# Greater Toronto Area (GTA) East Integrated Regional Resource Plan

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# List of Acronyms

| Acronym | Definition |
|---|---|
| BESS | Battery Energy Storage System |
| CDM | Conservation and Demand Management |
| CTS | Customer Transformer Station |
| DER | Distributed Energy Resource |
| DESN | Dual Element Spot Network |
| DG | Distributed Generation |
| DR | Demand Response |
| eDSM | Electricity Demand-Side Management |
| EOL | End-of Life |
| EV | Electric Vehicle |
| FIT | Feed-in-Tariff |
| GS | Generating Station |
| GTA | Greater Toronto Area |
| IESO | Independent Electricity System Operator |
| ISD | In-Service Date |
| IRRP | Integrated Regional Resource Plan |
| kV | Kilovolt |
| LDC | Local Distribution Company |
| LMC | Load-Meeting Capability |
| LTE | Long Term Emergency |

| Acronym | Definition |
|---|---|
| LTR | Limited Time Rating |
| MTS | Municipal Transformer Station |
| MVA | Megavolt Ampere |
| MW | Megawatt |
| NERC | North American Electric Reliability Corporation |
| NPCC | Northeast Power Coordinating Council |
| NWA | Non-Wires Alternative |
| OEB | Ontario Energy Board |
| ORTAC | Ontario Resource and Transmission Assessment Criteria |
| RAS | Remedial Action Scheme |
| RIP | Regional Infrastructure Plan |
| SS | Switching Station |
| TS | Transformer Station |
| TWG | Technical Working Group |

# Executive Summary

A reliable and affordable electricity system is essential to supporting growth, economic development, and electrification across Ontario. The GTA East region — encompassing the municipalities of Pickering, Ajax, Whitby, Oshawa, Clarington, Scugog, and Uxbridge — is expected to experience significant residential, employment, and electrification-driven growth over the next two decades. To ensure the electricity system can continue to serve these evolving needs reliably and cost-effectively, the Independent Electricity System Operator (IESO), in collaboration with local distribution companies and Hydro One, developed this Integrated Regional Resource Plan (IRRP) to identify implementation-ready actions and future-consideration options required to support the region's electricity needs.

IRRP recommendations are based on a comprehensive assessment of forecast electricity demand in the GTA East region, existing system capability, community feedback, and regional growth plans. Demand growth is expected to be driven by major residential developments, employment expansion, and increasing electrification of buildings and transportation.

To balance enabling growth with prudence, the IRRP adopts a phased planning approach that embodies flexibility and aligns infrastructure investments with the convergence of lead time and progression of need. By taking this approach, the plan addresses near-term reliability and growth needs while aligning larger future expenditures with the progression and confirmation of need. The plan identifies implementation-ready actions that should proceed to development and implementation to address identified needs in the Pickering-Ajax-Whitby and Oshawa-Clarington subregions, supported by additional electricity demand-side management (eDSM) initiatives. Together, these actions will address emerging reliability needs, accommodate forecast growth, and establish a foundation for continued development across the region. The plan also identifies future-consideration transmission and supply options that may be required as electrification and growth continue, ensuring the region can support reliability and economic development while reducing the risk of premature infrastructure investment.

**Implementation-Ready Actions**

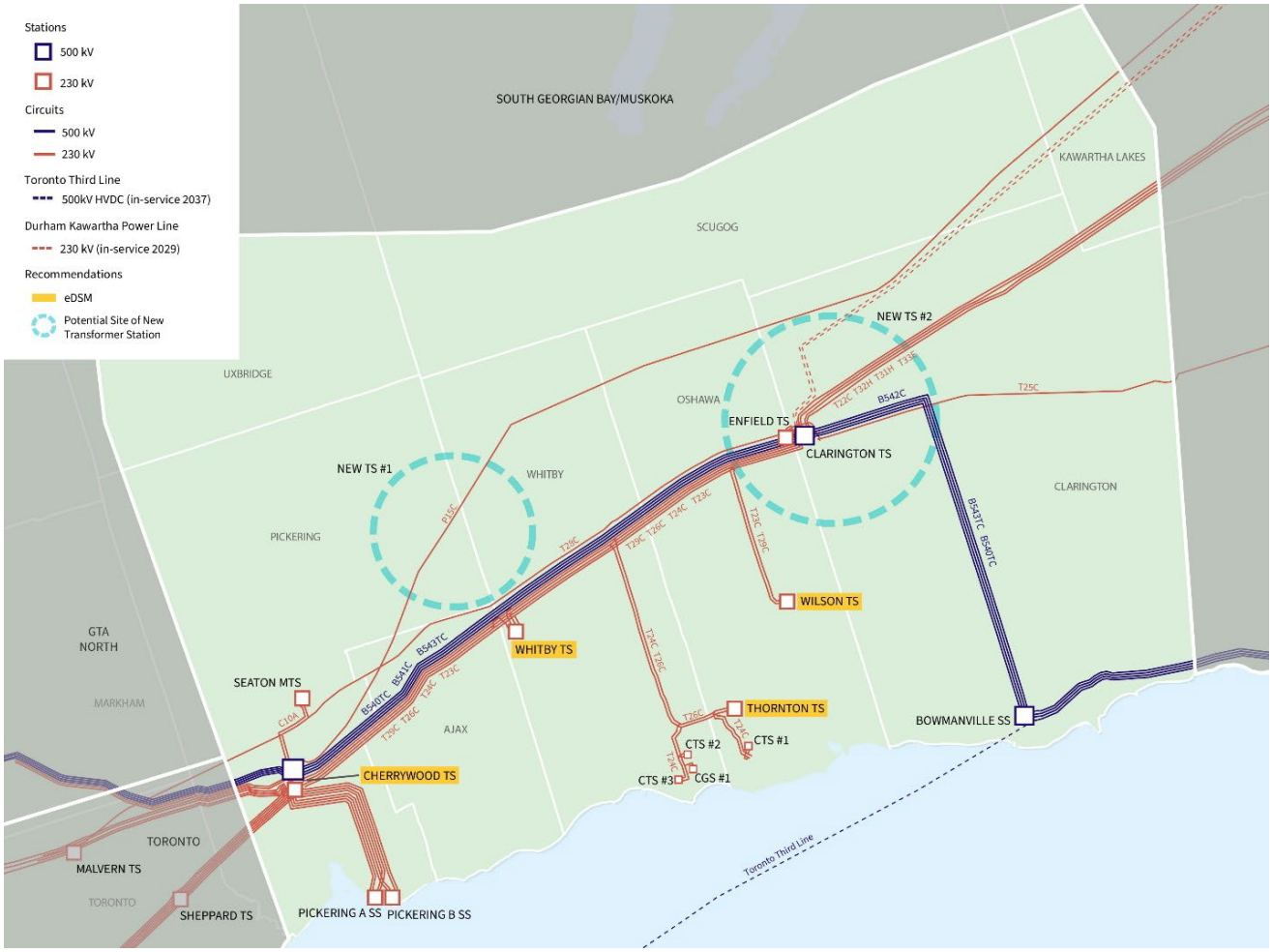
Implementation-ready actions are recommendations that should proceed to development and implementation now to ensure infrastructure is in service by the early- to mid-2030s. The IRRP recommends the development of a new 230 kV transformer station in the Pickering-Ajax-Whitby subregion to address emerging station capacity limitations, improve load security, and accommodate forecast growth. The final station design, ownership, and siting details will be confirmed through subsequent development and implementation activities.

To address identified station capacity, supply capacity, and load security needs and accommodate forecast growth, the IRRP recommends developing new 230 kV transformer station capacity in the Oshawa-Clarington subregion, supplied from the Durham-Kawartha Power Line. The final station configuration, ownership, and siting will be determined through subsequent planning and implementation activities.

As a low-cost and non-emitting resource, energy efficiency is a critical tool for the power system that achieves energy and peak demand savings and, in turn, reduces energy and capacity needs. Using electricity wisely offers benefits for individuals and businesses, as well as Ontario's electricity system, where energy efficiency typically involves upgrading or replacing existing equipment with higher-efficiency alternatives. To support near- and long-term needs, the plan recommends pursuing additional eDSM programs for Cherrywood TS, Whitby TS, Thornton TS, and Wilson TS, delivering a total of 75 MW of savings by 2042. These programs would help moderate electricity demand growth, maximize the utilization of existing infrastructure, and reduce the overall cost of meeting future electricity needs.

Together, these actions will strengthen the regional electricity supply system, improve transfer capability, and establish the foundation required to support continued residential growth and economic development.

**Figure 1 | GTA East IRRP Recommendations**



## Future-Consideration Options

Future-consideration options are potential reinforcements associated with longer-term demand growth, future generation development, and evolving policy direction. While these recommendations are not immediately required, they offer flexibility and responsiveness to future system needs as they develop while avoiding overcommitting costs to ratepayers. The IESO will continue to monitor system conditions and trigger the development of these reinforcements as needed.

In addition to the implementation-ready recommendations, the plan identifies longer-term considerations that will continue to be monitored through future regional planning cycles. In the Pickering-Ajax-Whitby subregion, future assessment of the 27.6 kV system will help ensure that reinforcement planning remains aligned with evolving growth patterns, customer connections, and broader transmission system developments.

In the Oshawa-Clarington subregion, future growth may necessitate additional transmission system expansion. Long-term development pathways identified through this planning process include potential expansion of the Clarington Transformer Station (TS) or Bowmanville Switching Station (SS) and new transmission facilities in the Oshawa-Clarington subregion. These options would provide additional supply capability to support future communities, employment lands, industrial customers, and emerging economic development opportunities. The Technical Working Group will continue to evaluate these pathways through future planning activities as demand growth materializes and system needs become more certain.

The regional planning assessments also considered non-wires alternatives, including distributed energy resources (DER) and local generation opportunities. While solar photovoltaic and battery energy storage facilities alone are not fully capable of addressing the scale of long-term regional needs, dispatchable distributed resources could help address future regional needs and should continue to be evaluated through future planning activities.

## Engagement

Developed in collaboration with Indigenous communities, municipalities, local distribution companies, Hydro One, and regional stakeholders, the GTA East IRRP reflects a shared commitment to a reliable electricity system that can support future growth and economic development. Over the course of IRRP development, the Technical Working Group received feedback and local insight at important milestones that helped inform recommendations — and incorporated a wide range of growth, housing, climate, and economic development initiatives to ensure the electricity system is aligned with the region's broader long-term vision. Ongoing engagement and co-ordination will continue as recommendations advance, and future planning activities are undertaken.

## Impact

The GTA East IRRP provides a prudent and adaptive roadmap to meet the region's electricity needs over the next 20 years — with recommended investments that address emerging reliability requirements while enabling continued residential growth, employment expansion, and electrification. By combining immediate infrastructure enhancements with longer-term planning pathways and considerations, the plan maintains flexibility as needs evolve to ensure the electricity system supports a fast-growing region. Together, the recommendations establish a resilient foundation for future growth, economic development, and decarbonization while protecting customers from any risk associated with premature infrastructure investment.

## Implementation and Monitoring

The recommended actions will proceed through established mechanisms, with ongoing monitoring of the system conducted by the Technical Working Group. Should conditions materially change, additional analysis and planning will be undertaken through future regional planning cycles to ensure continued reliability of the electricity system in the GTA East region.

# 1. Introduction

This Integrated Regional Resource Plan (IRRP) documents the recommendations required to address the electricity needs of the GTA East region over the next 20 years. It was prepared by the Independent Electricity System Operator (IESO) on behalf of a Technical Working Group (TWG) composed of the IESO, Elexicon Energy Inc. (Elexicon), Oshawa Power and Utilities Corporation Networks Inc. (OPUC), Hydro One Networks Inc. Distribution (Hydro One Distribution), and Hydro One Networks Inc. Transmission (Hydro One Transmission). Elexicon, OPUC, and Hydro One Distribution are the local distribution companies (LDCs) responsible for serving customers across the region, while Hydro One Transmission owns and operates the transmission infrastructure that supplies the region.

The GTA East region encompasses the municipalities of Pickering, Ajax, Whitby, Oshawa, Clarington, Scugog, and Uxbridge within Durham Region. The region is one of Ontario's most dynamic growth areas and is expected to accommodate significant population, housing, and employment growth over the coming decades. Growth is occurring through both intensification of existing communities such as Windfields and the development of major greenfield areas such as Columbus, Courtice, Kedron, Northeast Pickering, North Brooklin, Northwest Oshawa, and Seaton. These developments will support new homes, businesses, community services, and employment opportunities that are expected to shape the future of Durham Region for decades to come.

The IESO also acknowledges that the GTA East region is the traditional territory of many First Nations and Métis peoples and is committed to ongoing, meaningful dialogue with Indigenous communities to help inform long-term electricity planning in the region and across Ontario.

**Figure 2**, depicts the electrical transmission infrastructure for the GTA East region. Power is transmitted into the region via 230 kilovolt (kV) circuits originating from Cherrywood Transformer Station (TS) in the west and Clarington TS in the east.

**Figure 2 | Map of GTA East Region and Transmission System**




In Ontario, transmission planning to meet electricity reliability and supply needs at a regional level is carried out through the regional planning process established by the Ontario Energy Board (OEB) in 2013. As part of this process, the IESO, transmitters, and distributors jointly assess electricity needs and identify co-ordinated solutions that can maintain reliability while supporting long-term growth and development. This IRRP represents the latest cycle of regional planning for the GTA East region.

A defining characteristic of this planning cycle has been the unprecedented level of integration between electricity planning and the many municipal, regional, provincial, and federal initiatives shaping growth across Durham Region. Rather than relying solely on historical electricity consumption trends, the demand forecasts and needs assessments developed for this IRRP were informed by a broad range of planning inputs, including the Envision Durham Regional Official Plan, Durham Community Energy Plan, Durham Housing Plan, Durham Master Housing Strategy; secondary plans such as Brooklin, Columbus, Courtice, Kedron, Seaton Community, and Northeast Pickering; municipal climate and energy strategies; provincial housing initiatives; federal decarbonization policies; utility planning studies; and local customer connection activities.

Participating distributors worked closely with the municipalities to incorporate development forecasts, housing plans, employment growth assumptions, and customer connection information into their forecasts. As a result, the electricity needs identified in this IRRP reflect a shared regional vision in which new housing supports the creation of complete communities; communities attract employment

and economic investment; electrification increases energy demand; and electricity infrastructure provides the foundation that enables each stage of growth.

The importance of this integrated planning approach is particularly evident in the GTA East region, where population growth, housing development, employment expansion, and electrification are occurring simultaneously. Municipal and provincial plans identify significant opportunities for residential and economic development throughout Durham Region, including the creation of new communities that will require substantial electricity infrastructure to support homes, businesses, institutions, transportation systems, and emerging industries. Electrification has also become a central driver of future electricity demand, with municipal climate and energy plans increasingly relying on electric vehicles, building electrification, and broader energy transition initiatives to achieve greenhouse gas reduction objectives. The demand outlook reflects increasing electrification of transportation, buildings, and industry, which is expected to become a major driver of future electricity demand across the region.

The growth identified through this planning process presents both immediate challenges and significant long-term opportunities. Much of the existing transmission and distribution system is approaching its practical capacity limits, and several transformer stations and transmission facilities are expected to experience constraints as growth continues. At the same time, ongoing development in the region, together with planned evolution of the regional transmission network and future interconnections with the broader GTA system, is an opportunity to establish the additional supply capability needed to serve future communities, employment lands, and larger customer connections.

This IRRP therefore adopts a phased approach that balances near-term reliability needs with long-term regional planning objectives. The plan identifies implementation-ready actions that should proceed to development and implementation to address confirmed reliability needs and accommodate forecast growth. The plan also identifies future-consideration options that may be required as demand, electrification, and system requirements evolve but are not being advanced at this time. The strategy is intended to ensure that electricity infrastructure is developed in a manner that aligns with the needs of a fast-growing region, ensuring the system stays ahead of growth and minimizes delays that could constrain housing, economic investment, or electrification goals while maintaining sufficient flexibility to adapt as growth materializes. In this way, the region's utilities are actively collaborating to address immediate needs while building the foundation for a more resilient and interconnected electricity system capable of supporting future growth over the long term.

This report is organized as follows:

- A summary of the recommended plan for the region is provided in Section 2;
- The process and methodology used to develop the plan are presented in Section 3;
- The context for electricity planning in the region and the study scope is described in Section 4;
- Demand forecast scenarios, electricity Demand-Side Management (eDSM), and distributed generation assumptions are described in Section 5;
- Electricity needs in the region are presented in Section 6;
- Alternatives and recommendations for meeting needs are addressed in Section 7;
- A summary of engagement activities is provided in Section 8; and

- The conclusion is provided in Section 9.

# 2. The Integrated Regional Resource Plan

This IRRP provides recommendations to address the electricity needs of the GTA East region over the next 20 years. The identified needs are based on the demand growth anticipated in the region and the capability of the existing transmission system, as evaluated through application of the IESO's Ontario Resource and Transmission Assessment Criteria (ORTAC) and reliability standards governed by the North American Electric Reliability Corporation (NERC). The IRRP's recommendations are informed by an evaluation of different options to meet electricity needs and consider reliability, cost, technical feasibility, and maximizing the use of the existing electricity system (where economically feasible). The plan also reflects feedback from communities and stakeholders and seeks to balance the need to ensure the system is poised to enable growth — including economic development — against the risk of building investments too early.

Building electrification is expected to be an important contributor to demand growth in the subregion, particularly in the later years of the forecast period. The LDC forecasts incorporate assumptions related to net-zero building construction, building retrofit activity, and increasing adoption of electric space and water heating technologies. These assumptions are informed by regional and municipal planning initiatives, including the Durham Community Energy Plan, as well as federal net-zero objectives and local customer adoption trends. While these trends support increasing electrification over time, the pace and extent of adoption remain uncertain and will depend on factors such as customer economics, technology uptake, and program participation. To account for this uncertainty, the assessment considers a range of electrification outcomes when evaluating future electricity needs, and the recommended plan emphasizes solutions that can be adapted as electrification trends and system needs evolve.

The IRRP recommendations are organized into an implementation-ready plan and a set of Future-Consideration Options. This structure reflects the varying degrees of forecast certainty, development lead times, and planning commitments required over different timeframes. By doing so, the IRRP offers clear guidance on immediate investment needs while maintaining flexibility to adapt over the medium and long term as electrification, energy efficiency, and development plans continue to evolve.

## 2.1 Implementation-Ready Actions

The implementation-ready actions consist of recommendations that should proceed to development and implementation to accommodate forecast load growth, maintain reliability, and optimize asset replacement. The recommendations are summarized in **Table 1**.

