigenous communities and publishes those recommendations in the applicable bulk planning report. Where the IESO determines that the lead time required to implement those solutions need immediate action, the IESO may provide those recommendations ahead of the publication of a planning report, such as through a hand-off letter to the lead local transmitter in the region.

If a recommendation is made in a bulk planning report to proceed with a transmission solution, the transmission project proponent (not the IESO) will be responsible for obtaining applicable regulatory approvals from the provincial and/or federal governments, including an Environmental Assessment (EA). Where an EA is required, Indigenous consultation will be undertaken as part of the EA process. Other regulatory processes may also trigger the duty to consult. The relevant Crown entity is responsible for consultation but will delegate certain aspects of consultation to the proponent to carry out. In addition to fulfilling these delegated consultation obligations, project proponents are encouraged to engage early with Indigenous communities on ways to enable participation in particular projects.

In addition to the EA process, a project proponent will need to submit a Leave to Construct (LTC) application to the Ontario Energy Board prior to starting construction. The *Ontario Energy Board Act, 1998* limits the scope of the Ontario Energy Board's determination on whether the project is in the public interest to consideration of price, reliability, and quality of electricity service. Accordingly, it is not within the Ontario Energy Board's purview to assess whether the Crown's duty to consult has been satisfied in respect of the transmission project.

9. Future Resource Enablement North of Pinard TS

This section describes the potential future supply resource development opportunities north of Pinard TS that are most relevant to the North of Sudbury Bulk Plan, and explains how the recommended transmission strategy preserves optionality for those opportunities over time. Figure 12 illustrates the northern transmission system in the context of potential hydroelectric development sites in the Moose River Basin.

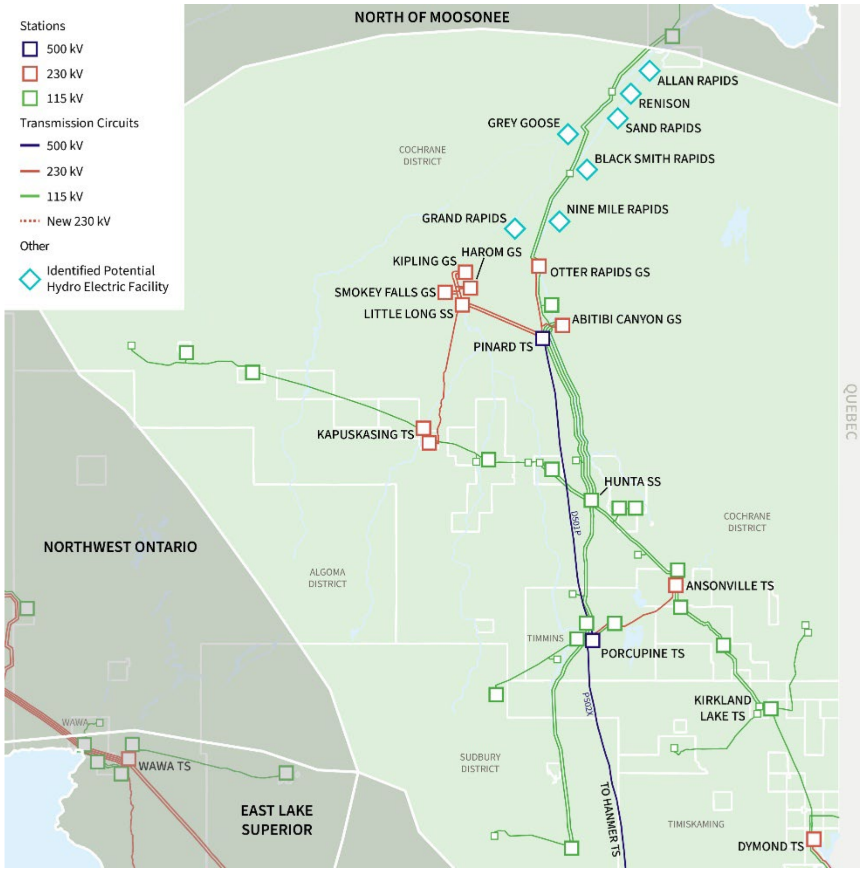
The relevance of future supply resources north of Pinard TS to this bulk plan is twofold. First, new generation in this area would materially increase southward transfer requirements on the northern transmission system. Second, while the bulk study primarily assesses transmission required to meet reliability and load growth needs, it also considers how transmission can support the integration of future supply resources north of Pinard TS.

