



MAY 7, 2025

Northern Ontario Connection Study

Webinar #1 Technical and Economic Option Analysis

Territory Acknowledgement

The IESO acknowledges the land we are conducting today's meeting from is the traditional territory of many nations including the Mississaugas of the Credit, the Anishnabeg, the Chippewa, the Haudenosaunee and the Wendat peoples and is now home to many diverse First Nations, Inuit and Métis peoples. We also acknowledge that Toronto is covered by Treaty 13 with the Mississaugas of the Credit First Nation.

Agenda

1. Northern Ontario Connection Study Overview
2. Demand Forecast Scenarios
3. Option Analysis: Technical and Economic Assessment
4. Next Steps & Discussion



Connecting Today.
Powering Tomorrow.



We work with:



Summary

- The Northern Ontario Connection Study (the Study) was requested by the government, as part of its policy to improve electricity reliability and build opportunities for First Nation economic self-determination and prosperity, improve reliability for grid-connected First Nation communities, support mining development, and enable new supply resources including but not limited to hydro-electric generation and renewable generation.
- Feedback and community perspectives are an important component of the study development and the IESO continues to seek input.
- Preliminary study results indicate that the most effective way to achieve these goals is via a North-South option consisting of a double circuit 230 kV transmission line, connecting to the existing East-West Tie Line near Nipigon Bay.
- The option has an advantage from a cost perspective and its ability to accommodate forecast demand and enable the connection of hydro-electric and renewable resources perspective in the future.

Feedback Opportunity

Local considerations and feedback are a critical component to the development of the Northern Ontario Connection Study. The IESO wants to hear your perspectives about:

- What other information should be considered in the study scope and the examination of the potential options?
- What feedback do you have regarding the study findings?
- What additional information should be provided in future engagements to help share perspectives and insights?

IESO welcomes written feedback until May 28.

Please submit feedback to engagement@ieso.ca using feedback form posted on the [engagement page](#).



Northern Ontario Connection Study Overview

Study Objectives

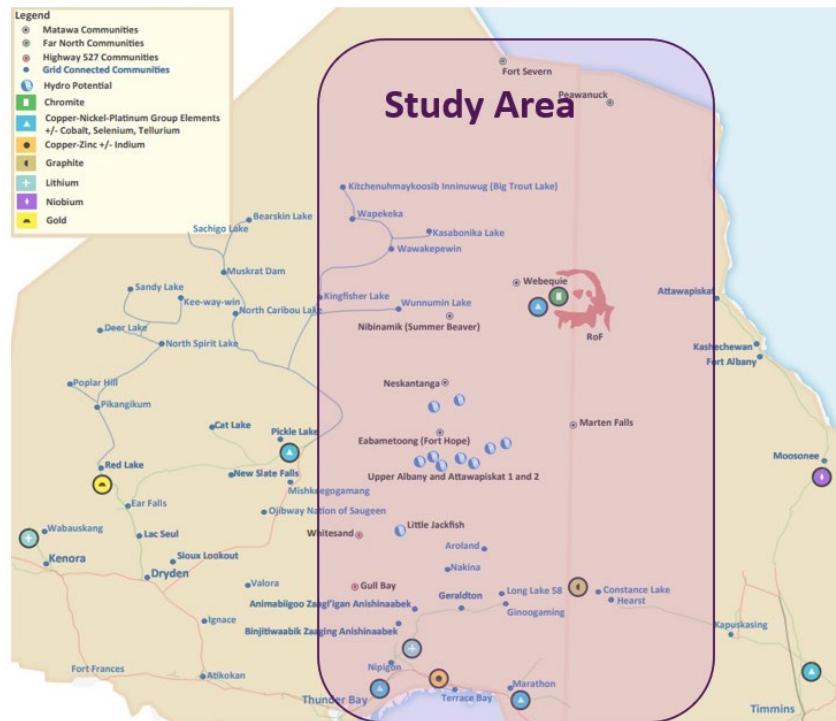
The Northern Ontario Connection Study will develop options to:

- connect remote First Nations communities to the grid that currently rely on diesel generators for electricity,
- improve reliability for First Nation communities that are already grid-connected,
- support critical minerals mining development in the region, and
- enable new supply resources including but not limited to hydro-electric generation and renewable generation.

The study was initiated in response to a request from the government of Ontario, as part of their policy to end reliance on diesel fuel and build opportunities for greater economic self-determination/prosperity.