**Table 1 | Implementation-Ready Actions**

| Need(s) | Technical Working Group Recommendation | Lead Responsibility | Expected In-Service Date |
|---|---|---|---|
| Cherrywood TS, Whitby TS T1/T2, Whitby TS T3/T4, station capacity, load security | Build a new 230 kV transformer station in the north Pickering/Whitby area connected to P15C and T28C | Elexicon, Hydro One Transmission | 2031 |
| Thornton TS, Wilson TS T3/T4, Wilson TS T7/T8, station capacity, load security, load supply Wilson subsystem, load supply CTS subsystem | Develop new 230 kV transformer station capacity in the Oshawa-Clarington area supplied from the Durham-Kawartha Power Line. | Oshawa Power, Hydro One Distribution, Hydro One Transmission | 2034 |
| Cherrywood TS, Whitby TS, Wilson TS, Thornton TS station capacity | Pursue additional eDSM programs for Cherrywood TS, Whitby TS, Wilson TS, and Thornton TS to reduce electricity demand by a total of 75 MW by 2042 | IESO, LDCs | 2027-2044 |

## 2.2 Future-Consideration Options

While the implementation-ready recommendations are expected to address the identified near-term reliability needs in the Pickering-Ajax-Whitby subregion, future assessment will be required as demand continues to grow beyond the planning horizon of the recommended investments. The recommended new 230 kV transformer station, combined with targeted eDSM initiatives that are expected to provide approximately 55 MW of demand savings by 2042, is expected to address 44 kV supply needs through approximately 2040.

However, additional needs are expected to emerge over time. In particular, forecast demand on portions of the subregion's 27.6 kV system is expected to exceed available supply capability beginning in the mid- to late-2030s, indicating that additional reinforcement may be required within the planning horizon. At the same time, much of the existing transmission infrastructure serving the subregion, including the existing 230 kV supply corridor and the circuits supplying the area from Cherrywood TS, is expected to be operating close to its practical limits. As a result, future expansion opportunities may require broader transmission system studies and the evaluation of new supply arrangements beyond the existing Cherrywood supply corridor.

Given the uncertainty associated with the timing, location, and magnitude of future growth, a preferred long-term reinforcement strategy has not been identified through this IRRP. The IESO, transmitters, and LDCs should continue to monitor demand growth, electrification trends, and system utilization, and reassess future supply requirements through subsequent regional planning cycles to determine the timing and nature of any additional reinforcements.

In the Oshawa-Clarington subregion, additional transmission supply capability may be required later in the planning horizon as electricity demand continues to grow. The planning assessment identified two potential reinforcement options for addressing these longer-term needs: expansion at Clarington TS and the development of new transformation and switching facilities at Bowmanville SS. These options are identified as Future-Consideration Options and are not recommended for implementation at this time.

The first option would expand the 500/230 kV transformation and switching facilities at Clarington TS to support new 230 kV transmission lines toward emerging load centres in the eastern part of the region. Further assessment would be required to determine how this option could be developed given the physical limitations at the existing station and the need to address short-circuit constraints.

The second option would develop new 500/230 kV transformation and a 230 kV switchyard at Bowmanville SS following completion of the planned station expansion. This option could support new transmission lines serving emerging load growth in the eastern part of the region and may provide flexibility to coordinate future electricity demand and generation development. The relative merits, timing and configuration of the Clarington and Bowmanville options will be assessed in future planning cycles as demand growth, generation development and broader system conditions become more certain.

The plan also assessed the feasibility of meeting the residual long-term needs in the Wilson TS subsystem through non-wires alternatives. Preliminary assessments indicate that a portfolio of approximately 200 MW of dispatchable distribution-connected resources, in combination with the recommended station investments and targeted eDSM initiatives, could potentially address the remaining needs in the Wilson TS subsystem. This represents a potential future alternative to additional transmission reinforcements identified for the Oshawa-Clarington subregion. By comparison, equivalent solar and battery energy storage system (BESS) portfolios would require substantially larger resource deployments and were not found to be feasible at the scale required. As this assessment remains preliminary, further technical, economic, operability, and implementation analysis is required before identifying dispatchable resources as a preferred solution pathway. The Technical Working Group will continue to monitor system needs and evaluate these alternatives through future planning cycles.

# 3. Development of the Plan

## 3.1 The Regional Planning Process

In Ontario, preparing to meet the electricity needs of customers at a regional level is achieved through regional planning, which assesses the inter-related needs of a region — defined by common electricity supply infrastructure — over the near, medium, and long term; and results in a plan to ensure cost-effective and reliable electricity supply. An integrated regional plan also considers existing electricity infrastructure in an area, forecasts growth and customer reliability, evaluates options for addressing needs, and recommends actions.

The current regional planning process was formalized by the OEB in 2013 and is performed on a five-year cycle for each of the 21 electricity planning regions in the province. The process is carried out by the IESO, in collaboration with the transmitters and LDCs in each region, and consists of four main components:

1. **Needs Assessment**, led by the transmitter, which completes an initial screening of a region's electricity needs and determines if there are electricity needs requiring regional co-ordination;
2. **Scoping Assessment**, led by the IESO, which identifies the appropriate planning approach for the identified needs and the scope of any recommended planning activities;
3. **IRRP**, led by the IESO, which proposes recommendations to meet the identified needs requiring coordinated planning; and/or
4. **Regional Infrastructure Plan (RIP)**, led by the transmitter, which provides further details on recommended wires solutions.

Other types include bulk system planning and distribution system planning. There are inherent overlaps in all three levels of electricity infrastructure planning. Additional technical information will be provided in a separately published appendix document.

## 3.2 IESO's Approach to Regional Planning

In developing this IRRP, the IESO worked closely with the GTA East Technical Working Group to assess system performance under forecast demand conditions and applicable contingencies, consistent with the ORTAC, NERC standards, and NPCC criteria.

An important aspect of this planning cycle was the consideration of a broad range of planning inputs extending beyond the electricity sector. Demand forecasts and planning assumptions were informed by provincial, regional, and municipal planning initiatives — including growth forecasts, housing strategies, employment forecasts, community energy plans, climate action plans, and electrification initiatives. These inputs helped ensure that the assessment of future electricity needs reflected both anticipated growth in electricity demand and the broader direction of community and economic development across Durham Region.

A wide range of potential solutions was considered, including transmission and distribution reinforcements, operational measures, conservation and demand-side resources, distributed energy

resources (DERs), and other non-wires alternatives (NWAs). Options were evaluated based on technical feasibility, timing, cost-effectiveness, and their ability to directly address identified system needs. Preferred approaches were selected where they provided the most effective and proportionate means of maintaining reliability while supporting the long-term development of the regional electricity system.

## 3.3 GTA East Region IRRP Development

Throughout the development of the IRRP, the Technical Working Group met regularly to review forecasts, assess transmission and station capability, discuss emerging needs, evaluate potential solutions, and confirm study findings. Particular emphasis was placed on understanding the impacts of population growth, housing development, employment growth, and electrification trends occurring across the region.

The Technical Working Group also reviewed planning information developed by municipalities, regional planning authorities, and participating distributors to better understand the location, timing, and magnitude of forecast growth. This included consideration of regional and municipal growth forecasts, housing development plans, secondary planning studies, community energy planning initiatives, and electrification strategies. The use of these planning inputs helped establish a common understanding of how the region is expected to evolve over the planning horizon and how future electricity infrastructure can support that growth.

# 4. Background and Study Scope

This is the third cycle of regional planning for the GTA East region, following an earlier IRRP published in 2016. Recommendations from the previous regional planning cycle are summarized, along with information on the current regional planning cycle.

## 4.1 Previous Regional Planning Cycle

The second cycle of regional planning for the GTA East region was completed in 2019. During this cycle, the Needs Assessment Report did not identify any electricity needs requiring co-ordinated planning and thus did not publish an IRRP. As a result, a GTA East 2019–2024 Regional Infrastructure Plan was published.

The following project has been implemented to address electricity needs across the region:

- End-of-life (EOL) transformer and switchyard refurbishment at Wilson TS (T1/T2): Wilson TS T1/T2 have been replaced with T7/T8 in early 2024.

The following project has been committed and remains underway:

- End-of-life (EOL) breaker replacement at Cherrywood TS (multi-phase projects): Two phases are underway with currently planned in-service dates of 2033 and 2037.

## 4.2 Bulk Planning and Other Developments

This IRRP reflects the outcomes of previously completed bulk system planning studies that affect the GTA East region, including the Gatineau Corridor End-of-Life Study and the South and Central Bulk Plan. These planning outcomes form part of the reference system and key assumptions used in the regional needs assessment and options analysis.

For the GTA East region, the most relevant reinforcement is the new double-circuit 230 kV transmission line between Dobbin TS in Peterborough and Clarington TS in Clarington (the Durham–Kawartha Power Line) from the Gatineau Corridor End-of-Life Study, with an expected in-service date of Q4 2029. This reinforcement is critical to accommodating projected load growth by providing an additional transmission corridor separate from existing corridors within the GTA East region.

## 4.3 Current Cycle of Regional Planning

The current cycle of regional planning began in 2024 with the publication of the Needs Assessment. The 2025 Scoping Assessment Outcome Report recommended an IRRP for the entire region to address needs in a co-ordinated manner. This report presents an integrated regional electricity plan covering the period 2025–2044.

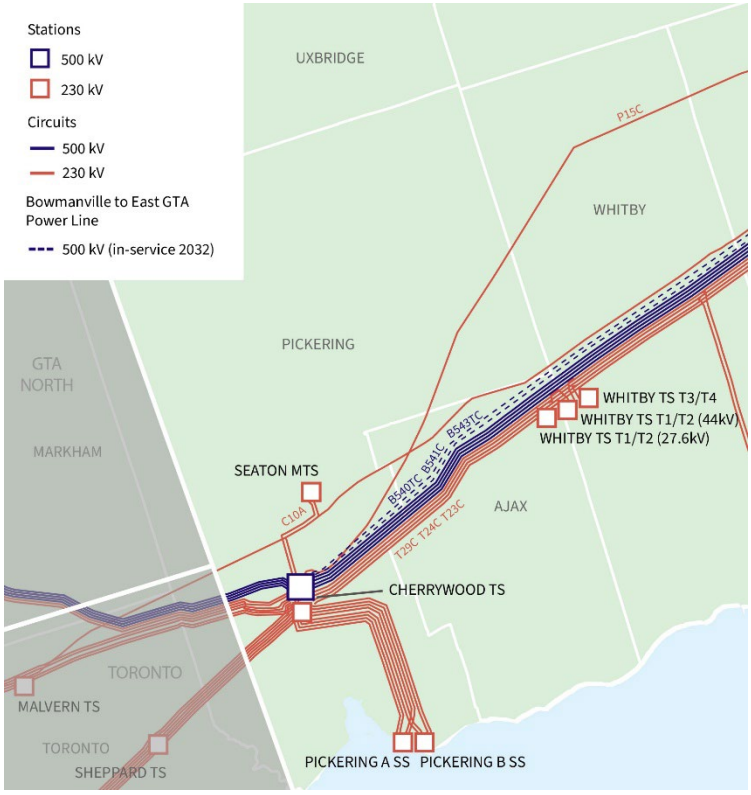
This IRRP develops and recommends options to meet the electricity needs of the GTA East region in the near, medium, and long term. The plan was prepared by the IESO on behalf of the Technical Working Group, and considers forecast electricity demand growth, eDSM, distributed generation, transmission and distribution system capability, relevant community plans, the condition of transmission infrastructure assets, and developments on the bulk transmission system.

The GTA East region is further divided into two subregions for planning purposes: Pickering-Ajax-Whitby and Oshawa-Clarington.

**Pickering-Ajax-Whitby Subregion**

This subregion consists of three step-down transformer stations that supply most of the City of Pickering, Town of Ajax, and part of the Town of Whitby. A map of Pickering-Ajax-Whitby subregion is shown in Figure 3.

**Figure 3 | Map of Pickering-Ajax-Whitby Subregion**



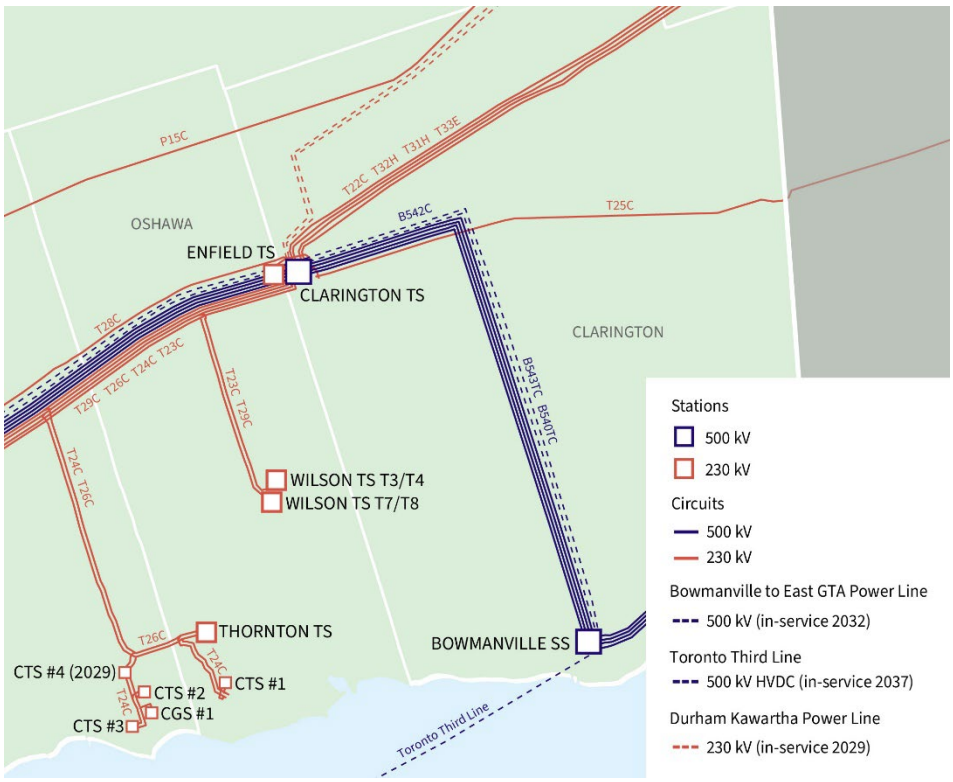
The following transmission facilities in the Pickering-Ajax-Whitby subregion were included in the scope of this study:

- Transformer stations: Cherrywood TS, Seaton MTS, and Whitby TS
- 230 kV transmission circuits: P15C, C10A/T28C, T24C/T26C, and T23C/T29C

### Oshawa-Clarington Subregion

This subregion consists of three step-down transformer stations that supply the City of Oshawa, part of the Town of Whitby, part of the Municipality of Clarington and part of the Township of Scugog and three transmission-connected customer transformer stations. A map of Oshawa-Clarington subregion is shown in Figure 4.

**Figure 4 | Map of Oshawa-Clarington Subregion**




The following transmission facilities in the Oshawa-Clarington subregion were included in the scope of this study:

- Transformer stations: Enfield TS, Thornton TS, Wilson TS, CTS #1, CTS #2, CTS #3, and a new customer station CTS #4 (planned ISD 2029)
- 230 kV transmission circuits: T24C/T26C, T23C/T29C, and Durham-Kawartha Power Line (planned ISD 2029)
- Local generating station: CGS #1

The GTA East IRRP was developed by completing the following steps:

- Preparing a 20-year electricity demand forecast and establishing needs over the planning timeframe (2025–2044).
- Examining the load-meeting capability (LMC) and reliability of the existing transmission system, taking into account facility ratings and performance of transmission elements, transformers, local generation, and other facilities such as reactive power devices. Needs were established by applying criteria and standards from ORTAC, NPCC, and NERC.
- Assessing system needs by applying a contingency-based assessment and reliability performance standards for transmission supply in the IESO-controlled grid.
- Confirming identified asset replacement needs and timing with the transmitter and the LDC.
- Establishing alternatives to address system needs including, where feasible and applicable, generation, transmission and/or distribution, and other approaches such as non-wire alternatives including additional eDSM.
- Engaging with communities on needs and possible alternatives.
- Evaluating alternatives to address near-, medium-, and long-term needs.
- Communicating findings, conclusions, and recommendations within a detailed plan.

# 5. Electricity Demand Forecast

Regional planning in Ontario is driven by the need to meet peak electricity demand requirements in a region. This section describes the development of the demand forecast for the GTA East region; and highlights the assumptions made for developing peak electricity demand forecasts, including weather correction, the contribution of eDSM and distributed generation, and the development of low- and high-growth forecast scenarios.

The reference planning forecast represents the expected growth outlook after accounting for forecast eDSM savings and distributed generation and adjusting demand for extreme-weather conditions. It is used to identify electricity needs over the planning horizon. It was developed based on firm loads (current and planned), organic growth, new residential and industrial developments, electrification, and community energy and municipal plans, which are described in more detail in the separately published appendices.

The high-growth scenario captures demand growth with greater uncertainty in its timing, magnitude or likelihood. The low-growth scenario reflects slower or delayed growth. These scenarios are used to test the robustness of the recommended plan and identify potential longer-term actions if demand develops differently from the reference forecast. To evaluate the reliability of the electricity system, the regional planning process is typically concerned with the coincident peak demand for a given area. This is the demand observed at each station during the hour of the year in which overall demand in the study area reaches its maximum. Where a station contains multiple buses, demand is represented separately for each bus rather than as a station-wide total.

In addition to coincident peak demand, the regional planning process also considers non-coincident peak demand, which reflects the maximum demand observed at each station, or at each bus within a multi-bus station, irrespective of the timing of those peaks. Non-coincident peaks are used to understand the potential needs of the stations.

## 5.1 Historical Demand

The forecast development process begins with a review of historical summer and winter peak demand to establish a baseline.

Historically, the GTA East region has been a summer-peaking region. **Figure 5** shows that the net actual and gross[1] actual summer coincident demand has remained relatively stable. However, looking at the gross median weather-corrected summer coincident demand, it increased from approximately 910 megawatts (MW) in 2020 to 980 MW in 2024. **Figure 6** shows the net actual, gross actual, and gross median weather-corrected winter coincident demand. Winter gross median weather-corrected

[1] A gross forecast means that existing and new distributed generation, and new electricity demand side management savings are not accounted for in the forecast. Once distributed generation and electricity demand side management savings are accounted for, they will reduce the gross demand forecast to produce a net demand forecast: the forecasted demand to be experienced by electricity system infrastructure.

coincident demand increased more noticeably over the same historical period, rising from approximately 800 MW in 2020 to 940 MW in 2024.

While historical summer demand has remained relatively stable, winter demand has increased. This may reflect a combination of underlying customer growth and increasing electrification, including the adoption of electric vehicles and electric heating.

Historical demand data also demonstrates that several transmission-connected industrial customers participate in the Industrial Conservation Initiative (ICI), resulting in lower contribution to regional coincident peaks than would otherwise be expected.

