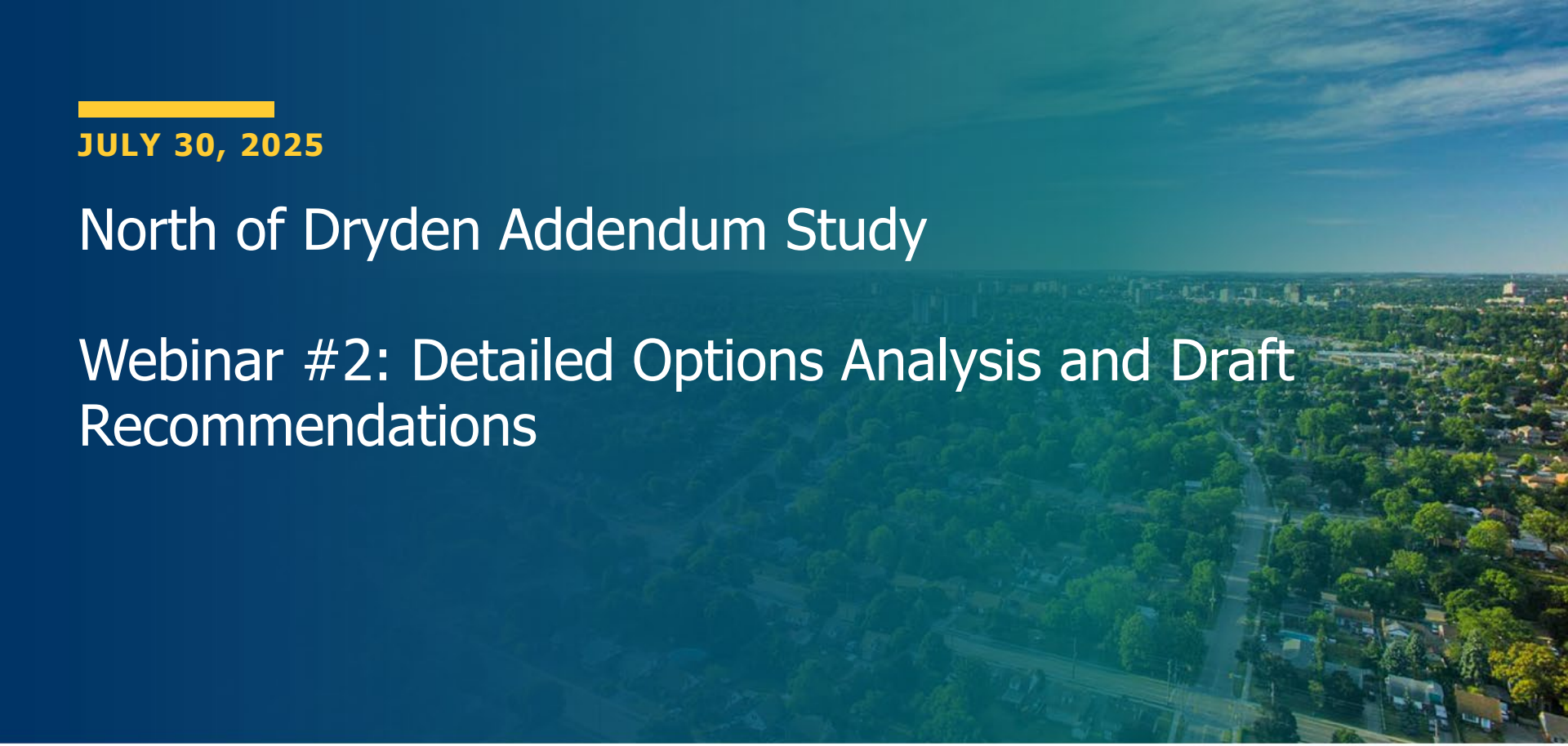
JULY 30, 2025

North of Dryden Addendum Study

Webinar #2: Detailed Options Analysis and Draft Recommendations



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Land Acknowledgement

The IESO acknowledges that North of Dryden is the traditional territory of many nations including the Anishinaabe Nation and Métis people, encompassing areas covered by Treaty 3, Treaty 5, and Treaty 9.

The IESO would also like to acknowledge all First Nations, Inuit and Métis peoples and their valuable past and present contributions to this land.

Agenda

- The Role of the IESO and Ontario's Electricity Sector
- Recap: Regional Planning Process, Demand Forecasts, Electricity Needs and Options Screening
- Detailed Options Analysis and Draft Recommendations
- Next Steps and Discussion

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We work with:

Generators >>> **Transmitters** >>> **Local Distribution Companies** >>> **Energy Consumers**

<<< **Communities** >>>

Seeking Input

Please keep the following points in mind to help shape your feedback during the discussion and written feedback:

- What feedback is there on the options analysis and draft recommendations?
- What information needs to be considered regarding these draft recommendations?
- How can the IESO continue to engage with communities and stakeholders as these recommendations are implemented, or to help prepare for the next planning cycle?

IESO welcomes written feedback until August 13, 2025. Please submit feedback to: engagement@ieso.ca.

Recap: Regional Electricity Planning Process, Demand Forecasts, Electricity Needs & Options Screening

Electricity Planning in Ontario

Provincial/ Bulk System Planning

Addresses provincial electricity system needs and policy directions.

Completed: 2013 Northwest Ontario Bulk Planning

Regional Planning

Addresses local electricity system needs at the transmission system level.

Underway: North of Dryden Addendum Study

Completed: 2023 Northwest IRRP

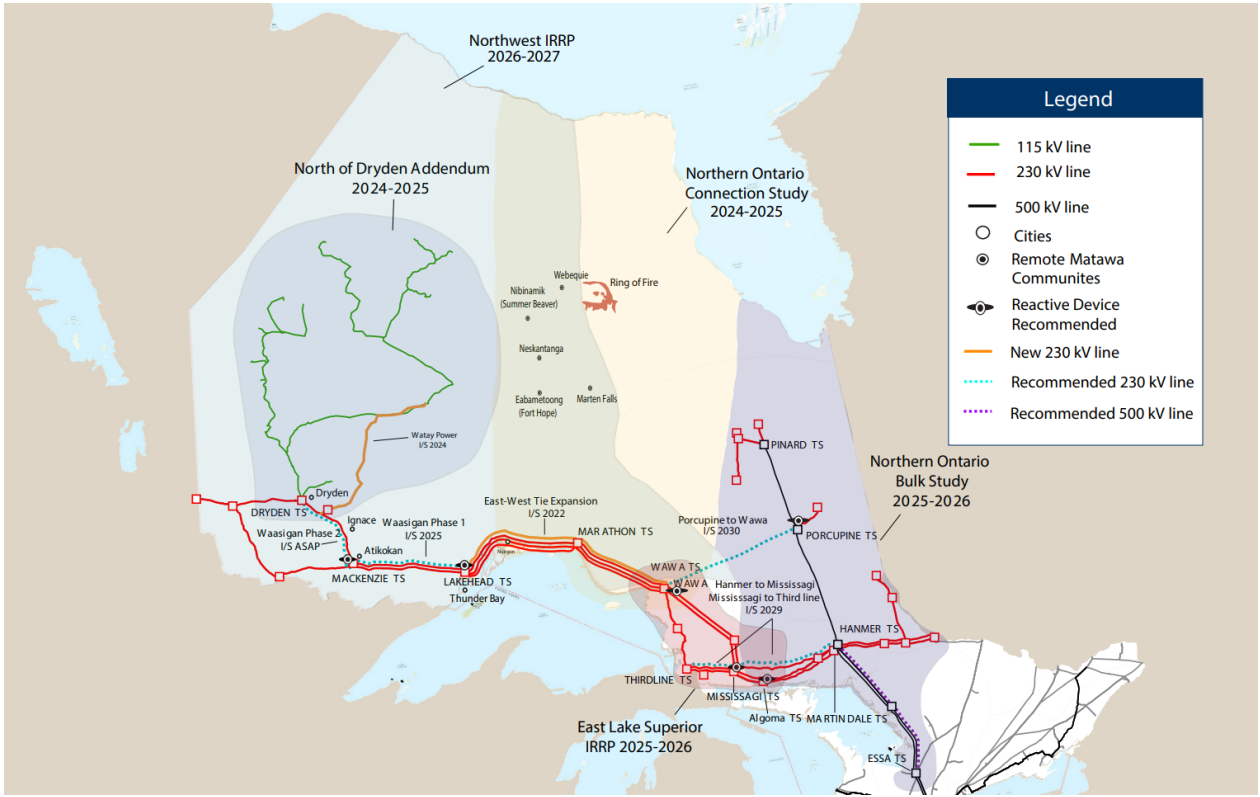
Upcoming: Northwest Regional Planning (2025)