Consistent with provincial policy objectives, the IESO has considered the role of long-lead-time supply resources in bulk system planning. As outlined in Energy for Generations, the government has emphasized the importance of supporting the continued development of long-lead energy projects, including hydroelectricity, recognizing their contribution to meeting baseload demand.

Within this context, government announcements indicate that the province is working in partnership with Indigenous communities and Ontario Power Generation to advance new hydroelectric development in northern Ontario, including projects in the Moose River Basin where early development work is being undertaken for new generating stations with potential output on the order of several hundred megawatts. These projects, being explored through co-planning arrangements led by Taykwa Tagamou Nation and Moose Cree First Nation, represent a significant prospective supply opportunity directly relevant to the northern bulk transmission system.

The purpose of this section is to describe how the bulk transmission system can support future supply resource development should these proceed, including initial development in the near term and potential expansion over time.

Figure 12 | Hydroelectric Potential Facilities in Moose River Basin Considered



9.1 Background and Strategic Context

Northern Ontario contains a significant share of the province's undeveloped hydroelectric potential. Estimates from Ontario Power Generation's Made-in-Ontario Northern Hydroelectric Opportunities report place the province's untapped hydroelectric potential in the range of approximately 4,000 MW to 5,000 MW, with roughly 3,000 MW to 4,000 MW located in northern Ontario.

From a bulk transmission perspective, the importance of this potential is driven not only by its scale, but also by its location. Many of these resources are situated in areas north of Sudbury where the transmission system is relatively weak, long, and highly radial, and already constrained under both normal and contingency conditions.

As a result, the ability to integrate future supply resources in northern Ontario depends on the capability of the transmission system to support both northward power delivery to load and southward transfers from new generation. This reinforces the role of transmission not only in meeting reliability and load growth needs, but also in enabling future resource development.

9.2 Moose River Basin Potential

Among the undeveloped hydroelectric resources in northern Ontario, the Moose River Basin represents one of the most significant and practically developable opportunities directly relevant to this study. The basin includes the Mattagami, Moose, and Abitibi river systems and has been identified in Ontario Power Generation's Made-in-Ontario Northern Hydroelectric Opportunities report as a key area for potential development.

Based on estimates presented in the Ontario Power Generation report, practical development potential in the Moose River Basin ranges from approximately 640 MW under a reduced-impact scenario to approximately 1,250 MW under a maximum-generation scenario.

This range is significant from a bulk transmission perspective. Development at this scale exceeds what can be supported by the existing northern transmission system without substantial reinforcement. While lower levels of development may be accommodated under certain system configurations, realizing the full potential of the basin would require additional transmission capability to support increased southward transfer and maintain system operability under a broad range of conditions.

9.3 Transmission Capability and Resource Enablement

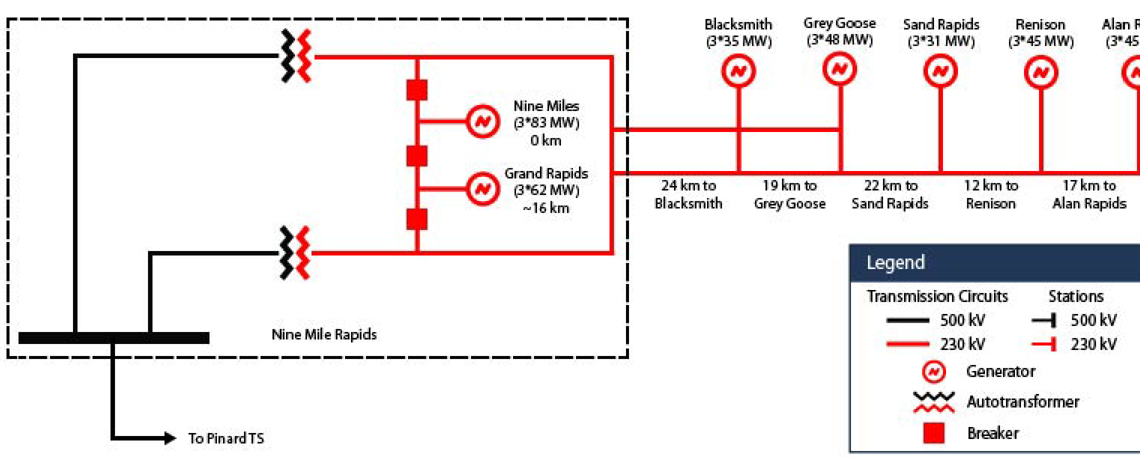
The recommended transmission strategy supports future potential supply resource development north of Pinard TS in a staged manner, with the level of enablement increasing as additional transmission capability is introduced. Implementation-ready reinforcements are primarily driven by reliability needs, but also provide meaningful enablement for new generation. Under the near-term system configuration, the study indicates that these reinforcements can support approximately 430 MW of additional hydroelectric development in the region. This level of capability is consistent with the scale of initial hydroelectric developments currently being explored in the Moose River Basin and demonstrates that the near-term plan not only addresses reliability requirements but also establishes the transmission conditions necessary to support initial development.