**Figure 5 | Historical Summer Peak Demand in the GTA East Region**

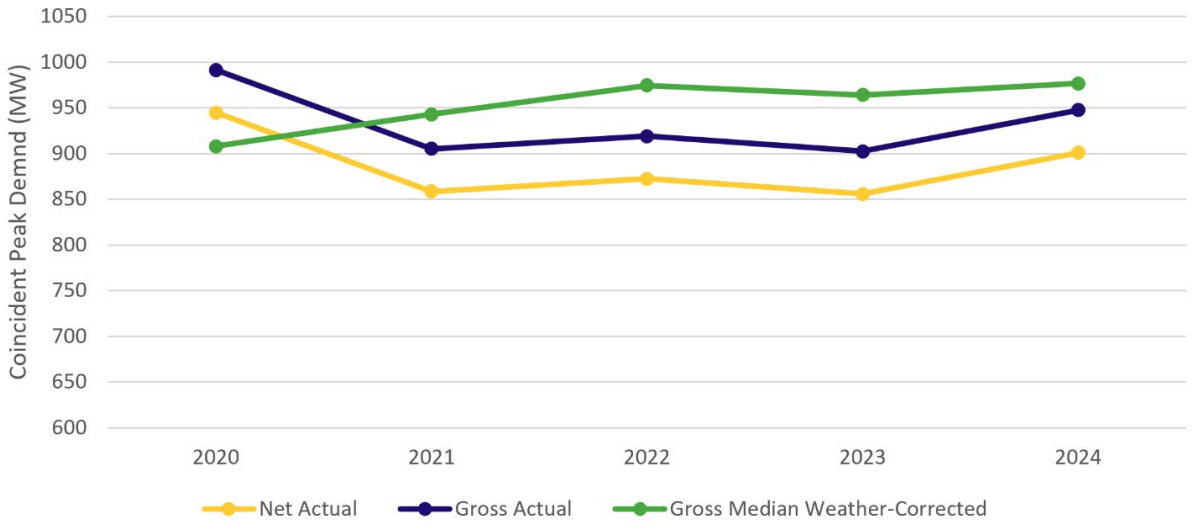
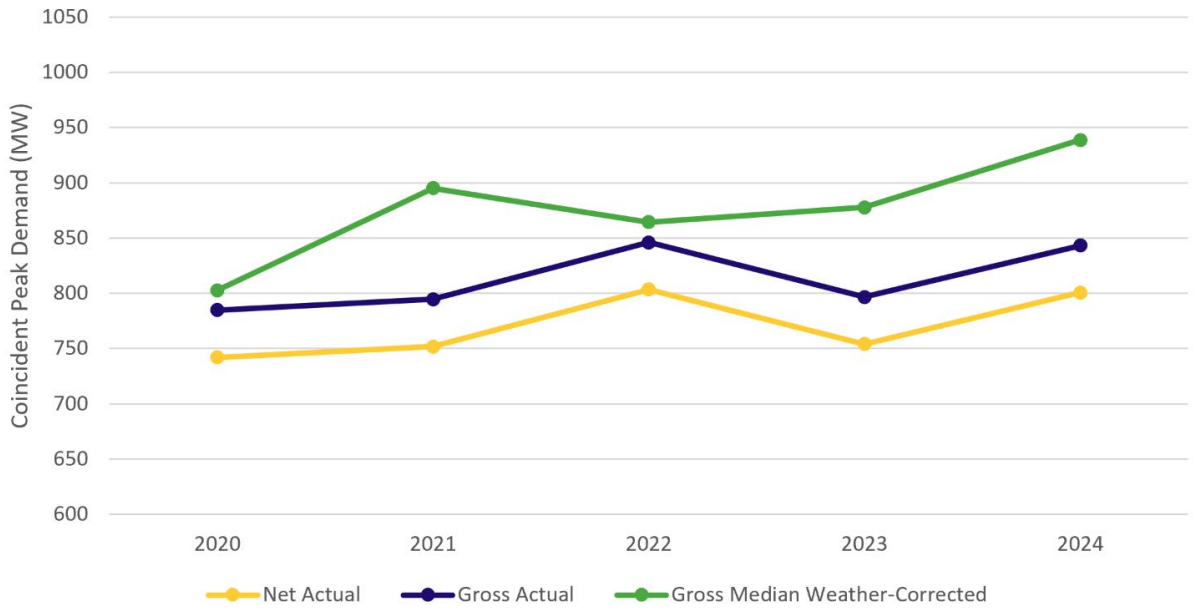


**Figure 6 | Historical Winter Peak Demand in the GTA East Region**




## 5.2 Demand Forecast Methodology

The GTA East demand forecast was developed using a collaborative process involving the IESO, Hydro One Transmission, Elexicon, OPUC, and Hydro One Distribution. The methodology combined utility-specific forecasts with regional planning assumptions to produce a consistent planning outlook for the region.

The forecasting process included:

1. Development of weather-normalized historical demand baselines
2. Development of station-level gross forecasts by participating LDCs
3. Application of eDSM savings assumptions
4. Application of distributed generation forecasts
5. Weather correction to reflect median and extreme weather conditions
6. Development of coincident regional forecast
7. Incorporation of transmission-connected industrial customer forecasts
8. Development of low-growth, reference, and high-growth scenarios

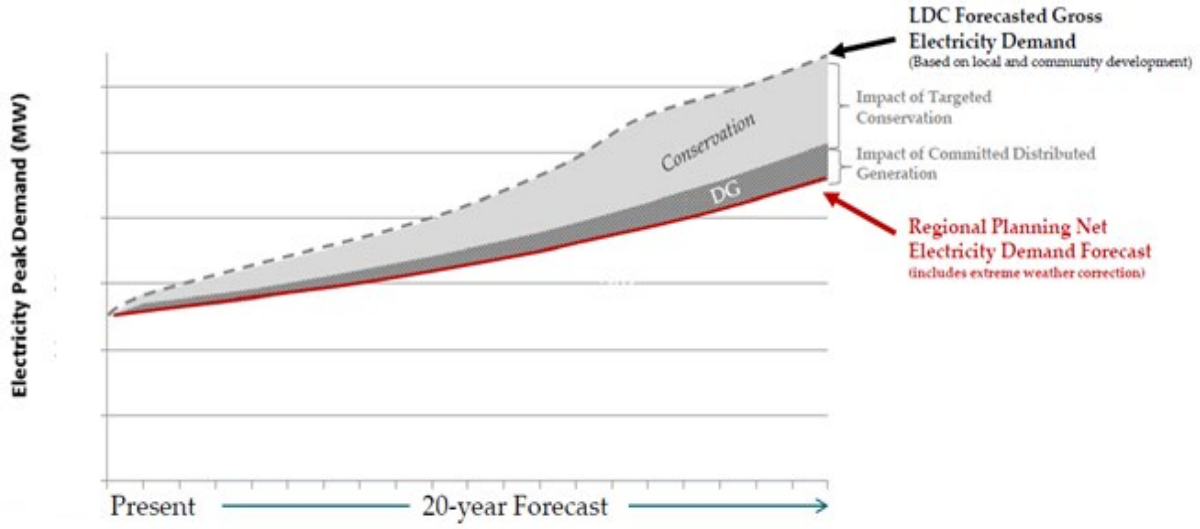
The steps taken to develop a 20-year IRRP peak demand forecast are depicted in **Figure 7**. Gross demand forecasts, which assume the weather conditions of an average year based on historical weather conditions (referred to as "normal weather"), were developed by the LDCs. These forecasts were then modified to reflect the peak demand impacts of provincial eDSM targets and distributed generation contracted through previous provincial programs, such as Feed-In Tariff (FIT) and

microFIT, and adjusted to reflect extreme weather conditions to produce a reference demand forecast for planning assessments. This net forecast was then used to assess the electricity needs in the region. Additional details related to the development of the demand forecast are provided in a separately published appendix document. The Ontario Energy Board has also published a Load Forecast Guideline for regional planning, through the Regional Planning Process Advisory Group.

The IESO recognizes data centres as an emerging and significant driver of electricity demand in Ontario. This is reflected in the 2026 Annual Planning Outlook (APO), where commercial data centres are identified as a key contributor to long-term demand growth and are incorporated into the provincial demand forecast. The APO also recognizes that data centre development is inherently uncertain, with the timing, location and magnitude of individual projects dependent on customer commitments, project maturity and broader market conditions.

The IESO continues to monitor emerging data centre opportunities through its planning and connection assessment processes. As projects mature and customer commitments become more certain, they will be evaluated through the appropriate planning processes and reflected in future planning assessments, as appropriate. In addition, the Ontario government's proposed Bill 40 and the associated regulatory framework, expected later this year, may further influence how future data centre developments are assessed and incorporated into Ontario's electricity planning framework.

**Figure 7 | Illustrative Development of Demand Forecast**



## 5.3 Gross LDC Forecasts

Each participating LDC in the GTA East region prepared gross demand forecasts at the station level or at the station bus level for multi-bus stations. These gross demand forecasts account for an increase in demand from new or intensified developments, electrification, as well as new connection applications. The LDC forecasts are aligned with municipal official plans and community energy plans and credited as a source for input data. LDCs were also expected to account for changes in consumer demand resulting from typical efficiency improvements and in response to increasing electricity price ("natural conservation"), but not for the impact of future distributed generation or new conservation measures (such as code and standards, and eDSM programs), which are accounted for by the IESO.

The LDC's gross forecast reflects a broad range of planning inputs including but is not limited to:

- Envision Durham Regional Official Plan;
- Municipal Official Plan;
- Brooklin Secondary Plan;
- Courtice Transit-Oriented Community Plan;
- Southwest Courtice Secondary Plan;
- Seaton Community Plan;
- Northeast Pickering Secondary Plan;
- Oshawa Columbus Secondary Plan;
- Kedron Secondary Plan;
- Durham Community Energy Plan;
- Customer connection requests;
- Regional housing and employment forecasts; and
- Federal electrification policies and electric vehicle adoption targets.

**Figure 8** and **Figure 9** show the gross regional coincident demand forecasts provided by the LDCs for the GTA East region under the low, reference, and high-growth scenarios for summer and winter peak demand.

**Figure 8 | Total Summer Gross Coincident Demand Forecasts Provided by LDCs (Median Weather)**

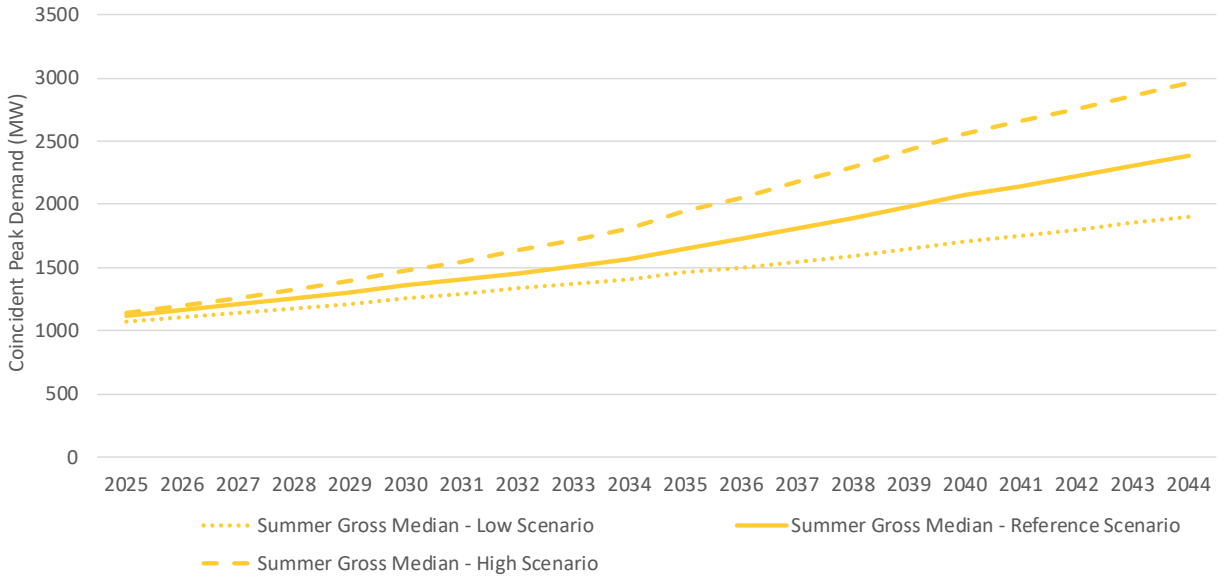
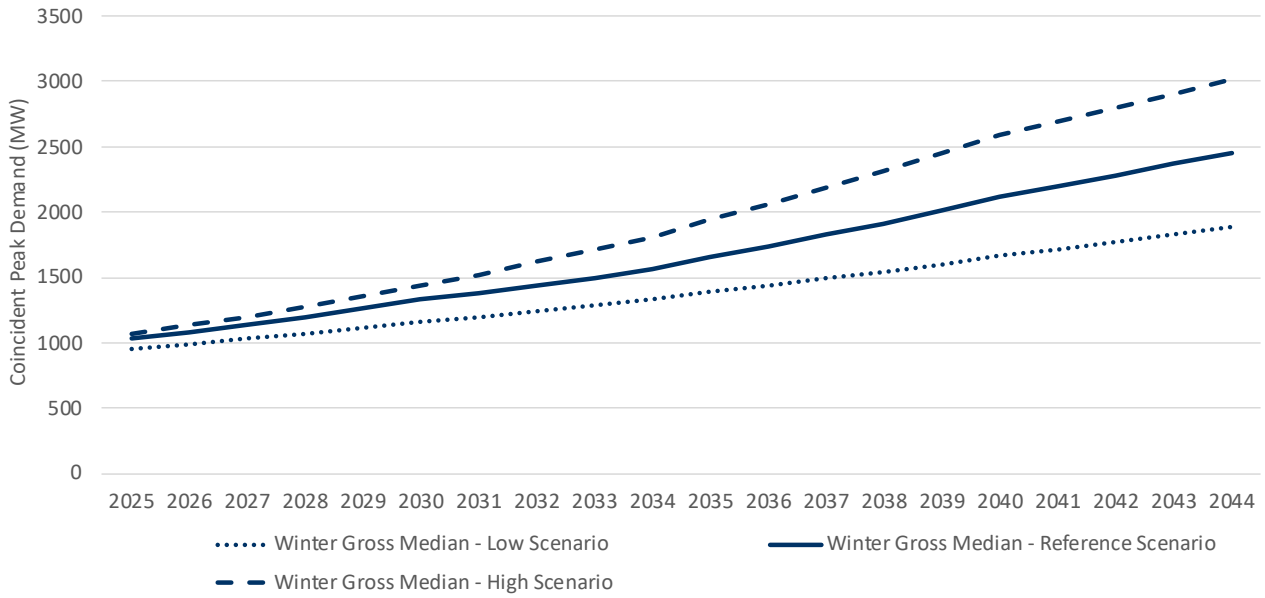



**Figure 9 | Total Winter Gross Coincident Demand Forecasts Provided by LDCs (Median Weather)**



## 5.4 Contribution of Electricity Demand-Side Management to the Forecast

Electricity Demand Side Management (eDSM) is a non-emitting and cost-effective resource that helps meet Ontario's electricity needs by reducing electricity consumption and peak demand and has become an integral component of provincial and regional planning. Electricity savings are achieved through both codes and standard amendments, as well as eDSM incentive program-related activities. These approaches complement each other to maximize results.

The estimate of demand reduction due to codes and standards is based on expected improvement in the codes for new and renovated buildings, and through regulation of minimum efficiency standards for equipment used by specific categories of consumers (e.g., residential, commercial, and industrial customers).

The estimates of demand reduction due to program-related activities account for the IESO's Electricity Demand Side Management (eDSM) initiatives between 2025 and 2044, consistent with the estimates of the 2025 Annual Planning Outlook.

The GTA East demand forecast was finalized before approval of the new 2025–2036 eDSM Framework and its savings targets and therefore assumes that the programs continue at 2021–2024 Demand Side Management Framework levels, with adjustments for gross demand growth.

**Figure 10** and **Figure 11** show the estimated total yearly reduction to the demand forecast due to eDSM savings for each of the residential, commercial, and industrial consumers. Additional details are provided in the in a separately published appendix document.

**Figure 10 | Total Summer Forecast Peak Demand Reduction (Codes, Standards, and eDSM Programs)**

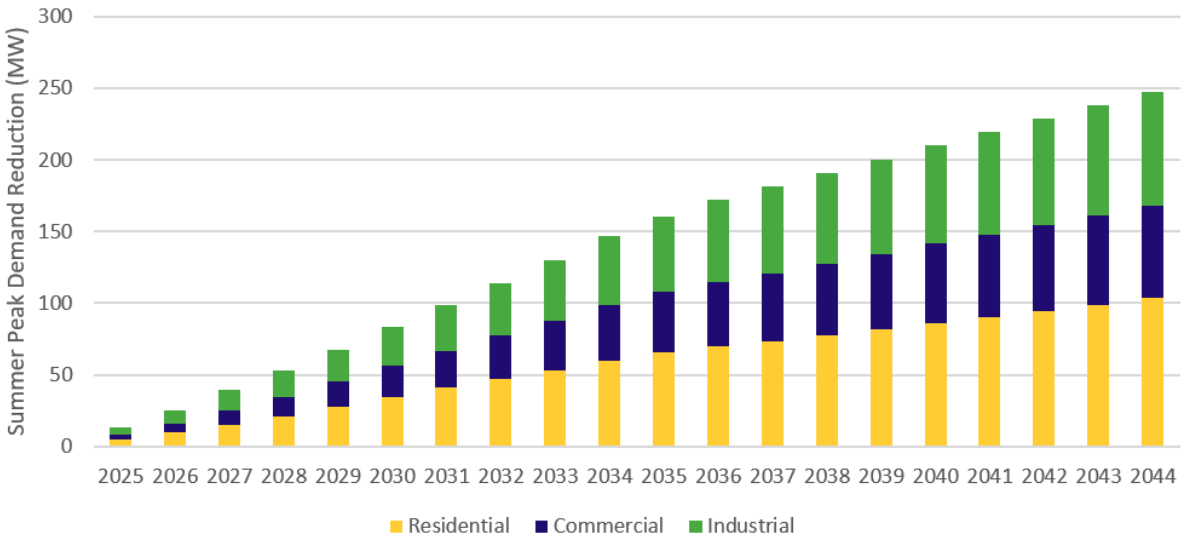
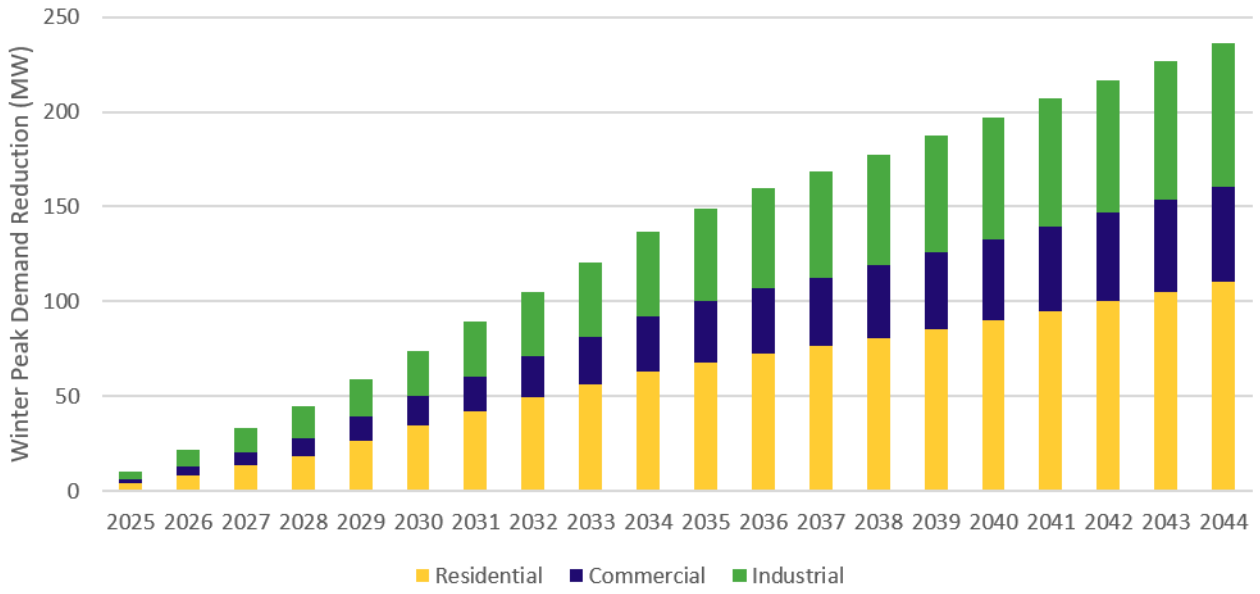