Distribution Planning

Addresses local electricity system needs and priorities at the distribution system level.

Led by local distribution companies.

Northern Ontario Electrical Region



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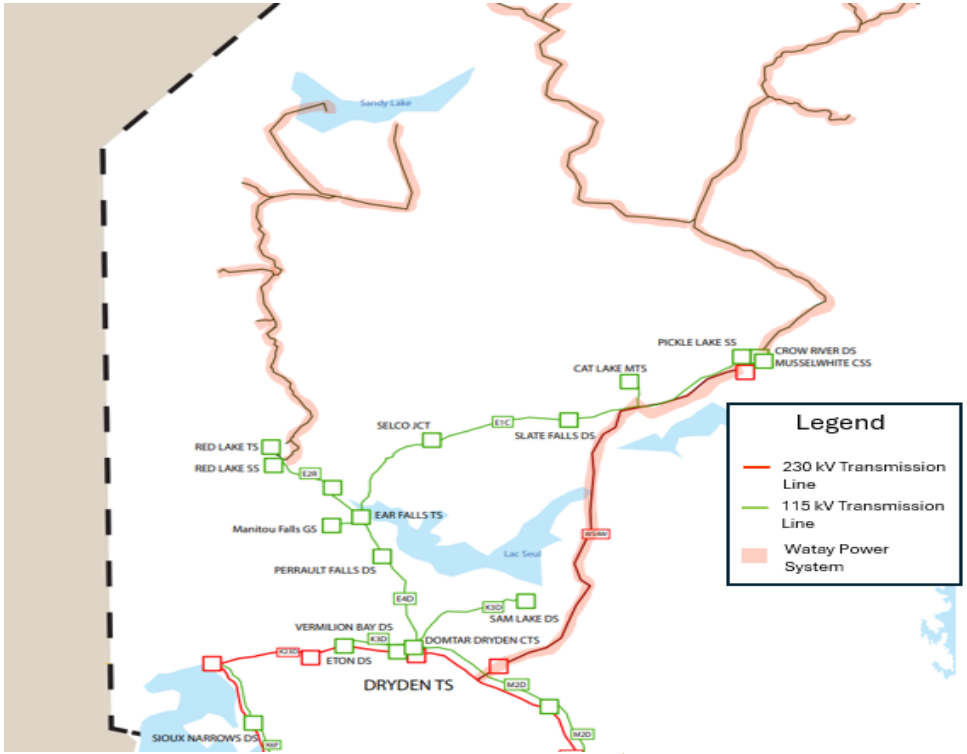
Regional Electricity Planning: North of Dryden Addendum

- In 2023, the IESO published the Northwest Integrated Regional Resource Plan ("NW IRRP"). While the supply capacity was adequate at the time the NW IRRP was published, emerging growth in the North of Dryden sub-region has necessitated re-studying the supply capacity needs. This study will be an Addendum to the NW IRRP 2023.
- The objective of the North of Dryden Addendum is to study the specific electricity needs in the reference forecast scenario, which include mining and industrial growth, in the North of Dryden sub-region (generally the area extending northward from Dryden to the towns of Ear Falls, Red Lake, Pickle Lake and surrounding areas).
- Following the regional system planning process, the North of Dryden Addendum will ensure a reliable supply of electricity by understanding the unique needs of the sub-region and consider a range of options and resources to address the identified needs.
- The IESO will be starting a new regional plan for the Northwest Region later this year. This study will be another opportunity to monitor forecast load growth in the broader region to understand growing needs and evaluate potential solutions.

North of Dryden Electrical Region

Area is serviced by 230 kilovolt (kV) and 115 kV lines and transformer stations (TS).

The electrical region encompasses several municipalities, Indigenous communities and Métis councils extending northward from Dryden to the towns of Ear Falls, Red Lake, Pickle Lake and surrounding areas.



Map is for illustrative purposes.

Regional Planning Milestones for North of Dryden Addendum

We are here

Q4 2024
Develop Updated Forecasts

Q2 2025
Identify Needs and Potential Options

Q3 2025
Complete Options Analysis and Draft Recommendations

Q3 2025
Release Final Plan

On-going engagement – Led by the IESO

Components of an Electricity Plan

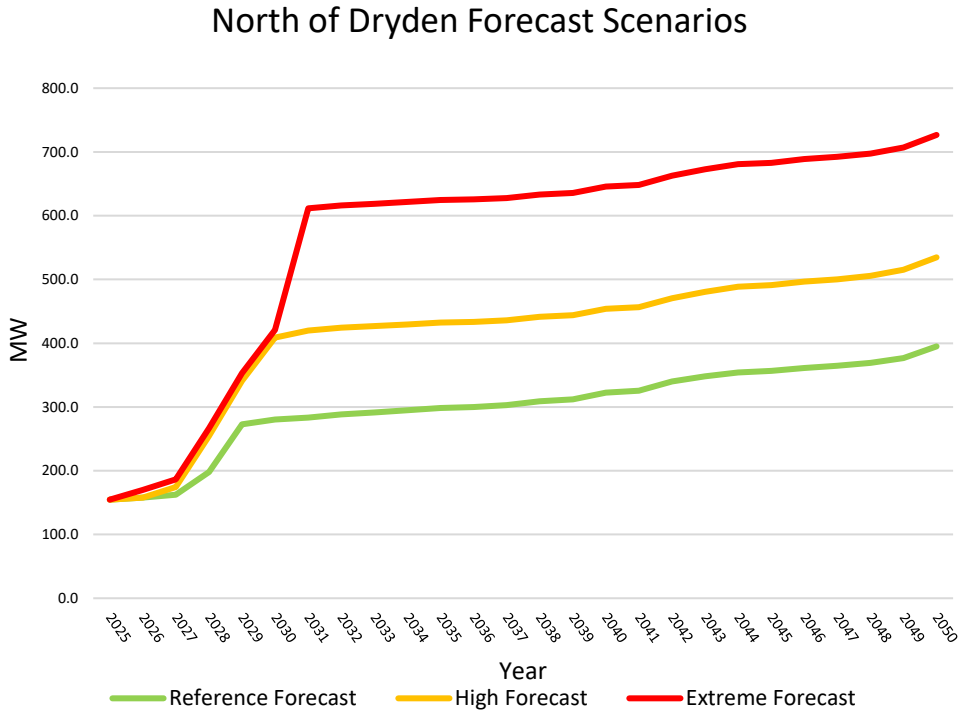
Demand Forecast	Needs	Potential Solutions	Recommendations
How much power is needed over the planning timeframe?	What needs are emerging in the region that need to be addressed? Electrical needs fall in the following categories: equipment and system capacity, end-of-life replacement, system security and power restoration.	What kinds of solutions can meet the future needs for the region?	Based on an assessment of potential options, what recommended actions will ensure a reliable and adequate electricity supply for the region over the long-term?