However, this level of enablement is limited relative to the full development potential of the basin. Expansion beyond this approximate level requires additional transmission capability to support increased southward transfers and maintain system operability under a broader range of conditions. The bulk study identifies that enabling larger-scale hydroelectric development north of Pinard TS depends on the availability of additional high-capacity transmission between Pinard TS and the broader system. In particular, increased transfer capability, supported by additional 500 kV infrastructure, is required to materially expand the amount of generation that can be integrated.

This assessment reflects input provided through ongoing co-planning activities involving Taykwa Tagamou Nation, Moose Cree First Nation, and Ontario Power Generation, who requested that the IESO assess the transmission requirements associated with integrating potential hydroelectric development in the Moose River Basin. In response, the IESO evaluated a representative transmission configuration at a planning level, including consideration of the voltage levels, number of transmission circuits, and overall configuration required to enable integration of generation at this scale. This evaluation was consistent with previous IESO studies of the area, namely the 2023 "Made-in-Ontario Northern Hydroelectric Opportunities" study, requested by the Minister of Energy. This included transmission infrastructure extending north of Pinard TS toward the basin, along with associated transformation and supporting infrastructure required to maintain reliable operation. The configuration assessed is presented in Figure 13 and is intended to illustrate the type and scale of infrastructure required.

The results of this assessment indicate that development on the order of approximately 1,000 MW of total generation can be supported from a bulk transmission perspective, provided that the necessary reinforcement pathways are established. Alternative lower-voltage approaches were also considered and were found to require multiple parallel circuits, introduce higher reactive losses, and result in greater exposure to voltage and stability limitations. As a result, higher-voltage transmission configurations are more effective in supporting larger-scale hydroelectric development in this region. This analysis demonstrates that a technically feasible transmission pathway exists to support large-scale hydroelectric development in the Moose River Basin, subject to further study and system reinforcement. Additional technical detail on the transmission configurations assessed is provided in Appendix I.

Figure 13 | Potential System North of Pinard to Support Moose River Basin Hydroelectric Development



9.4 Operational Considerations for Resource Integration

In addition to transmission capability, the integration of large-scale hydroelectric development north of Pinard TS depends on a number of operational and design considerations. While the transmission configurations described in Section 9.3 establish the capability required to integrate new generation from a bulk system perspective, overall system performance depends on how generation facilities are designed and operated in conjunction with the transmission network.

Key considerations include voltage performance, generation configuration, and the operational characteristics of the hydroelectric resources themselves. The addition of long transmission facilities may result in elevated voltages during periods of low or no generation, requiring generating units to provide dynamic voltage support, including operation in synchronous condenser mode where appropriate. Generation configuration also plays an important role, with multi-unit arrangements and appropriate transformer configurations improving flexibility and enabling more effective control of system conditions. In addition, hydroelectric development in the Moose River Basin introduces operational complexity associated with cascade river systems, where limited hydraulic storage and short retention times can result in rapid changes in output and corresponding impacts on voltage and system operation.

These considerations do not change the transmission capability identified in this study. However, they demonstrate that successful integration of large-scale hydroelectric resources depends on the interaction between transmission capability, generation design, hydraulic characteristics, and system operation, and would require further assessment as development progresses.

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