**Figure 11 | Total Winter Forecast Peak Demand Reduction (Codes, Standards, and eDSM Programs)**

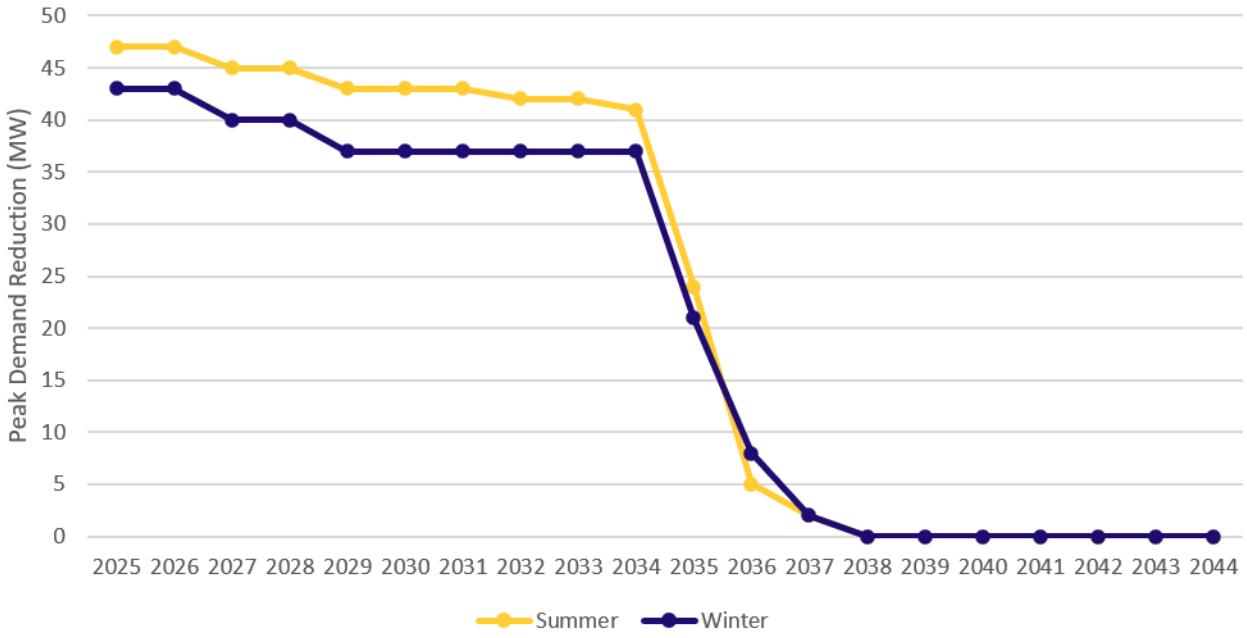



## 5.5 Contribution of Distributed Generation to the Forecast

In addition to eDSM, distributed generation in the GTA East region is also forecasted to offset peak demand requirements. The introduction of Ontario's FIT program increased the significance of distributed renewable generation that, while intermittent, contributes to meeting the province's electricity demands. The installed distributed generation capacity by fuel type and contribution factor assumptions can be found in the appendix. Most of the total contracted installed distributed generation capacity in the GTA East region is solar, wind, and biomass, with the remainder being gas facilities.

After reducing the demand forecast due to eDSM, the forecast is further reduced by the expected contribution from contracted distributed generation. **Figure 12** shows the impact of distributed generation on reducing the GTA East region demand forecasts. Note that facilities without a contract with the IESO were not included in the distributed generation peak demand reduction forecast, except for distributed generation facility information provided directly by the LDCs. Also, the forecast impact declines as the existing FIT and microFIT contracted facilities reach the end of their contract terms throughout the mid-2030s.

**Figure 12 | Peak Demand Reduction Due to Distributed Generation**




## 5.6 Planning Forecasts

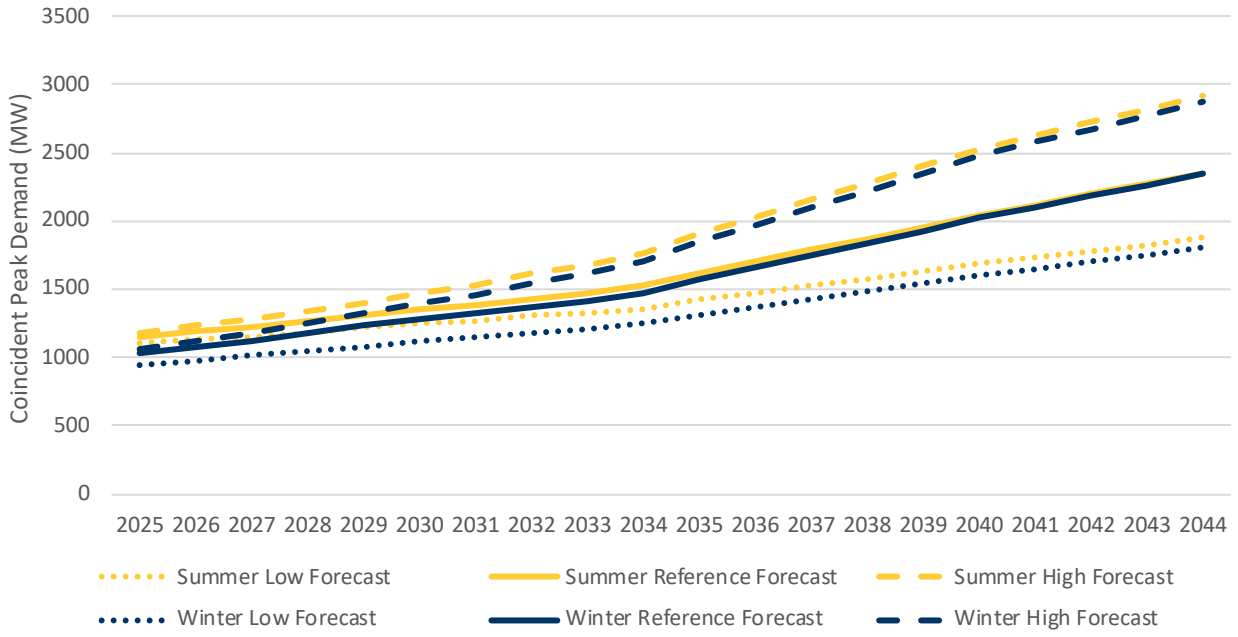
After taking into consideration the combined impacts of eDSM and distributed generation, a 20-year net demand forecast was created for the GTA East region, considering Low, Reference, and High Growth Scenarios. The following subsections describe the implementation of weather correction to create the Low Forecast, Reference Forecast, and High Forecast, and the total demand outlook for the region.

The net extreme weather forecast, also known as the "planning" forecast, is created by adjusting the net median weather forecast (the gross demand forecast with the forecast distributed generation and eDSM impacts as described above) for extreme weather conditions. The weather correction methodology is described in the separately published appendix document.

Note that this planning forecast is coincident, meaning that each station forecast reflects its expected contribution to the regional peak demand level. This supports the identification of need dates for regional needs that are driven by more than one station.

The coincident net extreme weather forecast for the GTA East region is shown in **Figure 13** for the low-growth forecast, reference forecast, and high-growth forecast representing peak summer and winter demand.

**Figure 13 | GTA East Net Extreme Weather Reference, Low-Growth, and High-Growth Forecast**




## 5.7 Hourly Forecast Profiles

In addition to the annual peak forecast, hourly load profiles (8,760 hours per year over the 20-year forecast horizon) for station(s) included in identified needs were developed to characterize the needs with finer granularity. The profiles were created using regression analysis that incorporates historical load data and demand variables such as calendar (i.e., holidays and weekends) to produce a "typical" hourly profile at the station. The profiles were then scaled to match the IRRP peak planning forecast for each year. As described in Section 7, these profiles were used to quantify the magnitude, frequency, and duration of needs to better evaluate the suitability of generation and distributed energy resource options.

Additional load profile details, including hourly heat maps for each need, can be found in the separately published appendix document. Note that this data is used to roughly inform the overall energy requirements needed to develop and evaluate alternatives; it cannot be used to deterministically specify the precise hourly energy requirements. Real-time loading is subject to various factors, like actual weather, customer operation strategies, and future customer segmentation. Demand patterns can change significantly as consumer behaviour evolves, new industries emerge, and trends like electrification are more widely adopted. Hence, these hourly forecasts are only used to select suitable technology types and roughly estimate costs for the needs and options studied in the IRRP. The Technical Working Group will continue to monitor forecast changes as part of the implementation of the plan.

# 6. Needs

This section summarizes the needs identified through the IRRP process. Economic growth, decarbonization and electrification are expected to increase pressure on the electricity system, particularly during winter months. Higher levels of building electrification, including increased adoption of electric and hybrid heating, could further increase winter demand over the planning horizon. In response, a range of electricity needs have been identified across near-, medium-, and long-term horizons.

## 6.1 Needs Assessment Methodology

Based on the planning demand forecast, system capability, the transmitter's identified asset replacement plans, and the application of ORTAC, NERC TPL-001-4, and NPCC Directory #1 standards, the Technical Working Group identified electricity needs that generally fall into the following categories:

- **Station Capacity Needs** describe the electricity system's inability to deliver power to the local distribution network through the regional step-down transformer stations during peak demand. The capacity rating of a transformer station is the maximum demand that can be supplied by the station and is limited by station equipment. Station ratings are often determined based on the 10-day Limited Time Rating (LTR) of a station's smallest transformer under the assumption that the largest transformer is out of service. A transformer station can also be more limited by downstream or upstream equipment (i.e., breakers, disconnect switches, low-voltage bus or high-voltage circuits).
- **System Capacity Needs** describe the electricity system's inability to provide continuous supply to a local area during peak demand. This is limited by the Load Meeting Capability (LMC) of the transmission supply. The LMC is determined by evaluating the maximum demand that can be supplied to an area after accounting for limitations of the transmission elements (i.e., a transmission line, group of lines, or autotransformer), when subjected to contingencies and criteria prescribed by ORTAC, TPL-001-4, and NPCC Directory #1. LMC studies are conducted using power system simulation analyses.
- **Asset Replacement Needs** are identified by the transmitter using an asset condition assessment, which is based on a range of considerations, such as equipment deterioration due to aging infrastructure or other factors; technical obsolescence due to outdated design; lack of spare parts availability or manufacturer support; and/or potential health and safety hazards, etc. Replacement needs identified in the near- and early medium-term timeframe would typically reflect more condition-based information, while replacement needs identified in the medium- to long-term are often based on the equipment's expected service life. As such, any recommendations for medium- to long-term needs should reflect the potential for the need date to change as condition information is routinely updated.

- **Load Security and Restoration Needs** describe the electricity system's inability to minimize the impact of potential supply interruptions to customers in the event of a major transmission outage, such as an outage on a double-circuit tower line resulting in the loss of both circuits. Load security describes the total amount of electricity supply that would be interrupted in the event of a major transmission outage. Load restoration describes the electricity system's ability to restore power to those affected by a major transmission outage within reasonable timeframes. The specific load security and restoration requirements are prescribed by Section 7 of ORTAC.

## 6.2 Pickering-Ajax-Whitby Subregion

For planning purposes, the Pickering-Ajax-Whitby subregion is defined by the loads supplied from Cherrywood TS, Seaton MTS, and Whitby TS T1/T2 and T3/T4. These facilities and their associated transmission supply were assessed together because they serve an electrically interconnected area with related station-capacity and load supply security needs. It should be noted that the load supply security needs have been identified across the GTA East region; therefore, a more detailed discussion is provided in Section 6.3. A summary of the needs can be found in **Table 2**.

**Table 2 | Summary of Pickering-Ajax-Whitby Subregion Planning Needs**

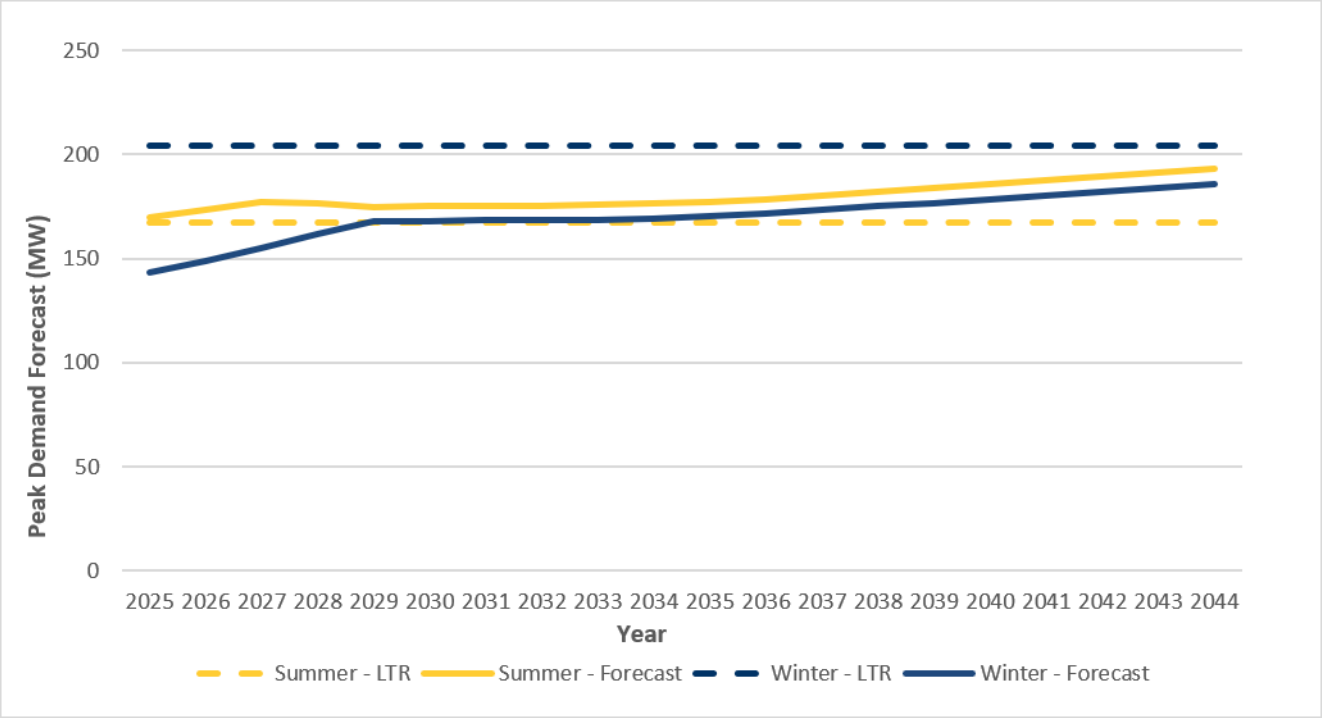
| Need | Summer Need Date | Summer Need by 2044 (MW) | Winter Need Date | Winter Need by 2044 (MW) |
|---|---|---|---|---|
| Cherrywood TS station capacity | 2026 | 26 | N/A | N/A |
| Whitby T1/T2 27.6 kV station capacity | 2036 | 123 | 2037 | 137 |
| Whitby T1/T2 44 kV station capacity | 2032 | 77 | 2030 | 112 |
| Whitby T3/T4 station capacity | 2026 | 106 | 2035 | 83 |
| Seaton MTS station capacity | 2038 | 115 | 2037 | 161 |
| Cherrywood TS asset replacement | 2033 | N/A | 2033 | N/A |

### 6.2.1 Station Capacity Needs

#### 6.2.1.1 Cherrywood TS

Cherrywood TS consists of two 230 kV/44 kV transformers with a summer Limited Time Rating (LTR) of 167.2 MW and a winter LTR of 204.5 MW. Cherrywood TS has a station capacity need of 6 MW in summer 2026, which increases to 26 MW by summer 2044. Cherrywood TS has no identified winter station capacity need over the study period. While demand growth at Cherrywood TS is relatively modest compared to some neighbouring stations, this reflects the fact that a significant portion of forecast load growth in the area is expected to be supplied by Seaton MTS on the 27.6 kV distribution system. **Figure 14** shows the Cherrywood TS demand forecast in relation to the summer and winter station LTR values.

**Figure 14 | Cherrywood TS Station Capacity Need**



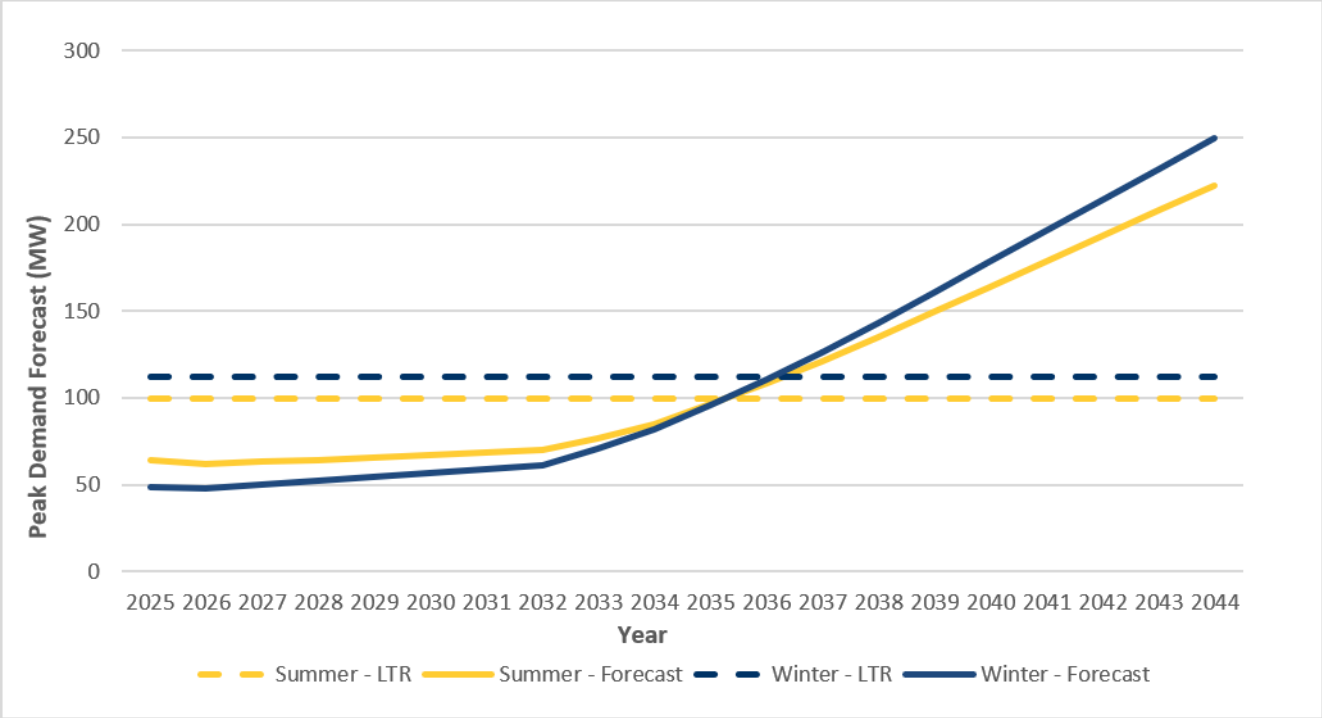
### 6.2.1.2 Whitby TS T1/T2

Whitby TS T1/T2 consists of two 230 kV/27.6-44 kV dual secondary winding transformers.