Final Forecast Scenarios

Three scenarios were developed for the North of Dryden Addendum:

1. Reference Scenario: 395 MW*
2. High Scenario: 535 MW*
3. Extreme Growth Scenario: 727 MW*

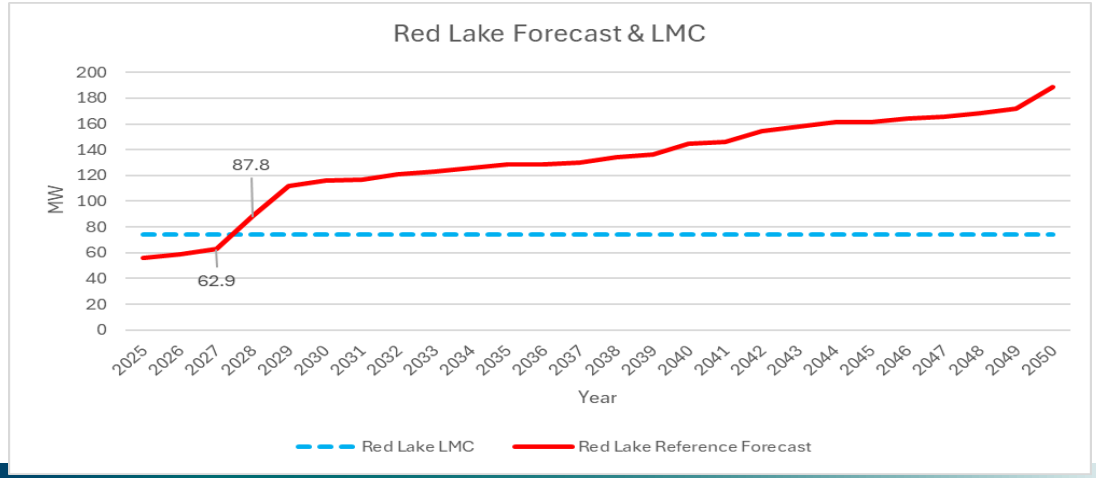
The **main driver** of growth in the sub-region is **new forecasted mining load**. Existing mining load remains relatively flat over the study and the residential load growth is estimated to be 1.6% per year.

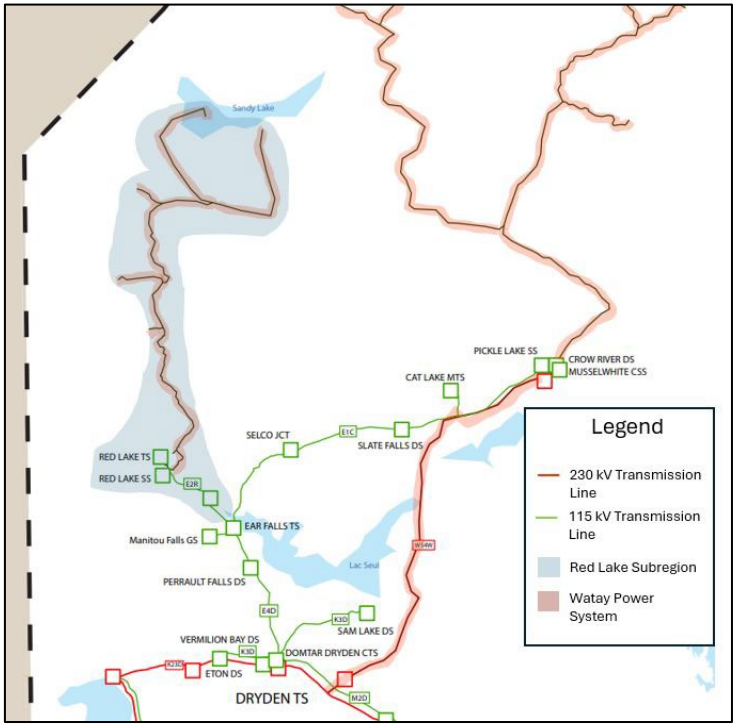


* By 2050

Reference Needs – Red Lake Pocket

Need Type	Impacted Equipment	Need Timing
Supply Capacity Ability of the system to supply power through the transmission lines to a local area	E4D and transmission network supplying the Red Lake sub region (highlighted in blue on map)	2028





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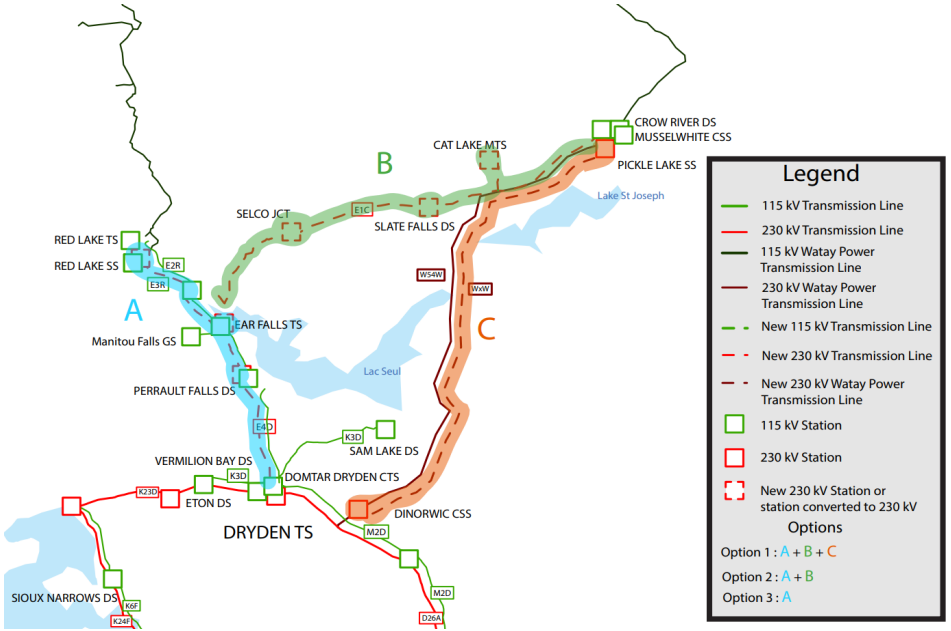
Initial Option Screening

To address the supply capacity need identified, the following options were screened-in:

Non-Wire Options	• Battery Energy Storage Systems (BESS) (in combination with solar and on-shore wind) • Biomass Generation
Wire Options	• **Option 1**: 230 kV transmission line from Dryden to Ear Falls to Pickle Lake, 115 kV transmission line from Ear Falls to Red Lake, and 230 kV transmission line from Dinorwic Junction to Pickle Lake (Option A, B & C on map) • **Option 2**: 230 kV transmission line from Dryden to Ear Falls to Pickle Lake, and 115 kV transmission line from Ear Falls to Red Lake (Option A & B on map) • **Option 3**: 230 kV transmission line from Dryden to Ear Falls to Red Lake (Option A on map)



Map is for illustrative purposes.