Northern Ontario Connection Study area encompasses the Greenstone-Marathon electricity planning sub-region (Marathon to Whitesand), up to Fort Severn in the far north.

It includes Matawa, Far North and Highway 527 communities.



Background

The **Northern Ontario Connection Study** builds on previous IESO analysis and adds new options developed with First Nation communities and stakeholders. Past studies and results include:

- 2014 [Connection of Remote First Nation Communities in Northwest Ontario Report](#), and the 2015 [North of Dryden Integrated Regional Resource Plan](#) resulting in the Indigenous-led Wataynikaneyap Transmission Project
- 2016 [Greenstone-Marathon IRRP](#) considered potential cost optimization opportunities between new customers in the Greenstone area and remote communities/mines
- 2023 [Northwest Region Integrated Regional Resource Plan](#) provided an update to findings from the Greenstone-Marathon IRRP

Key Components of the Study

To identify the option that meets the key study objectives, the IESO:

- ✓ Developed demand forecast scenarios to understand forecasted growth.
- ✓ Assessed the maximum load meeting capability* of transmission options, considering both 115 kV and 230 kV voltage levels, and single and double circuit configurations. Compared this information to demand forecast scenarios, which informed the technical capability of each option.
- ✓ Evaluated the most feasible connection points, equipment sizing and estimated cost of connecting hydroelectric resources, such as Little Jack Fish and Upper Albany-Attawapiskat rivers.
- ✓ Provided an economic analysis of each option.
- ✓ Engaged and offered opportunities for feedback that informed the routing and the options analysis.

*Load meeting capability, also referred to as system capacity, is the ability of the electricity system to supply power to customers in the area either by generating the power locally or bringing it in through the transmission system



Demand Forecast Scenarios

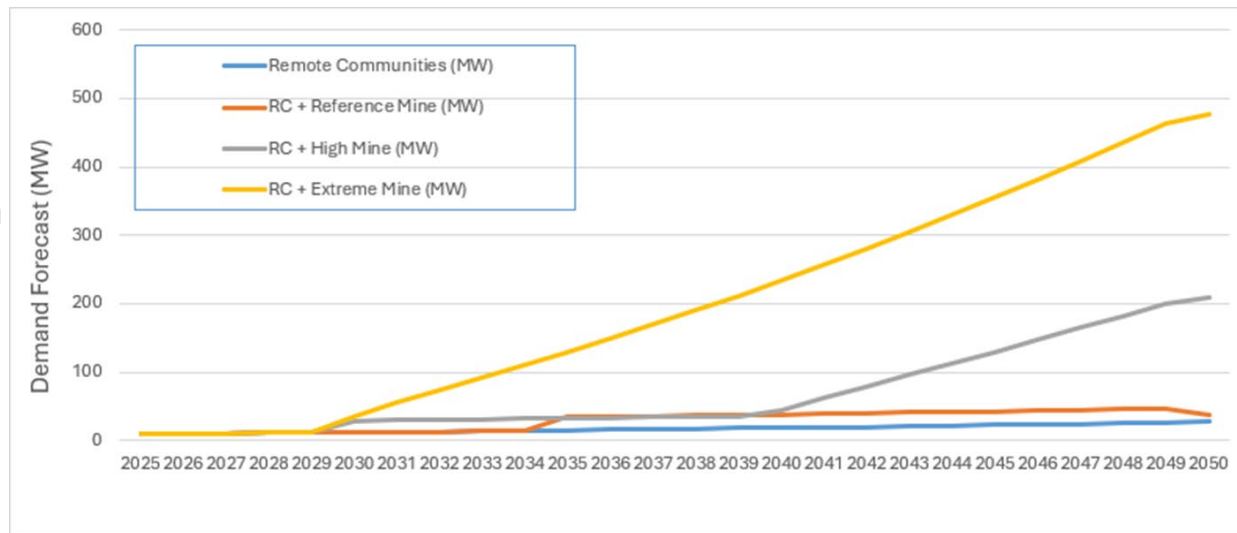
Demand Forecast – Overview

Several demand forecast scenarios were developed to understand forecasted electricity growth:

- A scenario to account for the growth of off-grid First Nation communities (Matawa, Hwy 527 and Far North).
- Three mining forecast scenarios: Reference Mine, High Mine and Extreme Mine. Key details for the mining forecast include:
 - An annual mining forecast is developed by the IESO based on known projects for site expansions of existing mines and potential new mining developments, using data from mining proponents, industry publications, utility companies, and government sources. The IESO engaged a consultant to provide insight into a long-term mining demand forecast with varying levels of mineral extraction and electrification.
 - Projects are assigned a "likelihood" factor, categorized from "most likely" to "least likely," that its electricity demand will materialize, based on factors such as data reliability, the project's development stage, timing, and permitting status. Varying levels of mine electrification and long-term mineral production were incorporated to provide a reference, high and extreme mining forecast.