#### 27.6 kV System

The 27.6 kV system is supplied by the 27.6 kV winding of Whitby TS T1/T2 and has a summer LTR of 99.9 MW and a winter LTR of 112.5 MW. Whitby TS T1/T2 (27.6 kV) has a station capacity need of 8 MW in summer 2036, which increases to 123 MW by summer 2044. Whitby TS T1/T2 (27.6 kV) has a station capacity need of 14 MW in winter 2037, which increases to 137 MW by winter 2044. **Figure 15** shows the Whitby TS T1/T2 (27.6 kV) demand forecast in relation to the summer and winter LTR values.

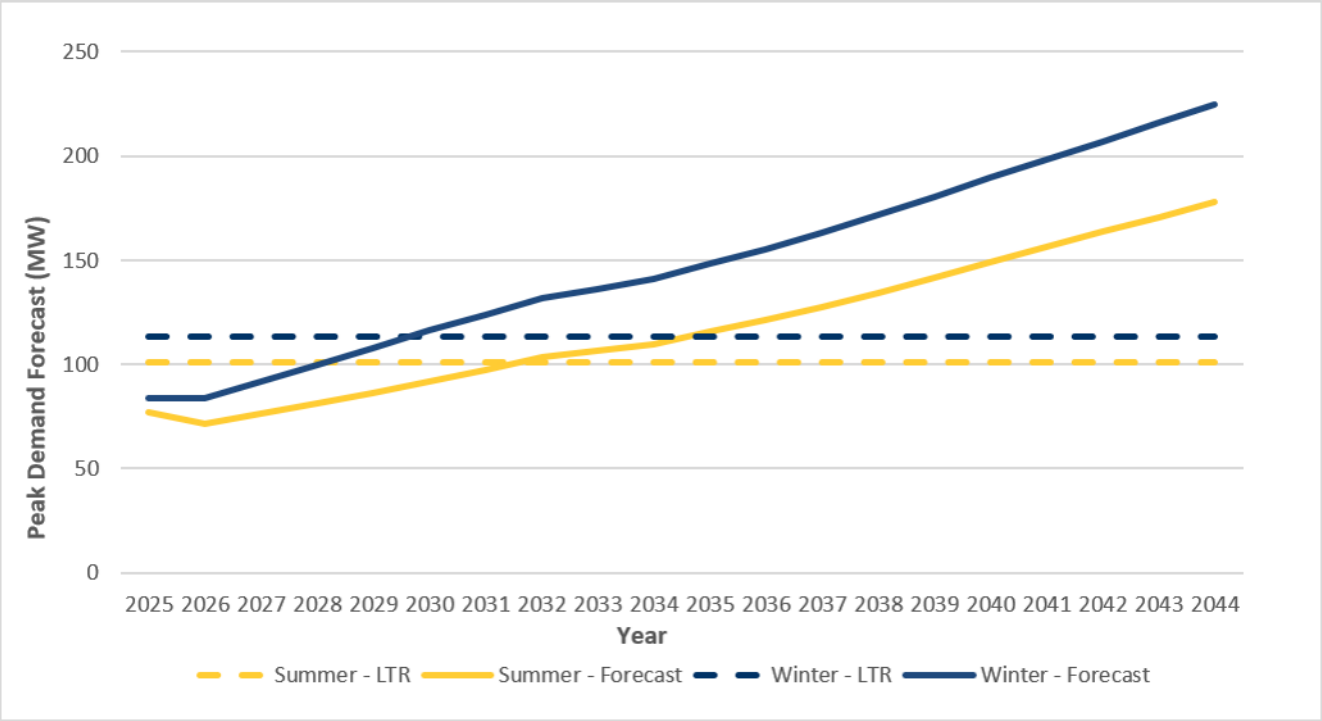
**Figure 15 | Whitby TS T1/T2 27.6 kV Station Capacity Need**



### 44 kV System

The 44 kV system is supplied by the 44 kV winding of Whitby TS T1/T2 and has a summer LTR of 100.8 MW and a winter LTR of 113.2 MW. Whitby TS T1/T2 (44 kV) has a station capacity need of 3 MW in summer 2032, which increases to 77 MW by summer 2044. Whitby TS T1/T2 (44 kV) has a station capacity need of 3 MW in winter 2030, which increases to 112 MW by winter 2044. **Figure 16** shows the Whitby TS T1/T2 (44 kV) demand forecast in relation to the summer and winter LTR values.

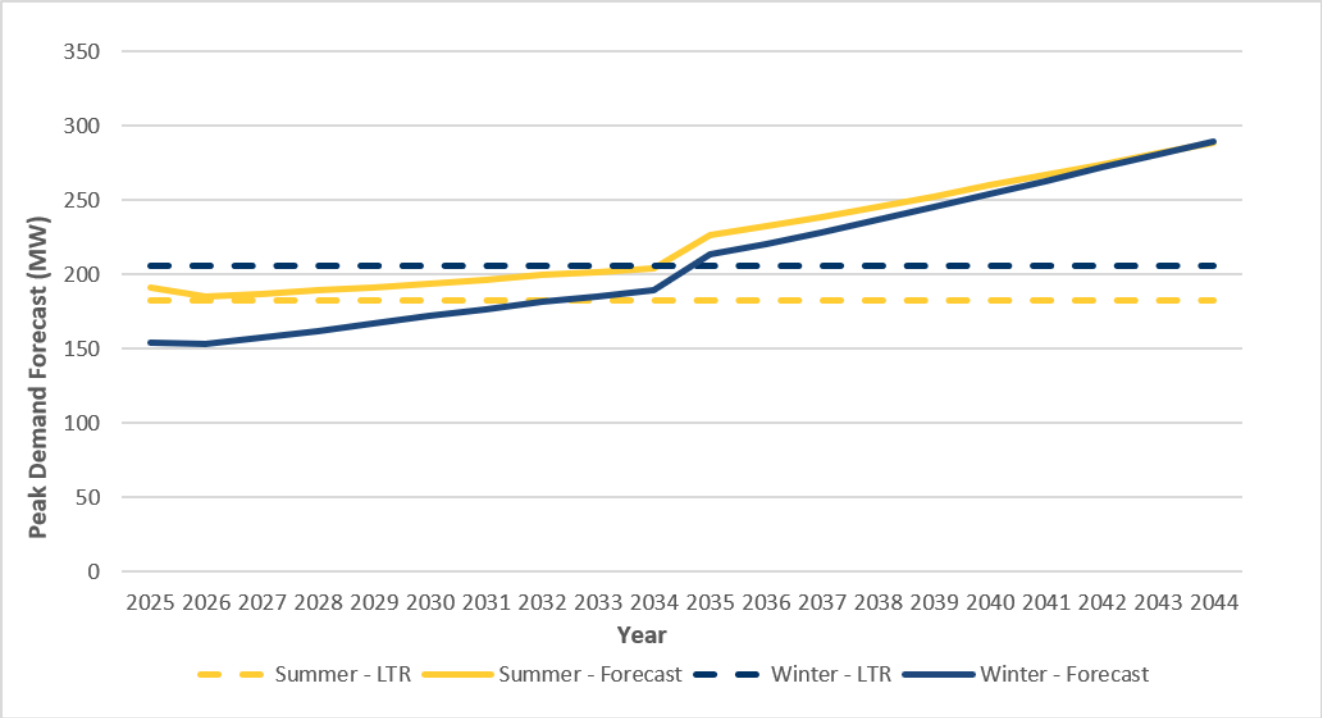
**Figure 16 | Whitby TS T1/T2 44 kV Station Capacity Need**



### 6.2.1.3 Whitby TS T3/T4

Whitby TS T3/T4 consists of two 230 kV/44 kV transformers with a summer LTR of 182.4 MW and a winter LTR of 206.2 MW. Whitby TS T3/T4 has a station capacity need of 3 MW in summer 2026, which increases to 106 MW by summer 2044. Whitby TS T3/T4 has a station capacity need of 7 MW in winter 2035, which increases to 83 MW by winter 2044. **Figure 17** shows the Whitby TS T3/T4 demand forecast in relation to the summer and winter LTR values. The step increases in demand observed between 2034 and 2035 is driven by the assumption that distributed generation resources connected to the Whitby TS T3/T4 are not re-contracted following the expiry of their contracts in 2035.

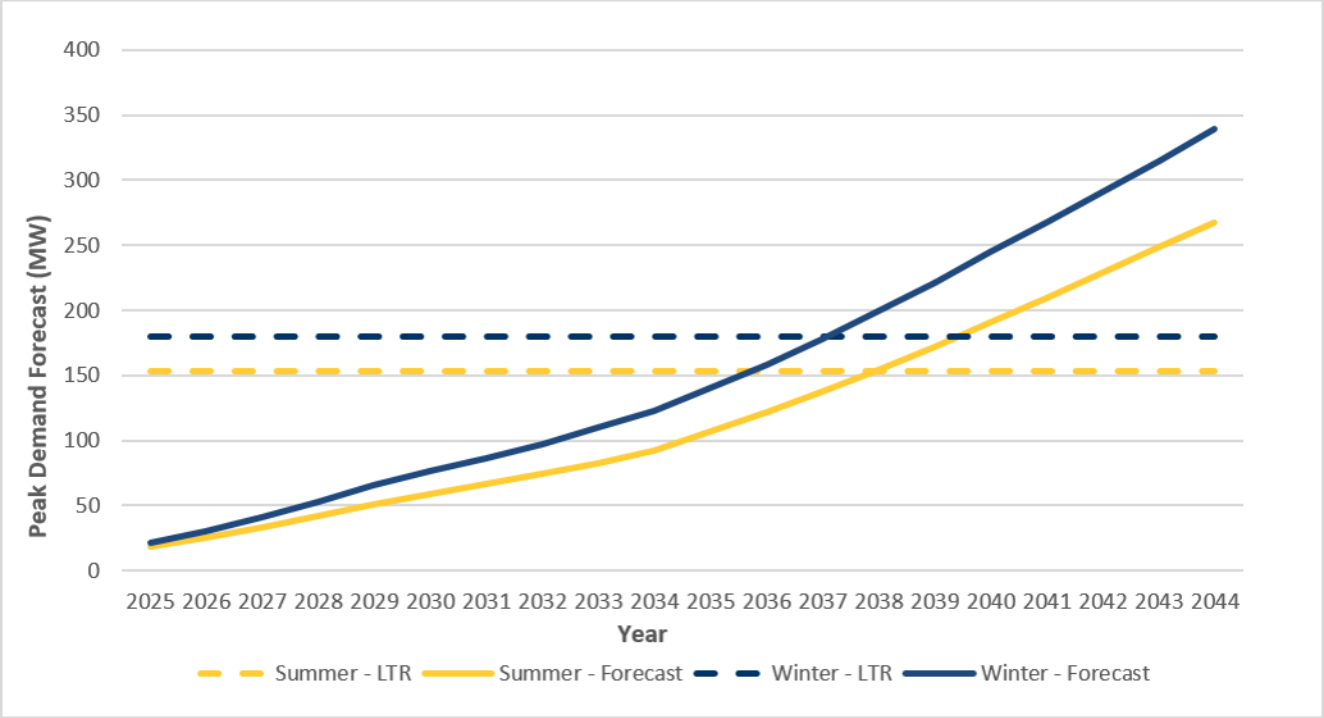
**Figure 17 | Whitby TS T3/T4 Station Capacity Need**



#### 6.2.1.4 Seaton MTS

Seaton Municipal Transformer Station (MTS) consists of a 230 kV/27.6 kV station with a summer LTR of 153.0 MW and a winter LTR of 180.0 MW. Seaton MTS has a station capacity need of 1 MW in summer 2038, which increases to 115 MW by summer 2044. Seaton MTS has a station capacity need of 21 MW in winter 2038, which increases to 161 MW by winter 2044. **Figure 18** shows the Seaton MTS demand forecast in relation to the summer and winter LTR values.

**Figure 18 | Seaton MTS Station Capacity Need**



## 6.3 Oshawa-Clarington Subregion

For planning purposes, the Oshawa-Clarington subregion is defined by the loads supplied from Enfield TS, Thornton TS, and Wilson TS (T3/T4 and T7/T8). These facilities and their associated transmission supply were assessed together because they serve an electrically interconnected area with related station-capacity, load supply security, and supply capacity needs. A summary of the needs can be found in **Table 3**.

**Table 3 | Summary of Oshawa-Clarington Subregion Planning Needs**

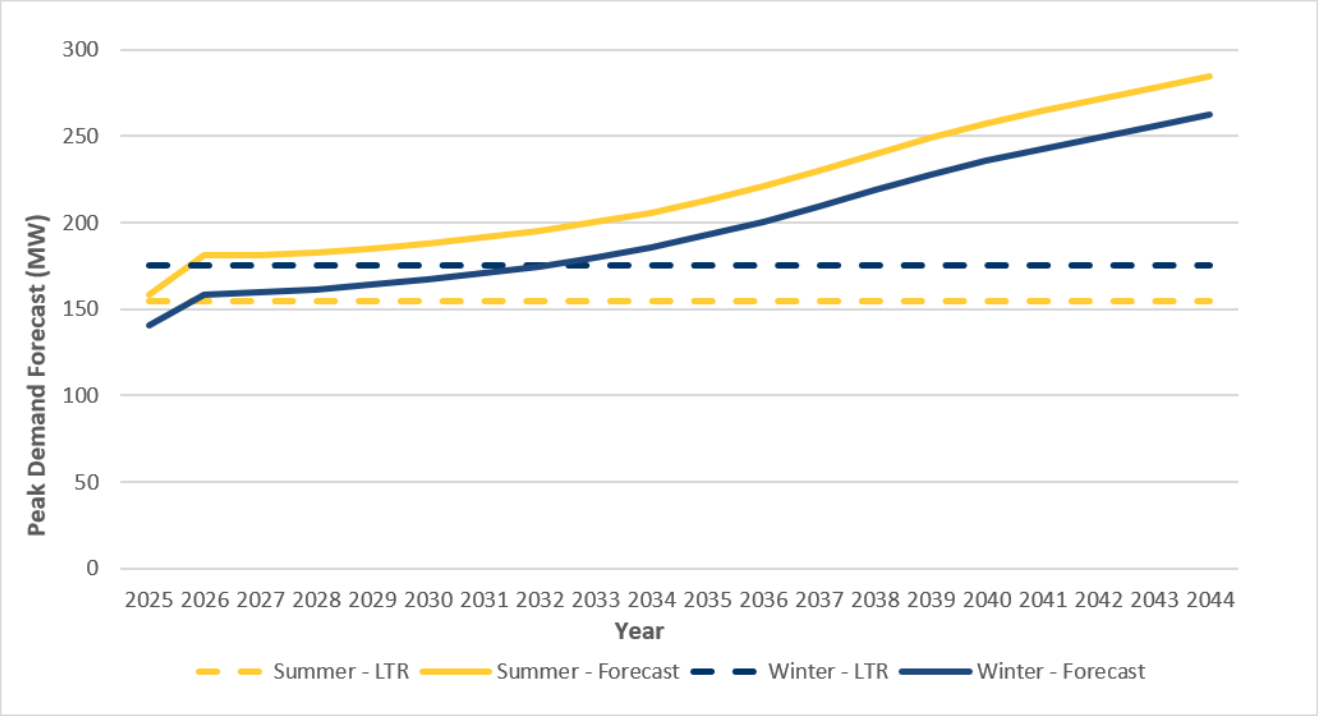
| Need | Summer Need Date | Summer Need by 2044 (MW) | Winter Need Date | Winter Need by 2044 (MW) |
|---|---|---|---|---|
| Thornton TS station capacity | 2026 | 130 | 2033 | 87 |
| Wilson TS T3/T4 station capacity | 2026 | 295 | 2026 | 267 |
| Wilson TS T7/T8 station capacity | 2026 | 170 | 2032 | 128 |
| Enfield TS station capacity | 2036 | 62 | 2038 | 41 |
| Wilson TS T3/T4 asset replacement | 2031 | N/A | 2031 | N/A |
| Wilson subsystem supply capacity | 2033 | 254 | 2038 | 129 |
| CTS subsystem supply capacity | 2035 | 110 | 2041 | 21 |
| T24C & T26C load supply security | 2037 | 214 | 2037 | 248 |
| T23C & T29C load supply security | 2033 | 346 | 2036 | 257 |

### 6.3.1 Station Capacity Needs

#### 6.3.1.1 Thornton TS

Thornton TS consists of two 230 kV/44 kV transformers with a summer LTR of 154.9 MW and a winter LTR of 175.5 MW. Thornton TS has a station capacity need of 26 MW in summer 2026, which increases to 130 MW by summer 2044. Thornton TS has a station capacity need of 4 MW in winter 2033, which increases to 87 MW by winter 2044. **Figure 19** shows the Thornton TS demand forecast in relation to the summer and winter LTR values.

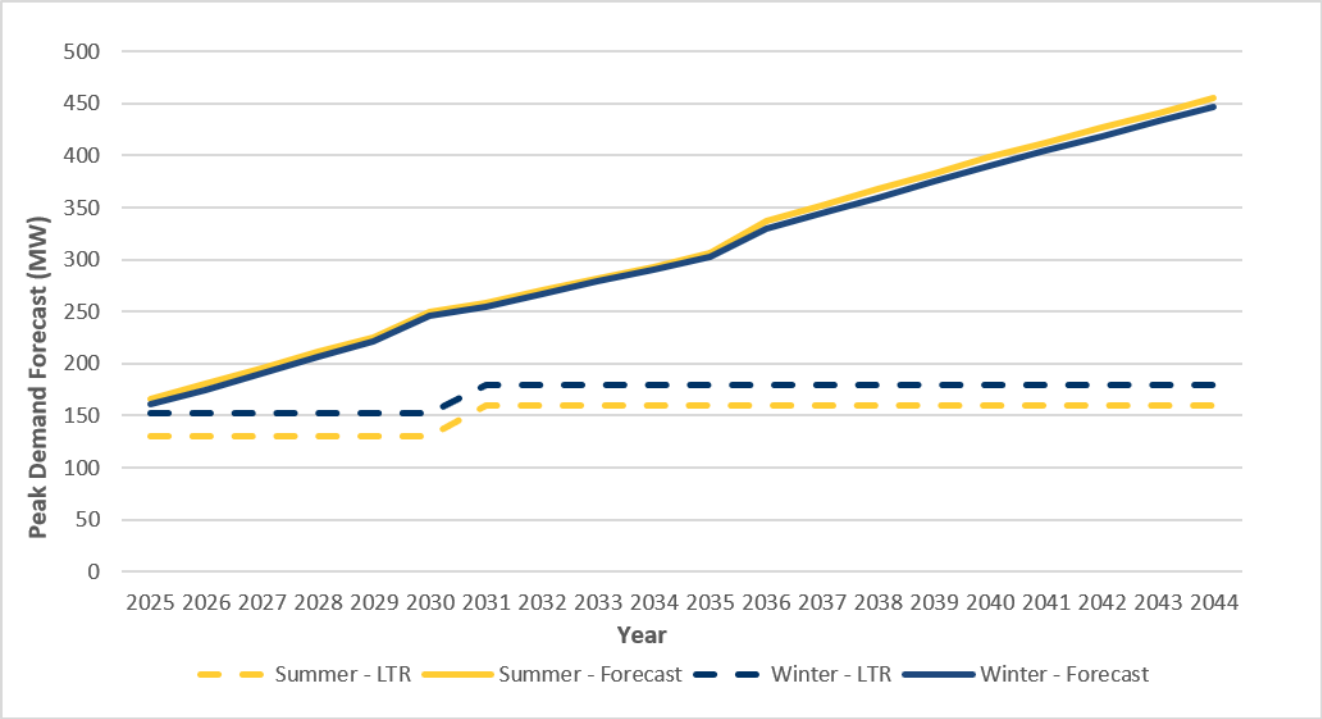
**Figure 19 | Thornton TS Station Capacity Need**



### 6.3.1.2 Wilson TS T3/T4

Wilson TS T3/T4 consists of two 230 kV/44 kV transformers with a summer LTR of 130.2 MW and a winter LTR of 152.0 MW. Wilson TS T3/T4 has a station capacity need of 51 MW in summer 2026, which increases to 295 MW by summer 2044. Wilson TS T3/T4 has a station capacity need of 23 MW in winter 2026, which increases to 267 MW by winter 2044. **Figure 20** shows the Wilson TS T3/T4 demand forecast in relation to the summer and winter LTR values. The planned like-for-like replacement will increase the LTR for summer and winter to 160 MW and 180 MW, respectively with a planned in-service date of 2031. At that point in time the residual summer and winter needs will be 99 MW and 75 MW, respectively.