Feedback Received During Previous Webinar

Key Areas of Feedback	Incorporating Feedback
Ensure growth is considered.	✓ Specific inputs shared by feedback respondents was accounted in the reference and high forecast. Forecast information received that was less certain or likely to proceed in terms of timelines, magnitude or location were captured in the high or extreme scenarios.
A short-term solution should be identified until new transmission will be in service.	✓ The IESO is open to receiving further feedback on potential short-term supply solutions that could be implemented until a more long-term option is developed. ✓ The next cycle of Northwest regional planning is commencing late this year, and short-term supply options could be further explored within that plan.
General support for the preliminary transmission options identified.	✓ Thank you for this feedback for the preliminary transmission options under consideration.
Support for the inclusion of non-wires alternatives to support the demand.	✓ As part of the planning process, the IESO will consider all feasible wire and non-wire solutions to meet the needs of this sub-region. More details will be shared shortly.

Overview of the Wire and Non-Wire Options Analysis and Draft Recommendations

Evaluating Options

Potential solutions are evaluated based on the following key considerations:

Technical Feasibility	• Can the option be executed? i.e., proximity to customers, routing and spacing considerations, operations
Ability to Address Needs	• Are the numbers, magnitude, and diversity of needs adequately addressed?
Integration & Cost-Effectiveness	• Is there the ability to solve multiple needs simultaneously? • Would a combination of option types be required?
Lead Time	• New transmission infrastructure is expected to take at least 5-7 years – how does this compare to the timing of needs?

North of Dryden - Options Overview

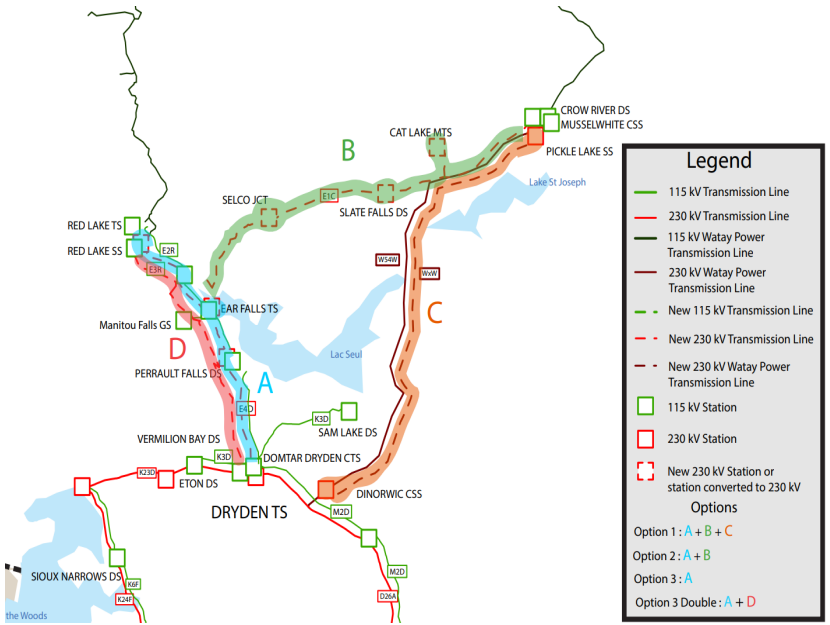
To address the supply capacity need identified in the Red Lake area, the following options were further analyzed:

Wire options:

- **Option 1*:** 230 kV transmission line from Dryden to Ear Falls to Pickle Lake, 115 kV transmission line from Ear Falls to Red Lake, and 230 kV transmission line from Dinorwic Junction to Pickle Lake (parallel to W54W)
- **Option 2*:** 230 kV transmission line from Dryden to Ear Falls to Pickle Lake, and 115 kV transmission line from Ear Falls to Red Lake
- **Option 3*:** 230 kV transmission line from Dryden to Ear Falls to Red Lake
- **New - Option 3 Double**: Double circuit 230 kV transmission line from Dryden to Ear Falls to Red Lake

Non-Wire Alternatives:

- Battery Energy Storage Systems (BESS) (in combination with solar and on-shore wind)
- **New –** Biomass Generation excluded



*Single circuit

Detailed Non-Wire Alternatives (NWA) Analysis

Option	Solar + Wind + BESS	Wind + BESS	Solar + BESS
Technical Feasibility	✓ Feasible	✓ Feasible	✓ Feasible
Ability to Meet Need	• Cannot fully meet the need due to the characteristics of the supply and the characteristics of the need (i.e., intermittent resources have variability and reliability considerations).		
Other Considerations	• NWAs require significant land requirements and specific connection points; to meet the need potentially multiple NWA projects with specific requirements would be required and timing must be aligned to meet the system need. • NWAs would not poise the system for continued growth. • Future NWAs may be possible once transmission reinforcements are in place; reducing connection costs and increasing transfer capabilities of resources to the main bulk transmission line.		

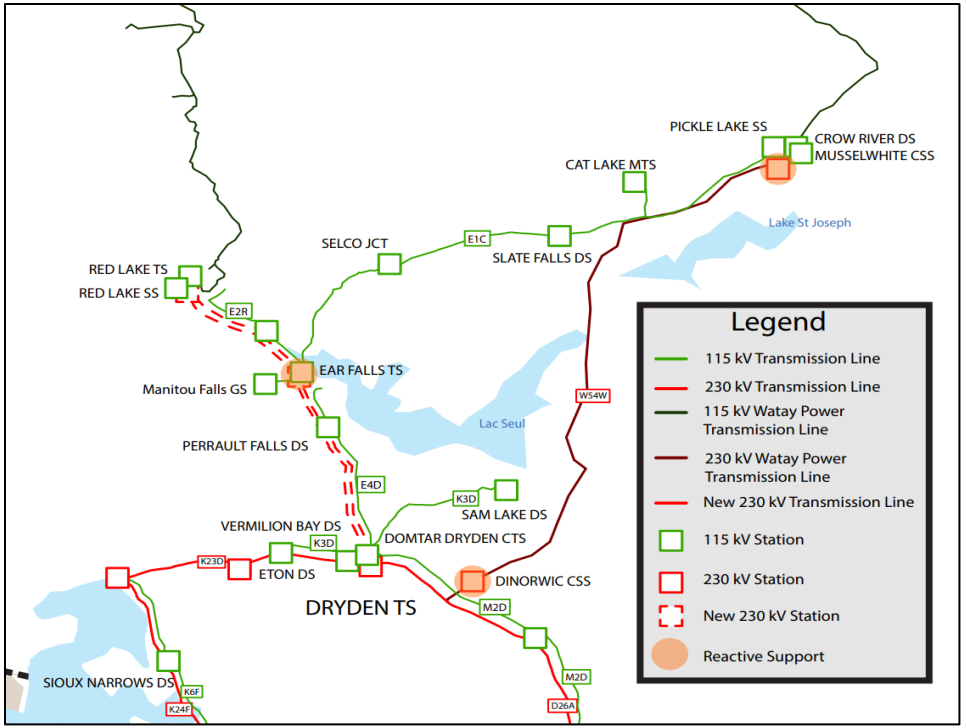
*Given that options above could not meet the need, costs and timing are not included in the table.