Demand Forecast

- The demand forecast scenarios can reach 50 MW by 2050 in the Reference scenario, and up to 500 MW by 2050 in the Extreme scenario.
- This wide range in forecasted demand is driven by the high uncertainty of mining development.
- Remote Communities (blue line) refers to the 9 off-grid diesel-reliant First Nation communities which are typically winter-peaking and are driven by residential and commercial growth.





Option Analysis: Technical and Economic Assessment

Assessment Background

The scope of the **economic assessment** includes the following objectives for the region:

- Evaluate the cost of status quo option (continued diesel generation)
- Evaluate the cost of non wires alternative (NWA) for all 9 off-grid communities
- Compare the cost of NWA with transmission costs

The scope of the **technical assessment** includes the following objectives for the region:

- Supply the forecasted electricity needs
- Improve reliability to existing electricity consumers
- Evaluate opportunities for enabling new supply resources

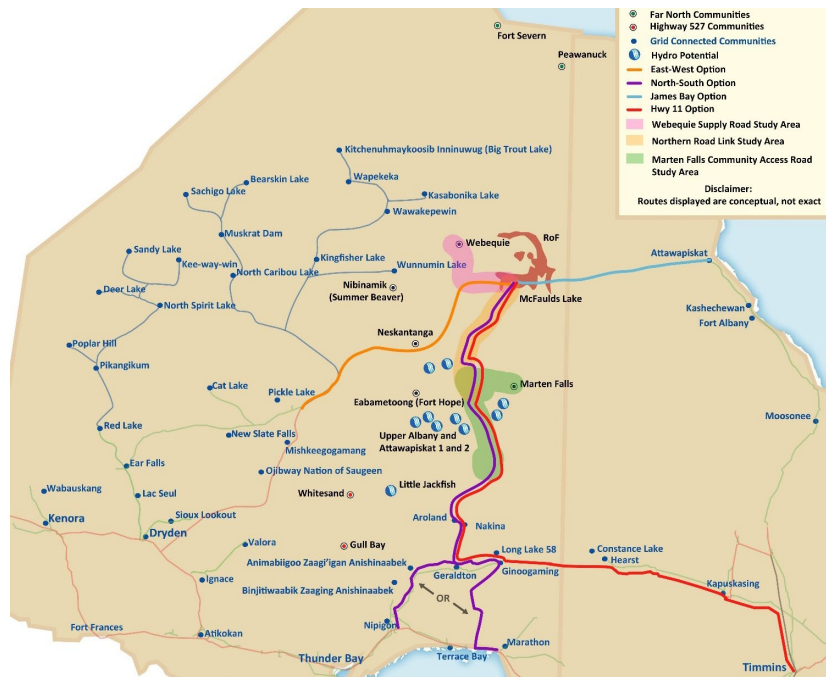
Four Options

The IESO considered 4 primary transmission supply options to meet objectives:

1. East-West Option (westward to Pickle Lake)
2. James Bay Option (eastward to Attawapiskat)
3. Highway 11 Option (southeastward along Highway 11 to Timmins)
4. North-South Option (southward to East-West Tie Line)

A combination of non-wires alternatives (NWA) which consist of wind, solar and battery storage were considered as well.

See appendix for more details.