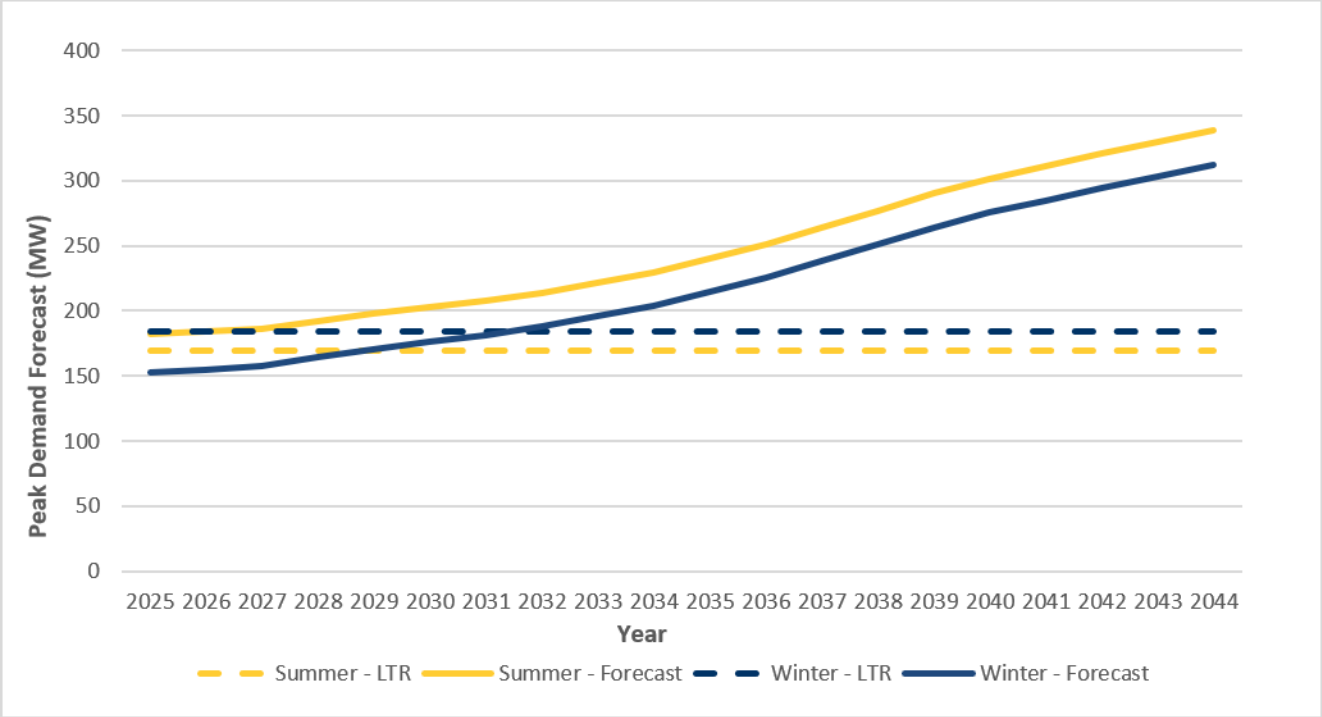
**Figure 20 | Wilson TS T3/T4 Station Capacity Need**



### 6.3.1.3 Wilson TS T7/T8

Wilson TS T7/T8 consists of two 230 kV/44 kV transformers with a summer LTR of 169.1 MW and a winter LTR of 184.3 MW. Wilson TS T7/T8 has a station capacity need of 15 MW in summer 2026, which increases to 170 MW by summer 2044. Wilson TS T7/T8 has a station capacity need of 4 MW in winter 2032, which increases to 128 MW by winter 2044. **Figure 21** shows the Wilson TS T7/T8 demand forecast in relation to the summer and winter LTR values.

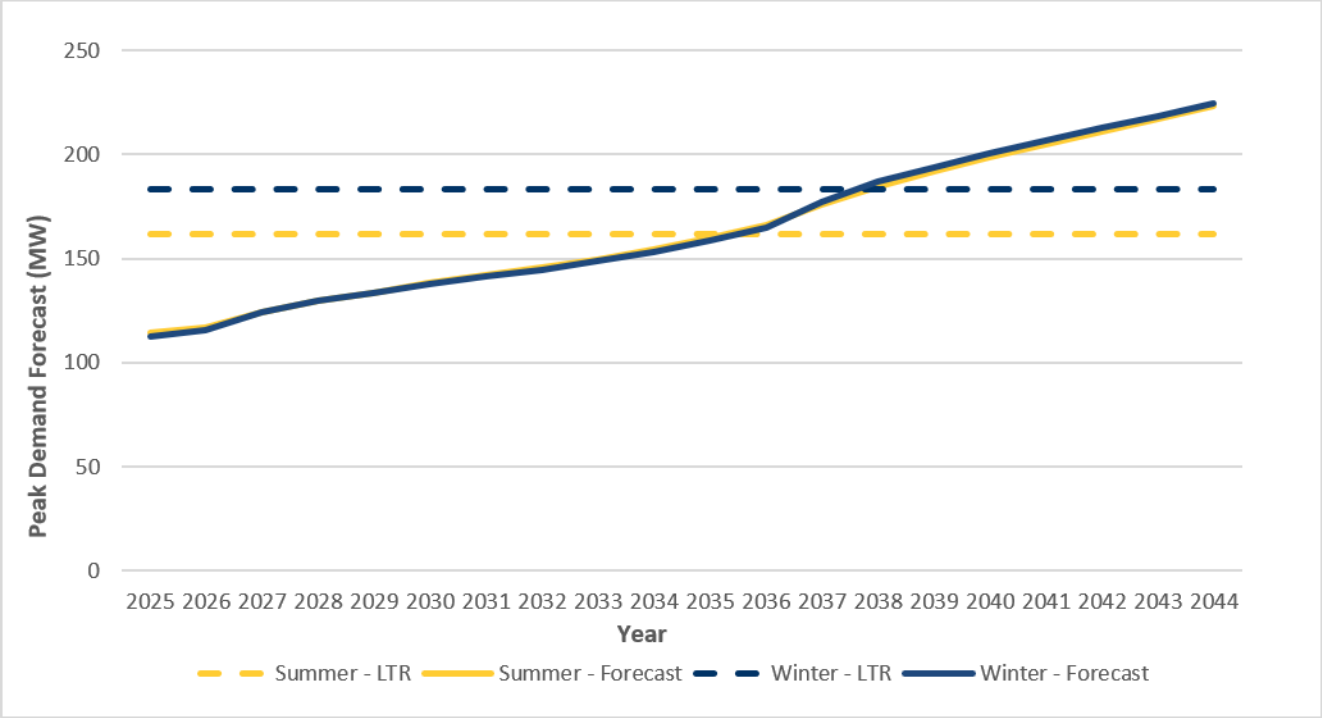
**Figure 21 | Wilson T7/T8 Station Capacity Need**



#### 6.3.1.4 Enfield TS

Enfield TS consists of two 230 kV/44 kV transformers with a summer LTR of 161.5 MW and a winter LTR of 183.4 MW. Enfield TS has a station capacity need of 5 MW in summer 2036, which increases to 62 MW by summer 2044. Enfield TS has a station capacity need of 3 MW in winter 2038, which increases to 41 MW by winter 2044. **Figure 22** shows the Enfield TS demand forecast in relation to the summer and winter LTR values.

**Figure 22 | Enfield TS Station Capacity Need**

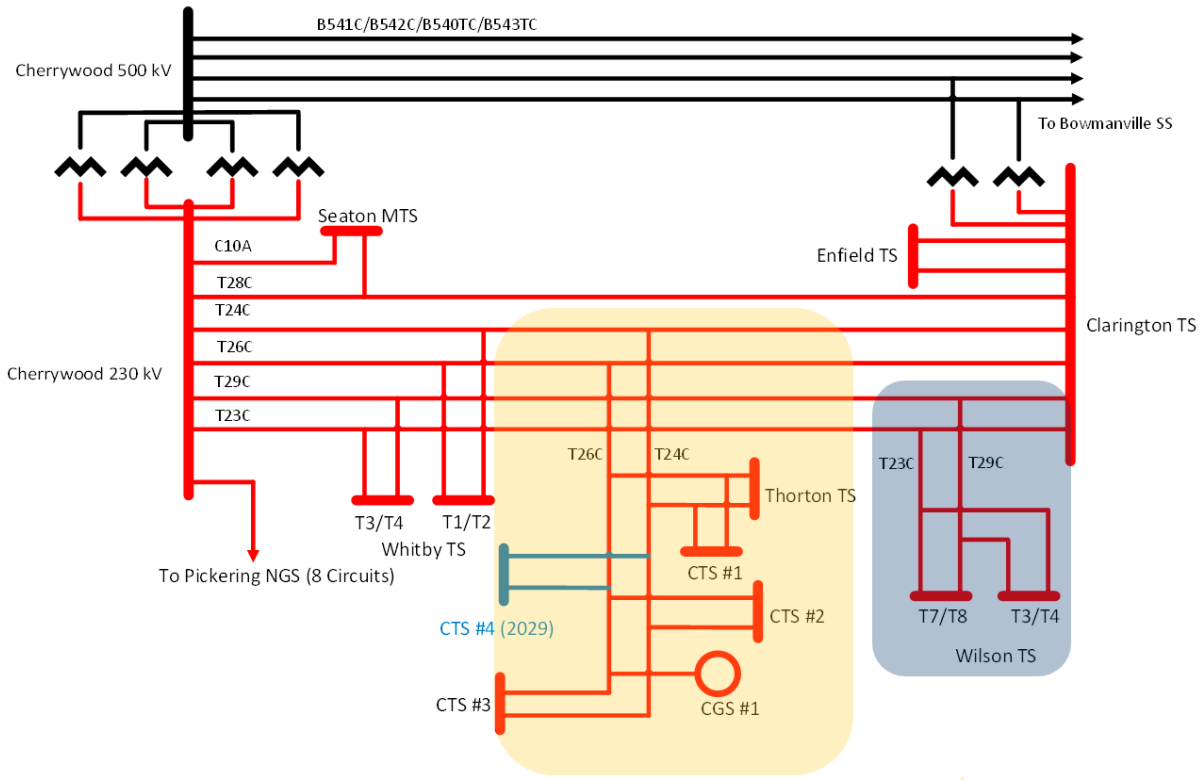



### 6.3.2 Supply Capacity Need

Supply capacity needs describe the electricity system's ability to provide continuous supply to subsystems at peak demand. This is limited by the LMC of the transmission supply to a subsystem. The LMC is determined by evaluating the maximum demand that can be supplied to a subsystem accounting for limitations of the transmission elements (e.g., a transmission line, group of lines, or autotransformer) when subjected to contingencies and criteria prescribed by ORTAC and NERC/NPCC standards. LMC studies are conducted using power system simulation analyses.

Assuming all planned transmission upgrades are in service, a system study was conducted to assess the system's ability to supply the future load growth (reference regional coincident load forecast). The study identified two emerging supply capacity needs within the region, located in the two subsystems highlighted in yellow and blue in **Figure 23**.

**Figure 23 | Emerging Supply Capacity Need Area**




The subsystem highlighted in blue in **Figure 23,** which includes the T23C and T29C circuits supplying the Wilson TS load, shows both a medium-term supply capacity need in summer and a long-term supply capacity need in winter. This emerging need is driven by thermal limitations under contingency conditions.

The supply limitation occurs when either of the T23C or T29C circuit is out of service and the Wilson TS load increases. Under this condition, the remaining radial segment (6.3 km) feeding from TxC junction to Wilson TS exceeds its Long-Term Emergency (LTE) rating. Given that the T23C and T29C circuits have identical ratings and a symmetrical configuration, losing one circuit versus the other produces no material difference in the calculated LMC as shown in **Table 4**.

Among all evaluated contingency and outage scenarios that take out either of the T23C or T29C circuit, Clarington P2L29 breaker failure results in the most constraining condition. A Clarington P2L29 breaker failure not only results in the loss of T29C circuit but also removes one of the Clarington shunt capacitors from service. The loss of this capacitor reduces the bus voltage at Wilson TS, and the resulting lower voltage requires higher current to supply the same MW and MVAr demand. This increased current further reduces the LMC of the subsystem and drives the overall limitation.

The Wilson subsystem supply capacity need is projected to emerge in summer 2033 and winter 2038, when the combined pocket load reaches approximately 432 MW for summer and 492 MW for winter under the governing contingency as shown in **Table 5** and **Figure 24.**

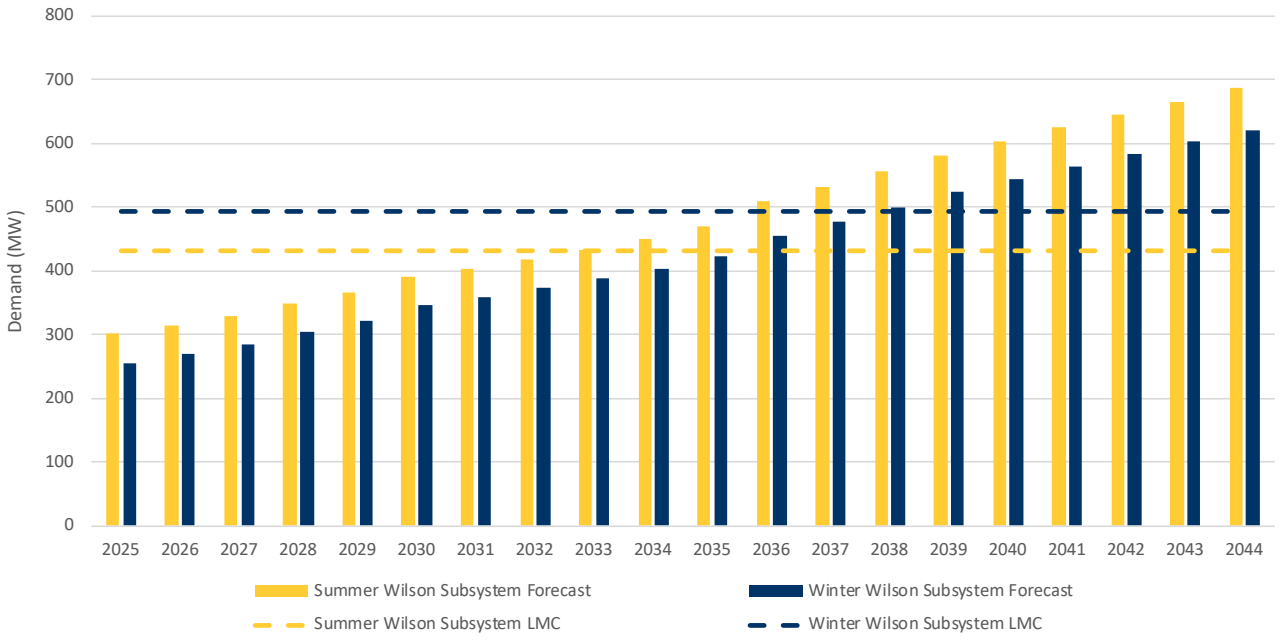
**Table 4 | Wilson Subsystem Load Meeting Capability under N-1 Scenarios**

| Season | Outage Element | Limiting Contingency | Phenomena | Limiting Element | Wilson TS Load (MW) | GTA East Load at the Need Year (MW) | Need Year |
|---|---|---|---|---|---|---|---|
| Summer | Non | T23C or T29C | Thermal | T23C or T29C – Wilson connection line | 437 | 1528 | 2034 |
| Winter | None | T23C or T29C | Thermal | T23C or T29C – Wilson connection line | 497 | 1846 | 2038 |

**Table 5 | Wilson Subsystem Load Meeting Capability under N-2 Scenarios**

| Season | Outage Element | Limiting Contingency | Phenomena | Limiting Element | Wilson TS Load (MW) | GTA East Load at the Need Year (MW) | Need Year |
|---|---|---|---|---|---|---|---|
| Summer | Non | Clarington P2L29 | Thermal | T23C – Wilson connection line | 432 | 1476 | 2033 |
| Winter | None | Clarington P2L29 | Thermal | T23C – Wilson connection line | 492 | 1846 | 2038 |

**Figure 24 | Wilson Subsystem Demand Forecast and LMC under N-2 Scenarios**




### 6.3.3 CTS Subsystem Supply Capacity Need

The subsystem highlighted in yellow in **Figure 23,** which includes the T24C and T26C circuits supplying the Thornton TS and all of the Customer Transformer Stations (CTSs) load, shows a medium-term supply capacity need in summer. This emerging need is driven by thermal limitations under contingency conditions.

The supply limitation occurs when the T26C circuit is lost and the load inside the subsystem increases. Under this condition, the T24C circuit feeding from Columbus Junction to Lasco Junction (8.5km) (refer to **Figure 25**) exceeds its LTE Rating. The LMC of the CTS subsystem under this N-1 scenario is shown in **Table 6**. Unlike T23C and T29C, which had a symmetrical configuration, T24C and T26C have identical ratings but different configurations which results in a different LMC.

Among all evaluated contingency and outage scenarios that take out T26C circuit, Clarington K1L26 breaker failure results in the most constraining condition. A Clarington K1L26 breaker failure not only results in the loss of T26C circuit but also removes one of the Clarington shunt capacitors from service. The loss of this capacitor reduces the bus voltage at the stations in the subsystem, and the resulting lower voltage requires higher current to supply the same MW and MVAr demand. This increased current further reduces the LMC of the subsystem and drives the overall limitation.