Detailed Wire Options Analysis

Option	Option 1	Option 2	Option 3	Option 3 Double
Technical Feasibility	✓ Feasible	✓ Feasible	✓ Feasible	✓ Feasible
Ability to Meet Need	• Does not meet needs	• Does not meet needs	• Does not meet needs	✓ Meets Reference and High need
Total Estimated Cost (Millions)*	$2,470 M	$1,530 M	$760 M	$820 M
Lead-time	5-7 years	5-7 years	5-7 years	5-7 years
Other Considerations				• Allows for future reinforcement into Pickle Lake with minimal cost. • Poises system for future growth.

Draft Recommendations

- To address the supply capacity need in Red Lake, a new double-circuit 230 kV transmission line from Dryden TS to Ear Falls TS to Red Lake SS is recommended.
- The transmission line will address the supply capacity need and accommodate further growth in the sub-system, while allowing long-term flexibility to address load across the sub-region and improving reliability. This will poise the system for further growth.
- In the Pickle Lake and Ear Falls pocket, reactive support is recommended to allow for full utilization of existing and recommended transmission lines.
- Due to reliability concerns, non-wires alternatives are not recommended at this time.

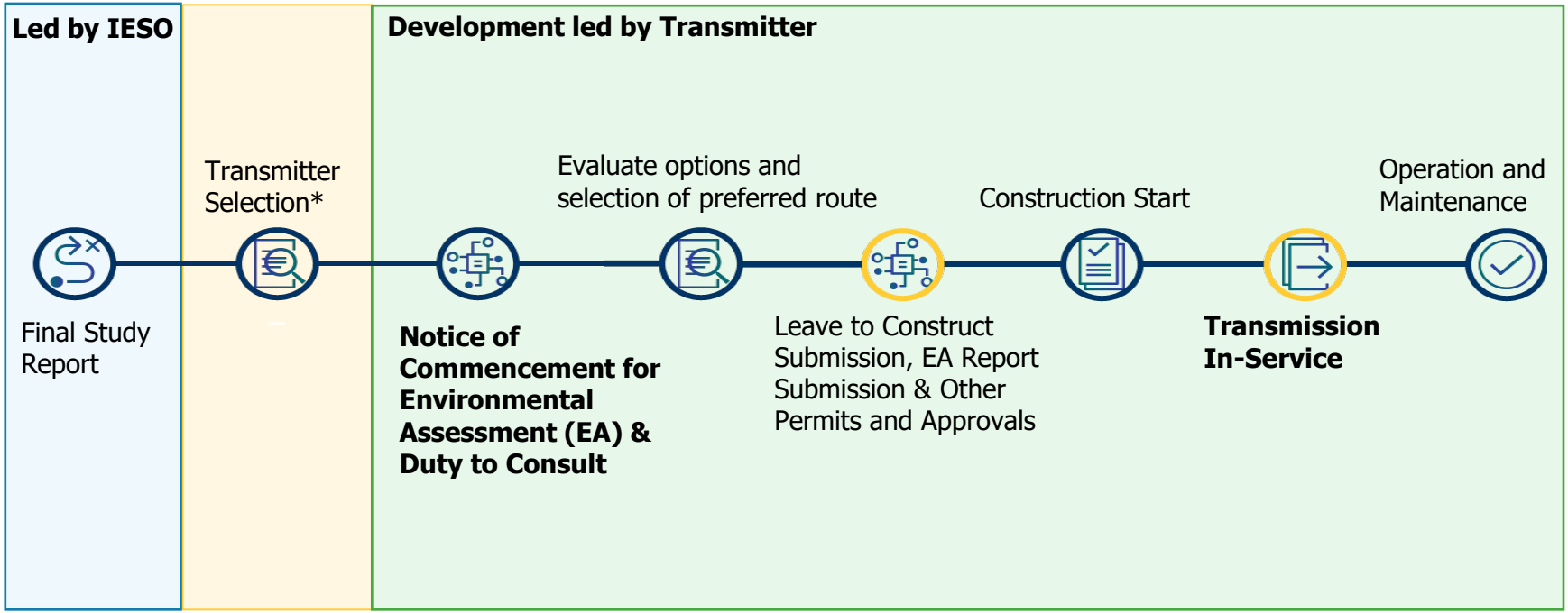


Map is for illustrative purposes.

Option 3 Double Circuit Rationale

1. Improves reliability in the North of Dryden sub-region and significantly reduces load interruptions.
2. Enables connection of new resources including hydro-electric, biomass and other resources by potentially reducing connection costs and improving transfer capability of power to the main transmission network.
3. Improves robustness and resilience of the transmission network in North of Dryden sub-region while respecting planning criteria.
4. Is compatible with other options should additional reinforcement be required in the future to supply a higher load growth in the Pickle Lake area. In conjunction with a 230kV circuit parallel to E1C, this Option will serve as an alternate supply to Pickle Lake area during outages to W54W.
5. The incremental cost of building a double-circuit transmission line is significantly lower than constructing a parallel single circuit line in the future.
6. Makes use of existing right-of-way corridors.

Typical Process for Transmission Development



*Currently, no standardized process exists to select a transmitter; Transmitter Selection Framework under development

Next Steps

Ongoing Engagement

Your input plays an important role in developing the electricity plan.

Participate in upcoming public webinars

Subscribe to receive updates on the IESO website by selecting the Northwest Region

Follow the Northwest regional planning activities online and the North of Dryden Engagement online

Next Steps

The IESO will continue to engage and inform throughout the Addendum's development. Participants can expect to hear from the IESO at these milestones:

- August 2025**:** Addendum Study will be completed and published on the North of Dryden Engagement webpage.
- IESO welcomes written feedback until August 13, 2025. Please submit feedback to: engagement@ieso.ca.
- Northwest Regional Planning will launch later this year.

Key Discussion Questions

The following is a list of questions to facilitate the discussion, but is not intended to limit the discussion:

- What feedback is there on the options analysis and draft recommendations?
- What information needs to be considered regarding these draft recommendations?
- How can the IESO continue to engage with communities and stakeholders as these recommendations are implemented, or to help prepare for the next planning cycle?

IESO welcomes written feedback until August 13, 2025. Please submit feedback to: engagement@ieso.ca.