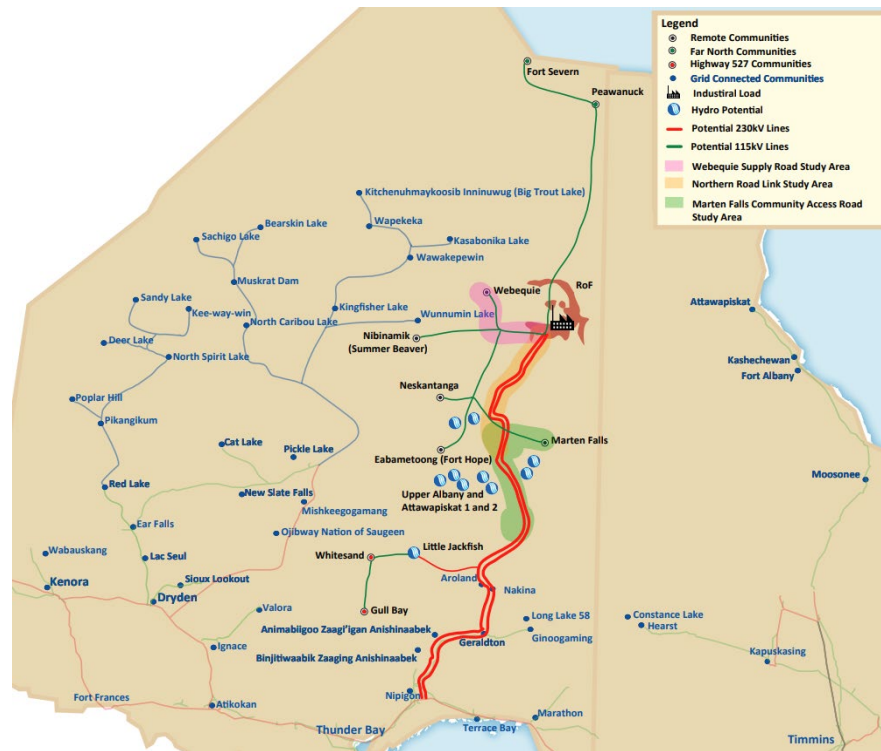


Study Findings

- The transmission options were compared based on several metrics such as cost, ability to serve load, compatibility with existing infrastructure and proposed community roads, the potential for future expansion and other benefits.
- The cost of NWA is greater than any of the transmission supply options for the Matawa, Highway 527 (Kiashe Zaaging Anishinaabek and Whitesand First Nation) and Far North (Fort Severn First Nation and Weenusk First Nation) communities, and greater than continuing to supply diesel generation to Matawa and Highway 527 communities.
- The option that provides most of these benefits is the North-South Option (Southward to East-West Tie Line) built as a double circuit 230 kV transmission line connecting to the existing East-West Tie Line near Nipigon Bay.

North-South Option Benefits

1. Meets the needs of the region until 2050
2. Enables connection of new resources including hydro-electric resources (Little Jack Fish and Upper Albany-Attawapiskat river area) through reduced connection costs and providing transfer capability of power to the main transmission network
3. Compatible with other options, such as development of the Timmins option (running east-west from Hwy 11) should future reinforcements be identified
4. Uses existing right-of-way and transportation corridors
5. Improves the reliability of supply in the Greenstone area and aligns with the "Greenstone Region Supply Reinforcement Business Case", a transmission plan that was submitted to the IESO as formal input from Minodahmun Development LP



All Options Costs Summary

Option	Matawa Communities (\$CAD in Millions)	Hwy 527 Communities (\$CAD in Millions)	Far North Communities (\$CAD in Millions)	Total Estimated Cost (\$CAD in Millions)	Load Meeting Capability (MW)
North-South double circuit 230kV	3,345	421	735	4,501	✓ 550
Hwy11-Timmins double circuit 230kV	4,476	463	735	5,674	✓ 550
North-South single circuit 230kV	2,623	421	735	3,779	X 275
Hwy11-Timmins single circuit 230kV	3,320	463	735	4,518	X 275
East-West 230kV	2,130	350	735	3,215	X 150
Non-Wires Alternatives	6,954	1,407	1,233	9,594	N/A



Next Steps

Next Steps

Upcoming milestones for the Northern Ontario Connection Study are:

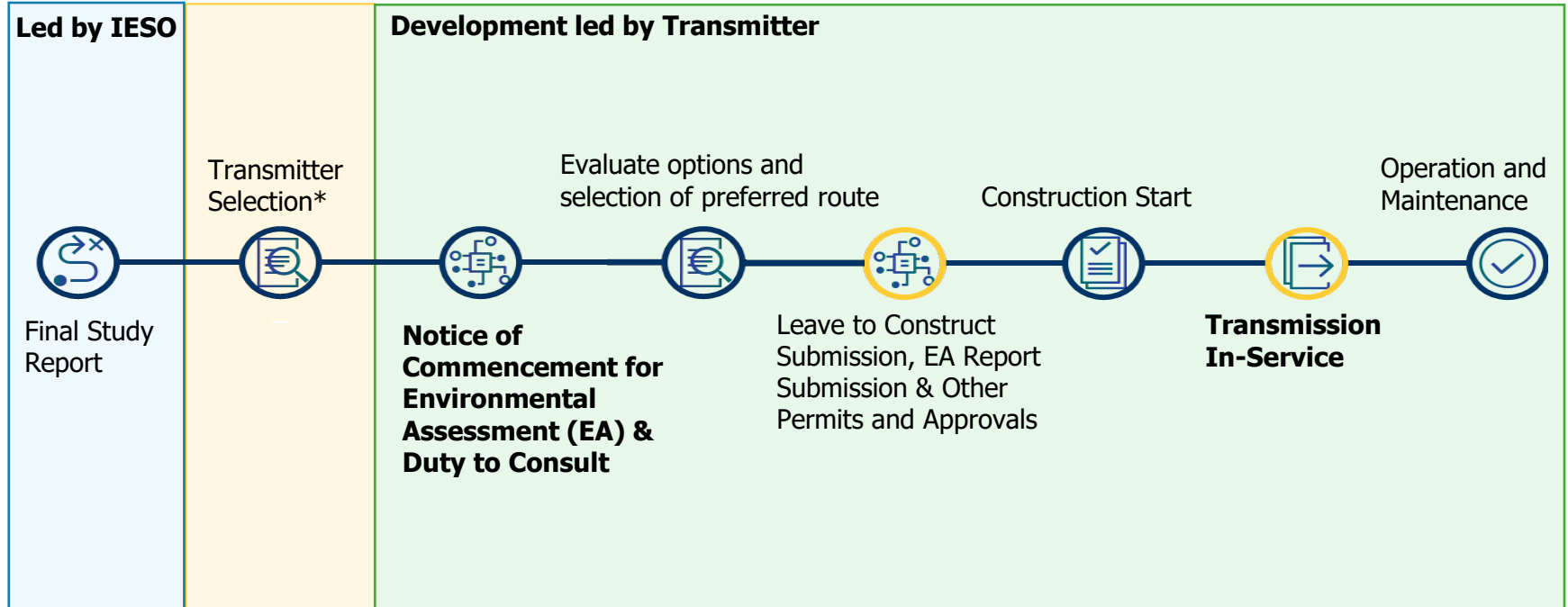
May 28, 2025: Deadline for feedback

Summer 2025: Public engagement webinar in advance of final report release.

Summer 2025: Final report released and published on the IESO's website.

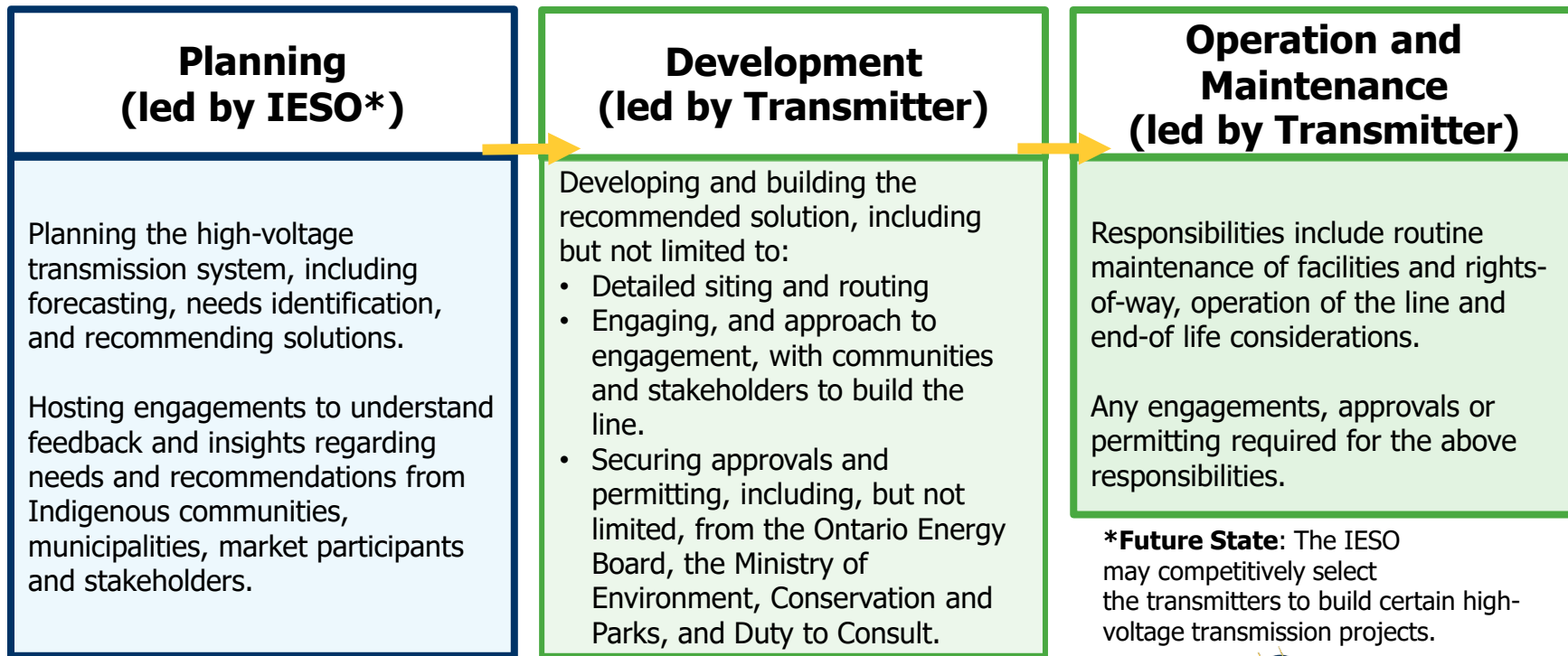
The full report will be posted on the [engagement webpage](#).