The CTS subsystem supply capacity need is projected to emerge in summer 2034, when the combined pocket load reaches approximately 357 MW under the governing contingency as shown in **Table 7** and **Figure 26.**

## Figure 25 | GTA East Map Showing Junction



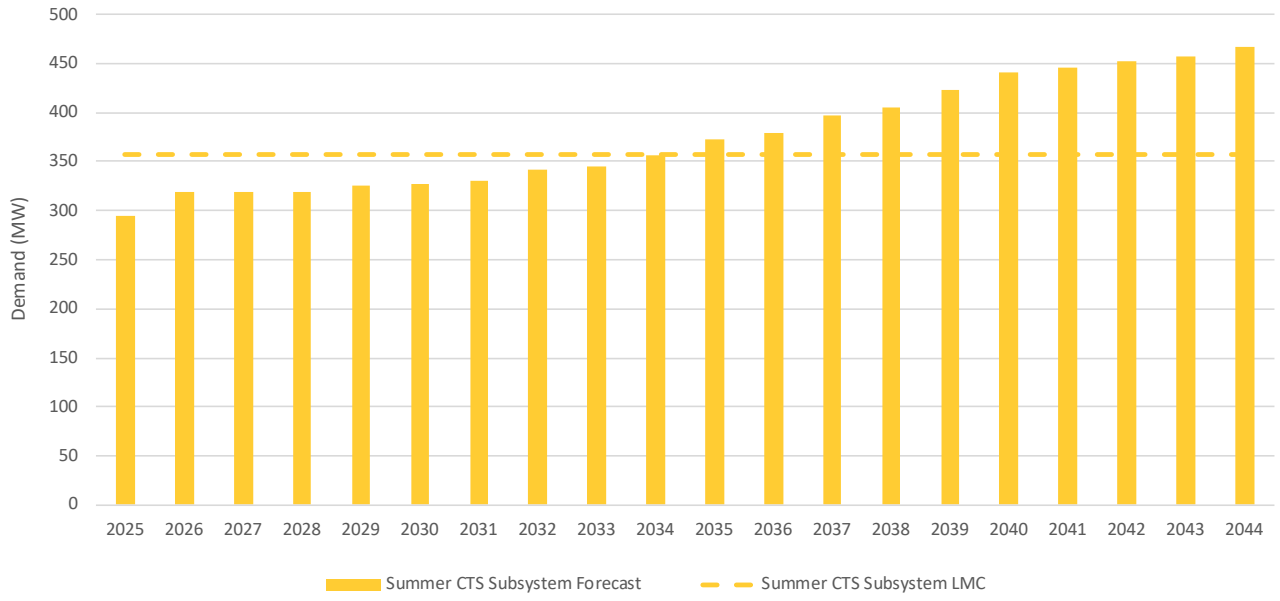
**Table 6 | CTS Subsystem Load Meeting Capability under N-1 Scenario**

| Season | Outage Element | Limiting Contingency | Phenomena | Limiting Element | Thornton and CTSs Load (MW) | GTA East Load at the Need Year (MW) | Need Year |
|---|---|---|---|---|---|---|---|
| Summer | None | T26C | Thermal | T24C – Columbus to Lasco Jct | 361 | 1621 | 2035 |

**Table 7 | CTS Subsystem Load Meeting Capability under N-2 Scenario**

| Season | Outage Element | Limiting Contingency | Phenomena | Limiting Element | Thornton and CTSs Load (MW) | GTA East Load at the Need Year (MW) | Need Year |
|---|---|---|---|---|---|---|---|
| Summer | None | Clarington K1L26 | Thermal | T24C – Columbus to Lasco Jct | 357 | 1621 | 2035 |

**Figure 26 | CTS Subsystem Forecast and LMC Under N-2 Scenarios**



### 6.3.4 Load Security and Restoration Needs

The study identified a load security need in the GTA East region based on the regional coincident reference forecast:

- With respect to double-contingency assessment, loads supplied by T23C and T29C are forecast to exceed 600 MW by 2033 in summer and 2036 in winter. This condition would result in a load security violation. The loads supplied by T23C and T29C consist of Whitby TS T3/T4, Wilson TS T7/T8 and T3/T4.
- With respect to double-contingency assessment, loads supplied by T24C and T26C are forecast to exceed 600 MW by 2037 in both summer and winter. This condition would result in a load security violation. The loads supplied by T24C and T26C consist of: Thornton TS, Whitby TS T1/T2 (27.6kV and 44kV), CTS #1, CTS #2, CTS #3, and CTS #4.

**Table 8 | Double-circuit Corridor, Net, Extreme-Weather, Coincident Load**

| | | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 | 2035 | 2036 | 2037 | 2038 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **T23C/ T29C** | **Summer** | 472.0 | 480.8 | 496.9 | 517.6 | 536.4 | 564.2 | 577.8 | 595.6 | 613.4 | 631.9 | 673.1 | 717.3 | 746.5 | 777.3 |
| | **Winter** | 380.3 | 393.2 | 411.8 | 434.7 | 455.4 | 484.4 | 499.3 | 518.0 | 536.2 | 555.0 | 596.1 | 634.9 | 663.3 | 693.1 |
| **T24C/ T26C** | **Summer** | 418.3 | 436.1 | 441.5 | 447.8 | 458.6 | 467.1 | 475.4 | 493.5 | 506.1 | 525.6 | 558.0 | 579.8 | 613.5 | 639.5 |
| | **Winter** | 389.6 | 410.7 | 419.7 | 429.8 | 443.7 | 455.6 | 466.3 | 486.6 | 502.6 | 525.6 | 560.8 | 585.9 | 622.7 | 652.5 |

## 6.4 Asset Replacement Needs

End-of-Life Asset Refurbishment Needs are identified by the transmitter with consideration to a variety of factors such as asset age, expected service life, risk associated with the failure of the asset, and its condition. Replacement needs identified in the near- and early mid-term timeframe would typically reflect condition-based information, while replacement needs identified in the medium to long term are often based on the equipment's expected service life. Note that IRRPs do not typically study and make recommendations for all end-of-life needs where like-for-like replacements have been established to be appropriate in earlier phases of the regional planning process. Instead, the IRRP focuses on a subset of end-of-life needs where there are interactions with other regional needs and where there may be opportunities to reconfigure or right-size assets.

**Table 9** summarizes the status of end-of-life asset refurbishment needs that were identified in past cycles. The needs identified in the 2024 Needs Assessment did not require further study in this IRRP and no incremental needs were identified by the IESO.

**Table 9 | Status of End-of-life Needs Identified in Past Cycles**

| Study Name | Needs | Status Update |
|---|---|---|
| 2024 Needs Assessment that proceed to Local Planning | Wilson TS T3/T4 Transformer Replacement | Currently planned in-service date of 2031. Like-for-like replacement which would increase station LTR to approximately 160 MW for Summer and 180 MW for Winter |

## 6.5 Operability and Operational Issues

Operational issues are not defined as planning needs. However, where they impact the reliability or operational flexibility of the bulk transmission system, the Technical Working Group may consider opportunities to address these issues while developing solutions for identified planning needs.

Operational issues were identified within the study area that are associated with voltage management and transmission system performance under outage conditions. These issues affect the capability and flexibility of the regional transmission network and have the potential to influence reliability during both planned and forced outages.

During periods of low primary demand, high voltages can occur on the transmission system, creating operational challenges and increasing the need for voltage control measures. In addition, the existing 230 kV corridor that forms part of the TEC interface experiences increased stress during 500 kV circuit outages and reconfiguration events. Under these conditions, transfer capability may be constrained, and system operators may need to rely on remedial action schemes, including the GTA RAS, to maintain system security.

The operational issues identified through this assessment do not require immediate action and are not addressed through the implementation-ready recommendations of this IRRP. Instead, they are being carried forward as Future-Consideration Options for assessment through subsequent regional and bulk transmission planning activities. The Technical Working Group will continue to evaluate measures to improve voltage performance during low-demand conditions and reinforce the 230 kV TEC interface corridor to better accommodate 500 kV outages and system reconfiguration events while reducing reliance on the GTA Remedial Action Scheme (RAS). Findings from these assessments will inform future planning recommendations, as appropriate.

# 7. Plan Options and Recommendations

This section describes the options considered and recommendations to address the needs in the GTA East region. When developing the plan, the Technical Working Group considered a range of integrated options. Considerations in assessing alternatives included maximizing the use of existing infrastructure, provincial electricity policy, federal regulations, technical feasibility, cost-effectiveness, lead time, local preferences, and consistency with longer-term needs in the area.

There are generally two approaches to address regional needs:

- Build new transmission or distribution infrastructure. These are commonly referred to as wire options and can include things like new transmission lines, autotransformers, step-down transformer stations, voltage control devices, upgrades to existing infrastructure, or distribution-level load transfers. Wire options may also include control actions or protection schemes that influence how the system is operated to avoid or mitigate certain reliability concerns.
- Install or implement measures to reduce the net peak demand to maintain loading within the system's existing capability. These are commonly referred to as non-wire alternatives (NWAs) and can incorporate local utility-scale generation or storage, distributed energy resources (including distribution-connected generation and demand response), or additional eDSM.

Section 7.1 provides a more in-depth overview of the NWA considerations in this IRRP. Subsequently, Section 7.2 presents the options that were ultimately developed and evaluated (including a cost comparison) before the Technical Working Group made a recommendation.

This section identifies implementation-ready actions that should proceed now to address existing and emerging needs within the required timeframe. It also identifies any preparatory work needed to preserve future options and longer-term pathways that should be reconsidered as system conditions evolve.

## 7.1 Non-Wires Analysis Process in IRRPs

Wire options are always considered in regional planning, and while they are always viable options for regional needs, NWAs may be more suitable for specific need types and characteristics. To select and appropriately size NWAs like generation or battery storage, additional work is required — including the creation of an hourly load profile, as described in Section 5.7. The most suitable technology type and capacity is chosen by examining the unserved energy profile, which is the hourly demand above the existing station or system capability. The profile indicates the duration, frequency, magnitude, and total energy associated with each need. More details on the NWA process and analysis are provided in the appendix.

### 7.1.1 Approach to Needs Screening

NWAs are suitable for specific types of needs, as described in the Integrated Regional Resource Plans: Guide to Assessing Non-Wires Alternatives. An initial screening step is performed to identify whether the NWAs may be suitable for the type of need addressed.

High-level cost estimates for wire options are based on input provided by the transmitter and transmission benchmark costs. Similarly, cost estimates for non-wire alternatives are based on benchmark capital and operating cost characteristics for each resource type and size. The complete list of assumptions used in the needs screening and options analysis is provided in the Appendix.

The IESO is mandated to centrally deliver province-wide eDSM programs for Ontario that target businesses, residential customers, and First Nations. The IESO offers incentives and rebates to electricity customers through a suite of Save on Energy programs, which provide a valuable and cost-effective system resource that helps customers better manage their energy costs. Demand savings from centrally delivered energy efficiency programs under the 2021–2024 CDM Framework and Save on Energy brand are already included in the load forecast, as discussed in Section 5.4. This forecast assumed the programming continues through the forecast period at levels consistent with the 2021–2024 CDM Framework.

Additional eDSM above and beyond that included in the demand forecast can also play a role in maximizing the useful life of existing infrastructure and maintaining reliable supply. Results from the IESO's provincial energy efficiency 2022 Achievable Potential Study inform estimates of the additional peak demand savings potential available from eDSM programming, and the cost to acquire those peak demand savings.

The 2025–2036 eDSM Framework provides the IESO with a twelve-year mandate and $10.9 billion budget ceiling to expand and enhance eDSM programming. Higher provincial savings targets under the new framework relative to the 2021–2024 CDM Framework may contribute to delivering additional eDSM recommended to address specific regional needs. The new framework also establishes new mechanisms for IESO and LDC eDSM collaboration, including specific funding for LDC-delivered programming that provides both local and regional or provincial benefits.

Generally, additional eDSM programming is suitable for needs where growth is slow and the magnitude of the overload relative to the total demand is very small (i.e., on the order of few per cent per year). These considerations are discussed further in Section 7.1.2. LDCs can also use the Ontario Energy Board's Non-Wires Solutions Guidelines for Electricity Distributors to leverage distribution rates to help address distribution and transmission system needs using NWAs. In some cases, NWAs can help manage needs in the interim before wires reinforcements are in-service.

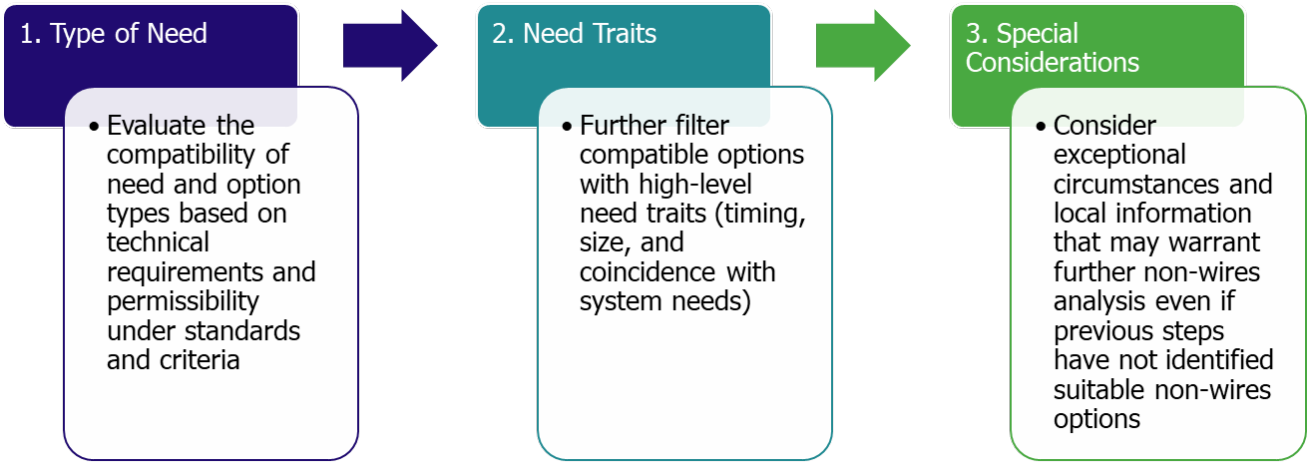
Where NWAs are screened in and determined to be feasible, the upfront capital and operating costs for both wire options and NWAs are compiled to generate levelized annual capacity costs (measured in dollars per kW per year). In this scenario, the cash flow of the levelized costs for the options is compared over the lifespan of the wire option and the net present value of these levelized costs is the primary basis through which feasible options are compared. Where NWAs are screened out or determined to be infeasible for meeting the need, overnight capital costs for wire options are used instead.

NWAs are subject to uncertainties in the procurement in terms of both the resource costs bid by proponents and the overall success of the procurement. Moreover, it is important to recognize that there is a significant uncertainty around cost estimates at the planning stage (from minus 50 per cent on the low side to plus 100 per cent on the high side), as they are only intended to enable comparison between options during the IRRP. The transmitter-led Regional Infrastructure Plan (which is conducted after the IRRP) performs additional detailed analysis and allows the opportunity to refine cost estimates of wire options before implementation work begins. The IESO continues to participate in the Technical Working Group during the Regional Infrastructure Plan and revisits these recommendations if cost estimates differ significantly.

### 7.1.2 Non-Wires Screening Results

Screening occurs early in the IRRP development — after local reliability needs are known but before options analysis. It helps direct time-intensive aspects of detailed NWA analysis (hourly need characterization, options development, financial analysis, and engagement) toward the most promising options. The three-step, high-level approach is shown in **Figure 27**.

**Figure 27 | IRRP Screening Mechanism**




The results of applying the screening mechanism to the GTA East IRRP needs are summarized and described in the sections below. More details on the steps and inputs used in the screening mechanism can be found in the appendix. The list of assumptions made in the needs screening and option analysis can also be found in the appendix. The summary of the needs screening can be found in **Table 10**.

**Table 10 | Results of the GTA East IRRP Needs Screening**

| Subregion | Need | Options Screened In | Options Screened Out[2] |
|---|---|---|---|
| Pickering-Ajax-Whitby | Station capacity and load security | Additional eDSM, Distributed generation, Transmission-connected generation, and Wires | Demand response |
| Oshawa-Clarington | Station capacity, load security and supply capacity | Additional eDSM, Distributed generation, Transmission-connected generation, and Wires | Demand response |

## 7.2 Solution Assessment Framework

Potential solutions were developed by the Technical Working Group and assessed to address the electricity system needs identified in Section 6. The assessment considered a range of solution types, including:

- transmission reinforcements or reconfigurations;
- station-level capacity additions or upgrades;
- local generation resources; and
- operational and NWAs, where feasible.

Each solution was assessed against key considerations, including:

- effectiveness in addressing the identified need and maintaining compliance with ORTAC, NERC, and NPCC criteria;
- timing and deliverability;
- flexibility and scalability, particularly where needs increase in magnitude over time;
- cost-effectiveness, including capital and lifecycle considerations; and
- consistency with broader system plans, including provincial planning outlooks and planned reinforcements such as the South and Central Bulk Plan, Gatineau Corridor End-of-Life Study, and East Bulk Plan.

[2] Since the IESO is mandated to centrally deliver provincial eDSM programs, the incremental eDSM potential is estimated for each need regardless of its ability to meet the need.

The assessment framework recognizes that different solution types may be more appropriate for different needs. As a result, solutions were evaluated and compared separately for station capacity needs and supply capacity needs, as described in the sections below.

## 7.3 Options Evaluation and Recommendations

### 7.3.1 Pickering-Ajax-Whitby Subregion

#### 7.3.1.1 Needs Assessment

The Pickering-Ajax-Whitby subregion is experiencing significant load growth driven by new residential development in the northern portion of the subregion, together with increased electrification of transportation, building heating, and industrial processes. The assessment identified emerging station-capacity needs on both the 44 kV and 27.6 kV systems.

The most immediate needs occur on the 44 kV system and are the primary focus of this IRRP. While future constraints are also forecast on the 27.6 kV system, these needs emerge later in the planning horizon and are discussed as Future-Consideration Options.

In addition to station-capacity needs, the assessment identified a longer-term load-security concern associated with continued growth on the existing supply arrangements served by the T24C/T26C and T23C/T29C circuits. Under the reference forecast, the applicable 600 MW load-security threshold would be reached in approximately 2037 and 2033, respectively.

#### 7.3.1.2 Options Assessment

The Technical Working Group evaluated a range of wires and non-wires alternatives to address the identified needs.

**Existing Station Expansions**

Expansion of existing stations was assessed but was not found to be feasible. The major stations serving the subregion are already operating at the practical limits of their installed transformation equipment and therefore cannot provide the additional capacity required to accommodate forecast growth.

**Load Transfers**

The Technical Working Group also evaluated load-transfer opportunities between existing stations. Transferring load from Cherrywood TS to the Whitby stations was not found to be feasible due to the configuration of the distribution system and existing connection arrangements. While limited transfers between Whitby stations may be possible, they do not provide a sustainable long-term solution since all three stations are forecast to reach capacity over the planning horizon.

**Incremental eDSM**

Incremental electricity demand-side management (eDSM) was found to be a feasible and cost-effective complementary measure.

The assessment indicates that targeted incremental eDSM could achieve approximately 10 MW of demand reduction at Cherrywood TS by 2042 and approximately 45 MW across the Whitby stations by 2042, for a total of approximately 55 MW of savings within the subregion. These savings are incremental to demand-management impacts already reflected in the reference forecast and help optimize the utilization of existing infrastructure while reducing forecast station loading.