Thank You

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Appendix

IRRP Study Team ("Technical Working Group")

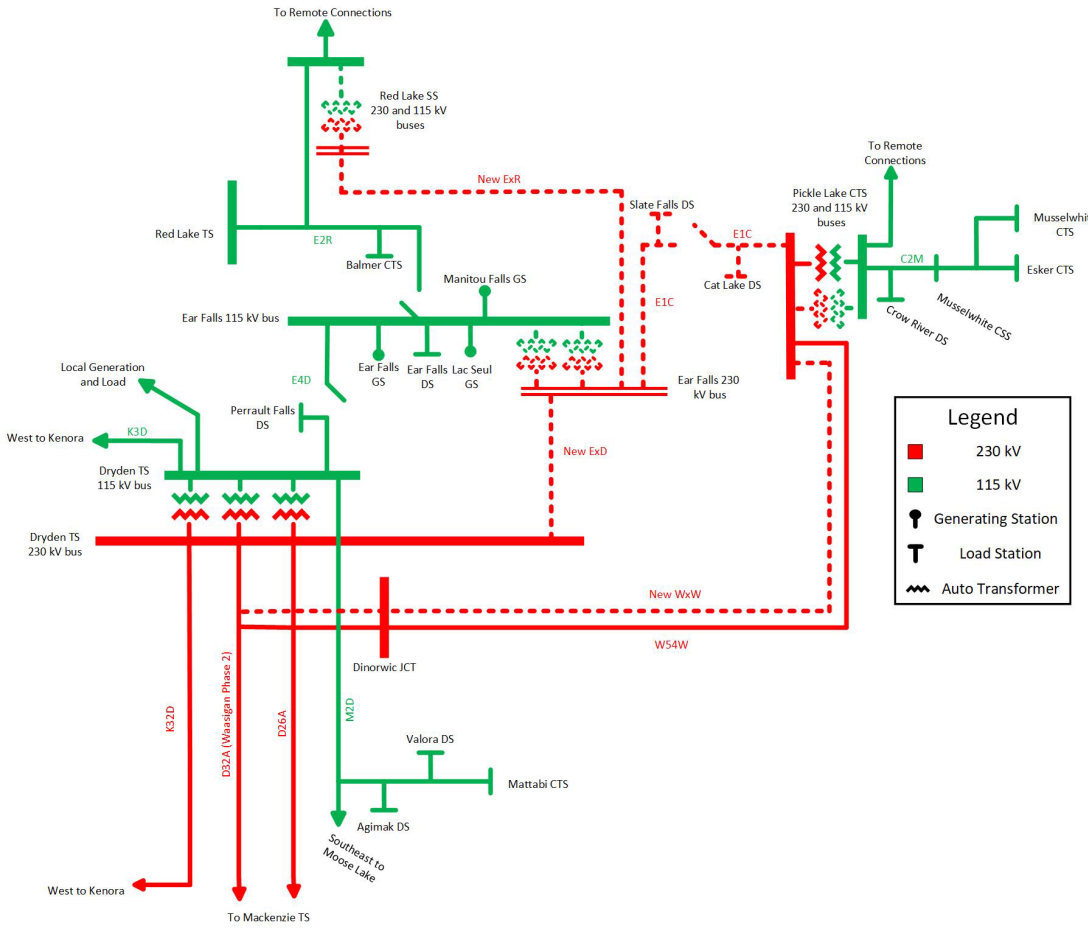
The plan will be developed by a Technical Working Group, led by the IESO, and consisting of the local distribution companies and transmitters.

Team Lead, System Operator	• Independent Electricity System Operator
Lead Transmitters	• Hydro One Networks Inc. (Transmission) • Wataynikaneyap Power
Local Distribution Companies (LDC)	• Hydro One Networks Inc. (Distribution) • Hydro One Remotes • Fort Frances Power Corporation • Sioux Lookout Hydro Inc.

Transmission Option #1

Option 1

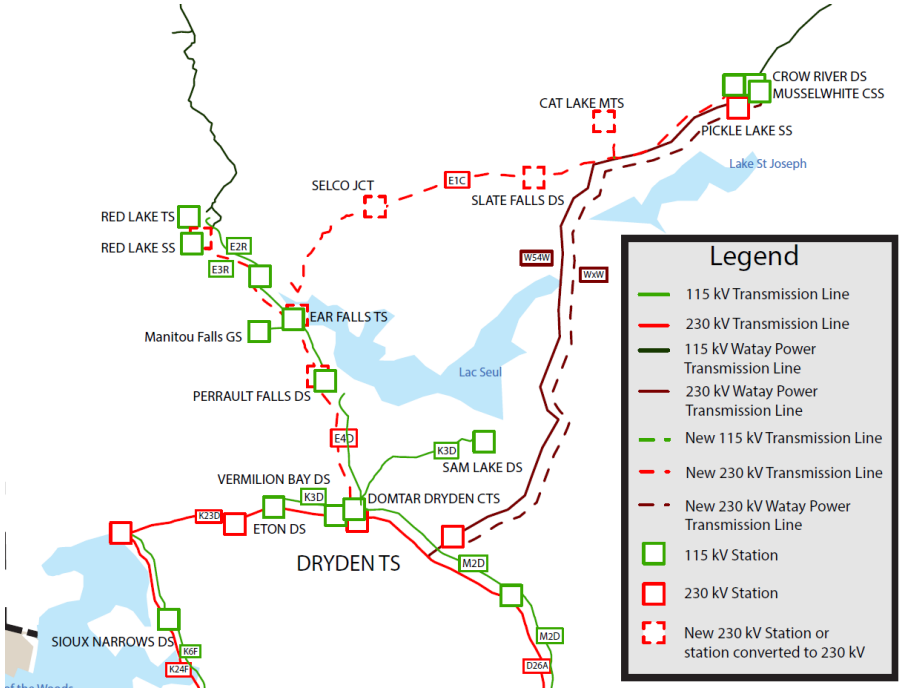
- Build one new 230kV E4D (100km) + one new 230kV E1C (260km) with terminals
- Build one parallel 115kV E2R (66.5km) with terminals
- Install two 230/115kV auto at Ear Falls TS and one 230/115kV auto at Pickle Lake CTS
- Replace Perrault Falls, Cat Lake and Slate Falls step-down with a 230/12.5 or 25kV transformer
- Remove old 115kV E1C and E4D infrastructure.



Transmission Option #1

Option 1

- Build one new WxW 302km 230kV line with 230kV terminations
- Build one new 230kV E4D (100km) with 230kV terminations
- Build one new 230kV E1C (260km) with 230kV terminations
- Build one parallel 115kV E2R (66.5km) with 115kV terminations
- Install two 230/115kV auto at Ear Falls TS and one 230/115kV auto at Pickle Lake CTS
- Replace Perrault Falls, Slate Falls and Cat Lake MTS step-down with a 230/12.5 or 25kV
- Build new Switching station with ring bus at Dinorwic
- Remove old 115kV E4D and E1C infrastructure