Typical Process for Transmission Development



*Currently, no standardized process exists to select a transmitter

Key Roles and Responsibilities for Transmission Projects



Key Takeaways

The Study evaluated the transmission and non-wires alternatives that could feasibly:

1. connect off-grid First Nations communities;
2. improve reliability to communities already connected to the grid;
3. improve supply reliability in the Greenstone area; aligns with the “Greenstone Region Supply Reinforcement Business Case” transmission plan;
4. enable development of critical minerals, and;
5. enable new hydro-electric/renewable supply resources in the region.

Preliminary study results indicate that the most effective way to achieve these goals is via a North-South option consisting of a double circuit 230 kV transmission line, connecting to the existing East-West Tie Line near Nipigon Bay.

Additional engagement is planned for late spring/summer of 2025 where we hope to gather feedback about the recommendation from First Nations communities and stakeholders.

Feedback Opportunity

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Thank You

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Appendix

Demand Forecast – Mining Forecast

The IESO adopted a scenario-based approach to explore the region's future needs and the flexibility of alternative solutions to meet those needs. This wide range in the forecast scenarios is driven by some of the current uncertainty in mining development.

Scenario	Operational by	Assumptions
Reference	2035	• 20% of mines will reach net zero carbon emissions by 2050 • no long-term mineral production component
High	2030	• 40% of mines will reach net zero carbon emissions by 2050 • long-term mineral production component begins in 2040
Extreme	2030	• 100% of the mines will reach net zero carbon emissions by 2040 • long-term mineral production component begins by 2030

Transmission Options Load-Meeting Capabilities

Transmission Option	Variation	Total Length of 230 kV and 115 kV Transmission Line (km)	LMC (MW)
North-South Option	Double circuit 230 kV – Route A	930-1530	550
	Double circuit 230 kV – Route B	980-1580	550
	Single circuit 230 kV – Route A	930-1530	275
	Single circuit 230 kV – Route B	980-1580	275
	Single circuit 115 kV – Route A	930-1530	50
	Single circuit 115 kV – Route B	980-1580	50
Highway 11 Option	Double circuit 230 kV	1,310-1910	550
	Single circuit 230 kV	1,310-1910	275
East West Option	Single circuit 230 kV	750-1350	150
	Single circuit 115 kV	750-1350	35
James Bay Option	Single circuit 115 kV	675-1275	35

Non-Wires Alternatives (NWA) Options Summary

Communities	NWA Solution	BESS Total (MW)	BESS Reservoir (MWh)	Wind (MW)	Solar (MW)	Cost adjusted for remote location (\$CAD Millions)
Matawa	BESS Solar Wind	933	9,330	196	1,126	6,954
Hwy 527		176	1,760	36	213	1,407
Far North		156	1,560	31	189	1,233

NWA in remote communities are estimated to be triple to what they would be otherwise based on information provided by Hydro One Remote Communities Inc (HORCI).