Transmission Option #2

Option 2

- Build one new WxW 302km 230kV line with 230kV terminations
- Build one new 230kV E4D (100km) with 230kV terminations
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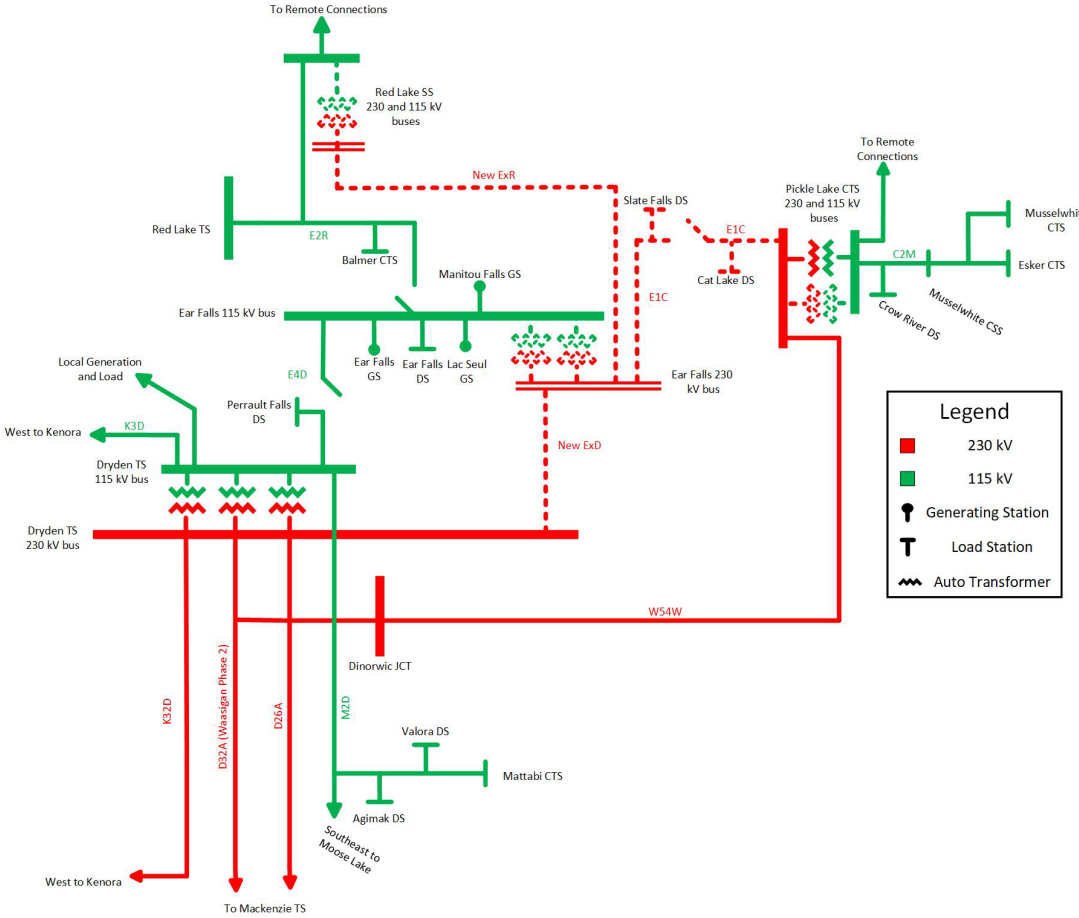

Transmission Option #2

Option 2

- Build one new 230kV E4D (100km) + one new 230kV E1C (260km) with terminals
- Build one parallel 115kV E2R (66.5km) with terminals
- Install two 230/115kV auto at Ear Falls TS and one 230/115kV auto at Pickle Lake CTS
- Replace Perrault Falls, Cat Lake and Slate Falls step-down with a 230/12.5 or 25kV transformer
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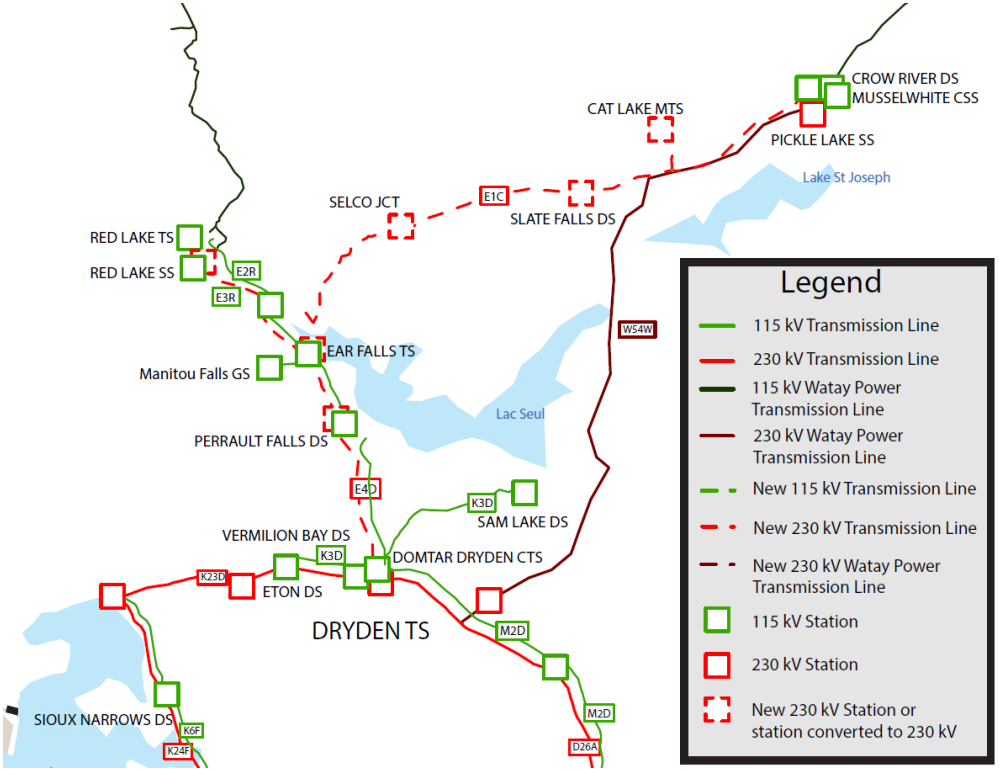
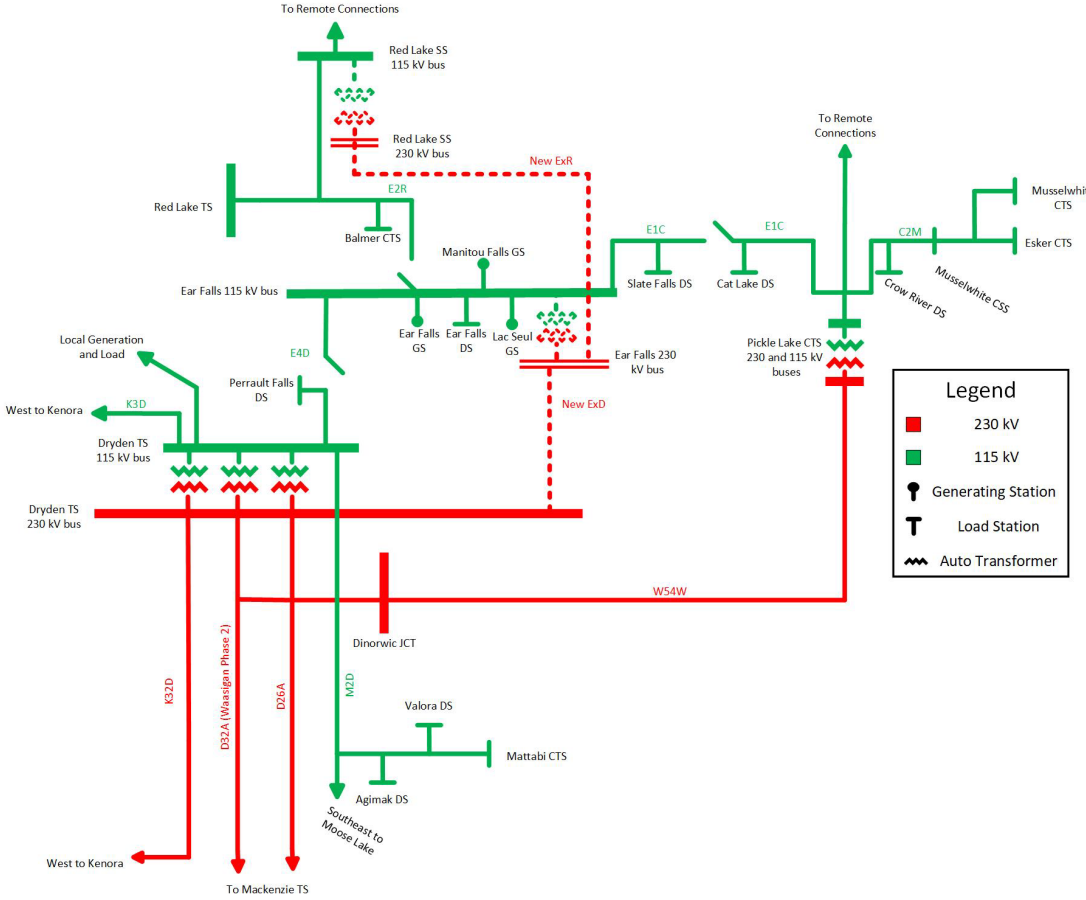


Transmission Option #3

Option 3

- Build one new 230kV line from Ear Falls TS to Dryden TS (100km)
- Build one new single 230kV line from Ear Falls TS to Red Lake TS (66.5km)
- Install 230/115kV autotransformers at Red Lake TS and Ear Falls TS
- Normally Open 115kV E4D at Ear Falls TS – This configuration is to be utilized as back-up
- After the I/S of Waasigan 230kV D32A (Phase 2 – Anticipated by end of 2027), W54W @ Dinorwic Jct to tap onto the D32A circuit



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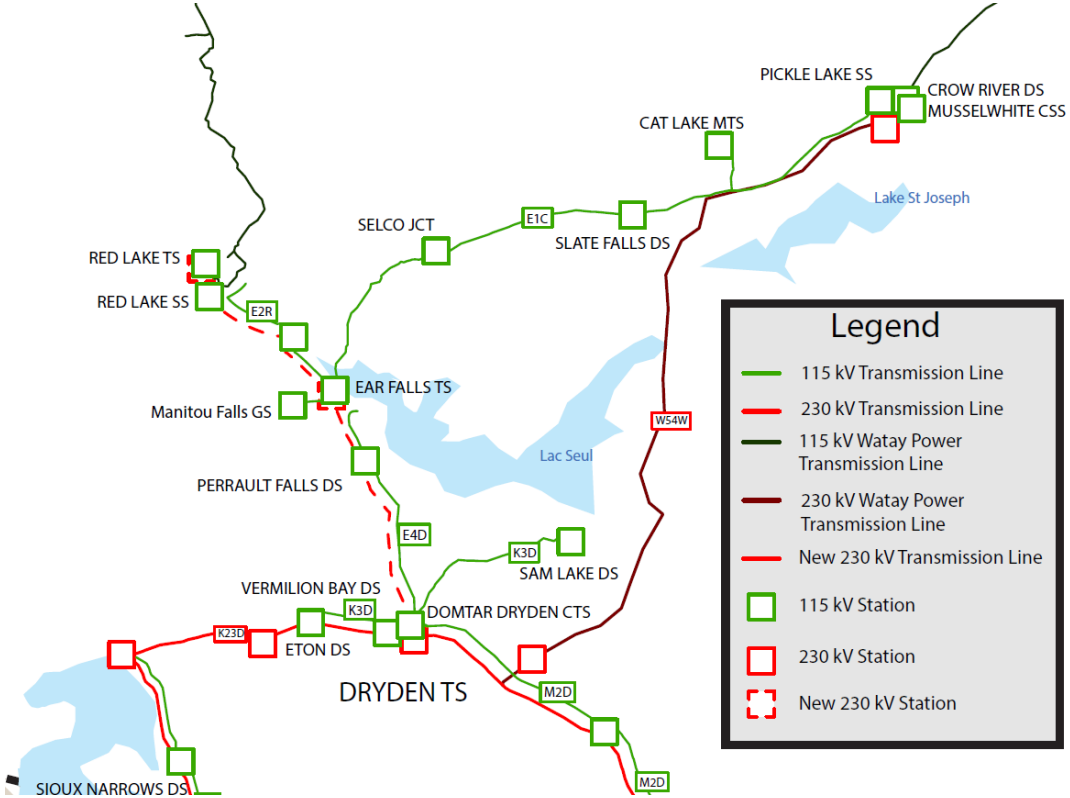

Transmission Option #3 Double

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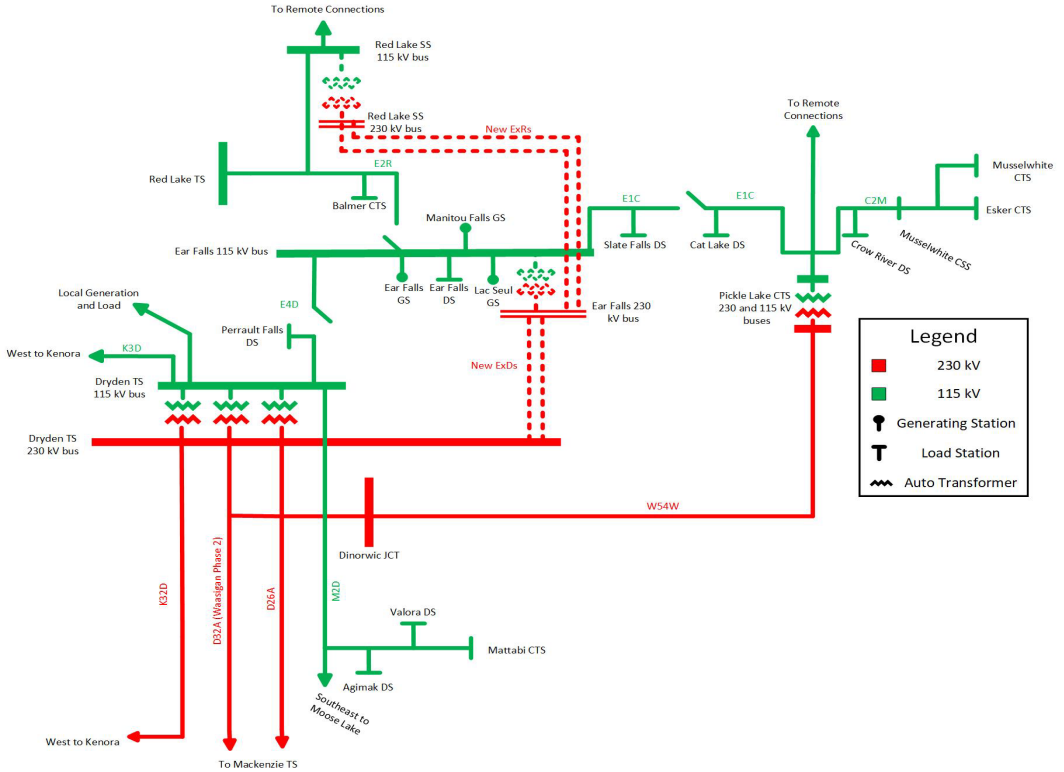

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