**Other Non-Wires Alternatives**

The Technical Working Group also evaluated non-wires alternatives, including dispatchable generation, renewable generation and battery energy storage systems (BESS).

From a technical perspective, these alternatives would require either large, centralized facilities connected directly to the transmission system or distributed deployment throughout the subregion. Based on the assessment, these options were not found to be feasible because of short-circuit limitations and other technical constraints associated with the existing system.

#### 7.3.1.3 Preferred Approach

The Technical Working Group found that a new transformer station represents the only practical solution capable of addressing the magnitude and geographic distribution of the identified needs.

Although station-capacity needs emerge at multiple stations over the planning horizon, analysis demonstrated that a strategically located new station could address all identified 44 kV station-capacity needs while also mitigating the emerging load-security concern.

The area near the junction of P15C and T28C was identified as the preferred location because it provides the greatest overall system benefit. A new station at this location can support emerging development in northern Pickering and Whitby, facilitate future load transfers, address multiple station-capacity needs, and improve compliance with applicable load-security requirements.

Accordingly, the Technical Working Group concludes that a new 230 kV transformer station near the junction of P15C and T28C, supported by targeted incremental eDSM, represents the preferred approach for the subregion as seen in **Figure 28**.

#### 7.3.1.4 Implementation-Ready Actions

The Technical Working Group recommends the development of a new 230 kV transformer station in the Pickering-Ajax-Whitby subregion to address identified station-capacity and load-security needs and accommodate forecast growth.

The recommended station, together with approximately 55 MW of targeted incremental eDSM savings, is expected to address the identified 44 kV station-capacity needs and provide sufficient 44 kV supply capability through approximately 2040 under the reference forecast.

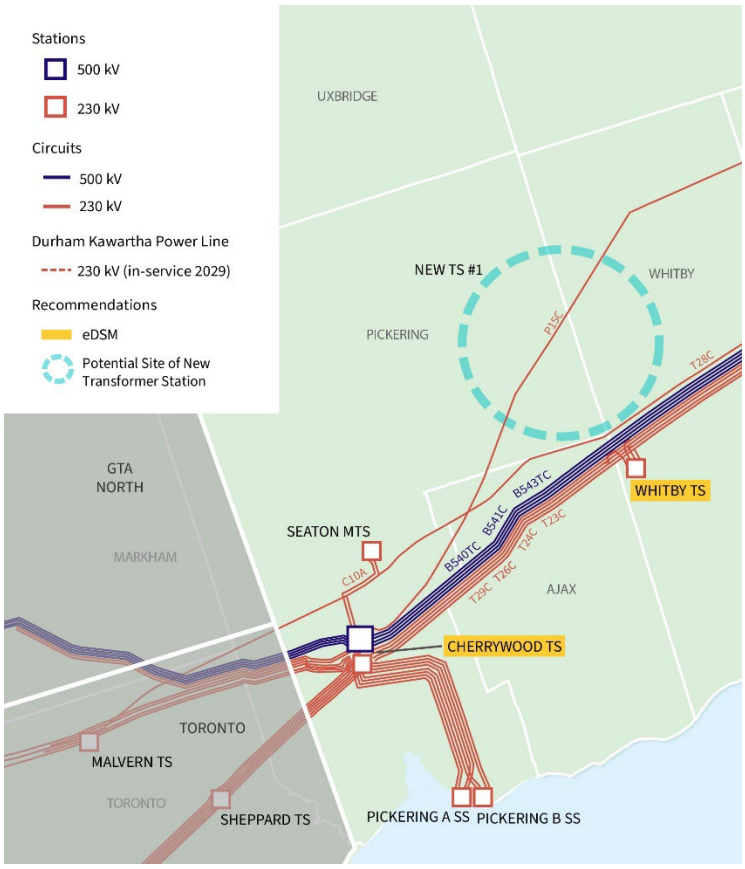
The estimated cost of the station and associated connection facilities is approximately $90 million to $135 million which includes environmental assessment activities, land acquisition, detailed engineering, procurement, construction and commissioning.

Facility: New 230 kV transformer station near the junction of P15C and T28C

Need addressed: Station-capacity needs and load-security needs within the Pickering-Ajax-Whitby subregion

Supporting action: Approximately 55 MW of targeted incremental eDSM savings by 2042 (10 MW at Cherrywood TS and 45 MW across the Whitby stations)

**Figure 28 | Pickering-Ajax-Whitby Recommendations**




### 7.3.1.5 Future-Consideration Options

While the implementation-ready recommendations are expected to address the identified 44 kV needs throughout most of the planning horizon, additional needs are expected to emerge on the 27.6 kV system.

Forecast constraints have been identified at Whitby TS T1/T2 and Seaton MTS and forecast demand on the subregion's 27.6 kV system is expected to exceed available supply capability beginning in the mid-2030s and continue to grow throughout the planning period. Given the magnitude of this need and the uncertainties associated with future growth patterns, a preferred reinforcement strategy has not been identified as part of this IRRP. Further assessment will be required through future regional planning activities to determine the appropriate combination of transmission, transformation, and distribution reinforcements needed to serve long-term growth in the area. In addition, much of the existing transmission infrastructure serving the area is approaching its practical limits, and future expansion may require broader transmission system studies and the identification of new supply arrangements beyond the existing Cherrywood transmission corridor.

The assessment also indicates that the existing transmission infrastructure serving the subregion, including the existing 230 kV supply corridor and the circuits supplied from Cherrywood TS, will approach practical limits over the longer term. As a result, future expansion opportunities may require broader transmission-system studies and evaluation of new supply arrangements beyond the existing Cherrywood corridor.

The IESO, transmitter, and LDCs should continue to monitor demand growth, electrification trends, station utilization, and transmission-system capability and reassess longer-term supply requirements through future planning cycles. The long-term forecasts for summer and winter for the 44 kV system with the implementation-ready actions can be seen in **Figure 29** and **Figure 30**. The long-term forecasts for summer and winter for 27.6 kV system are also shown in **Figure 31** and **Figure 32**.

**Figure 29 | Pickering-Ajax-Whitby 44 kV Non-Coincident Summer Reference Forecast**

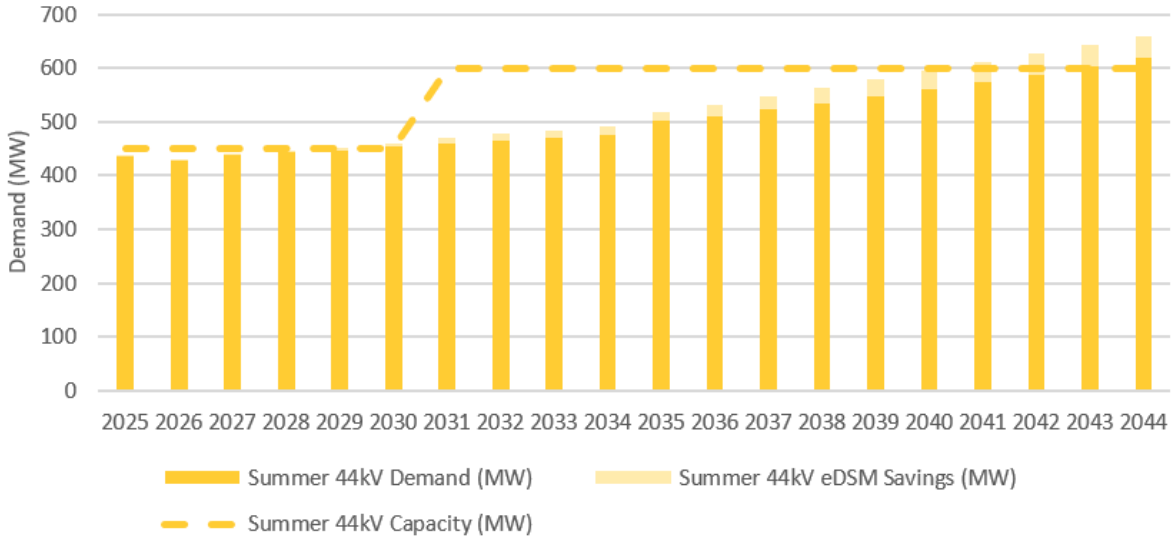



**Figure 30 | Pickering-Ajax-Whitby 44 kV Non-Coincident Winter Reference Forecast**

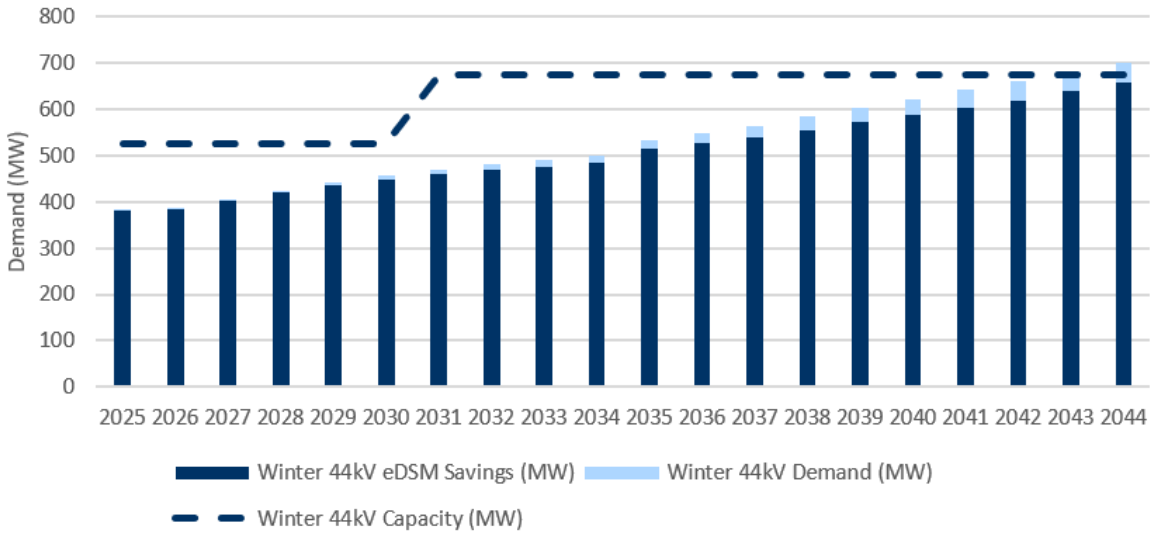


**Figure 31 | Pickering-Ajax-Whitby 27.6 kV Non-Coincident Summer Reference Forecast**

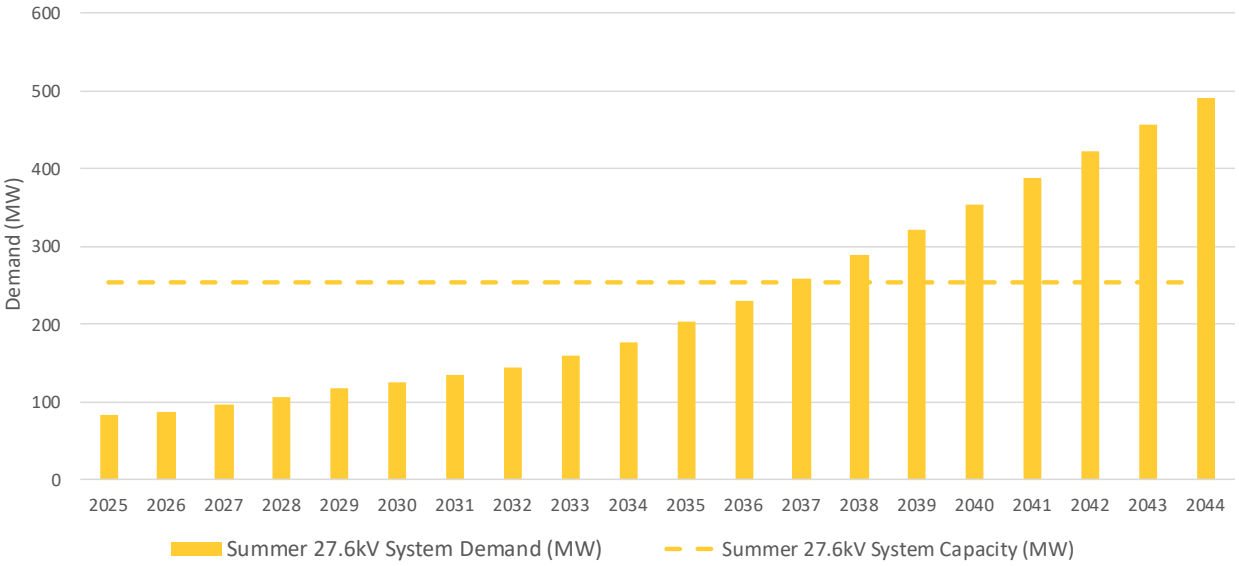
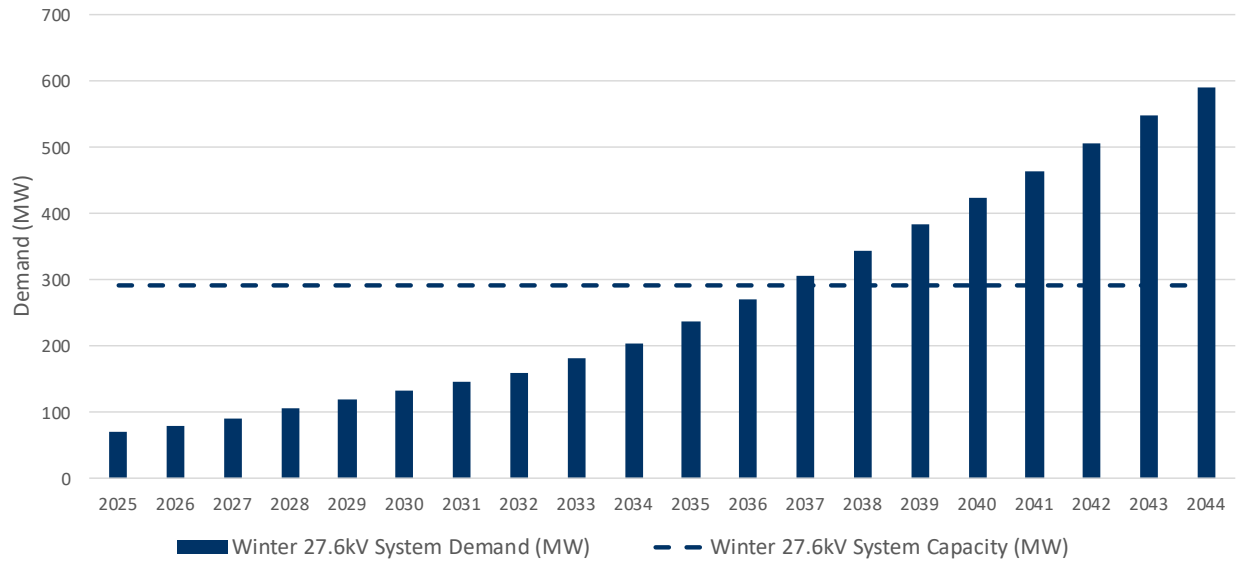



**Figure 32 | Pickering-Ajax-Whitby 27.6 kV Non-Coincident Winter Reference Forecast**



### 7.3.2 Oshawa-Clarington Subregion

#### 7.3.2.1 Needs Assessment

The Oshawa-Clarington subregion is experiencing significant load growth driven by residential development, commercial growth, and increasing electrification. The assessment identified station-capacity needs at Thornton TS and Wilson TS (T3/T4 and T7/T8), as well as supply-capacity needs within the Wilson subsystem and CTS subsystem.

Forecast demand growth in the subregion is expected to exceed 275 MW by 2035. Unlike the Pickering-Ajax-Whitby subregion, the Oshawa-Clarington area must address multiple interrelated needs, including station capacity, supply capacity, and load security. These needs affect multiple load-serving entities, including OPUC, Elexicon, Hydro One Distribution, and several connected customers supplied through the CTS subsystem.

The assessment also identified a longer-term supply-capacity limitation in the Wilson subsystem resulting from thermal constraints under contingency conditions. In addition, continued load growth on the existing transmission supply arrangements would increase reliance on facilities that are approaching their practical load-security limits.

#### 7.3.2.2 Options Assessment

The Technical Working Group evaluated a range of wires and non-wires alternatives to address the identified station-capacity, supply-capacity, and load-security needs.

**Existing Station Expansions**

Expansion of the existing stations within the subregion was evaluated but was not found to be feasible. Thornton TS and Wilson TS are approaching their practical station-capacity limits and do not provide sufficient opportunity for expansion to accommodate forecast growth over the planning horizon.

**Load Transfers**

The Technical Working Group is working towards a solution that may be able to transfer load from Wilson TS to Enfield TS to help meet near-term needs. These discussions are ongoing and will require collaboration between multiple LDCs. The Technical Working Group will continue to provide updates in subsequent planning products.

**Incremental eDSM**

Targeted incremental electricity demand-side management (eDSM) initiatives were found to be a feasible and cost-effective complementary measure.

The assessment indicates that approximately 3 MW of incremental savings could be achieved within the Thornton TS supply area by 2042 and approximately 17 MW within the Wilson TS supply area by 2042, for a total of approximately 20 MW of incremental demand reduction. These savings are incremental to any conservation and demand-management impacts already reflected in the reference forecast.

The Technical Working Group recognizes that eDSM alone cannot eliminate the identified station-capacity, supply-capacity, or load-security needs. Rather, these savings help reduce station loading, optimize the use of existing infrastructure, and defer the timing of future investments.

**Other Non-Wires Alternatives**

The Technical Working Group also assessed longer-term non-wires alternatives to address the residual supply-capacity needs within the Wilson subsystem.

Three resource portfolios were evaluated:

- A new station combined with approximately 200 MW of dispatchable generation and incremental eDSM;
- A new station combined with approximately 335 MW of solar generation, battery energy storage system (BESS) resources, and incremental eDSM;
- A new station combined with approximately 625 MW of BESS resources and incremental eDSM.

Of these alternatives, only the portfolio including approximately 200 MW of dispatchable generation was found to be technically feasible. The assessment indicated that the alternative could potentially address the residual long-term needs within the Wilson subsystem while requiring less than 100 hectares of land.

The solar and BESS portfolios were not found to be feasible due to the scale of resources required and associated land requirements. In particular, the solar and BESS portfolio would require approximately 335 MW of resources and roughly 500 hectares of land, while the BESS-only portfolio would require approximately 625 MW of battery storage capacity.

The dispatchable-generation assessment remains preliminary and should be considered a future-consideration rather than a preferred solution. Additional technical, economic, operability, environmental, and implementation assessments would be required before determining whether such resources could represent a practical alternative to future transmission reinforcements.

#### 7.3.2.3 Preferred Approach

The Technical Working Group determined that new transformer-station capacity supplied from the Durham-Kawartha Power Line represents the preferred approach for addressing the identified near-term station-capacity, supply-capacity, and load-security needs within the Oshawa-Clarington subregion.

The planned Durham-Kawartha Power Line provides a new source of transmission supply to the area without increasing reliance on the existing transmission corridors serving the subregion. By developing new transformer-station capacity supplied from this new transmission source, the region can address multiple identified needs while maintaining compliance with applicable load-security requirements.

The preferred approach also provides the flexibility necessary to serve multiple LDC service territories and connected customers while accommodating the significant forecast growth expected throughout the subregion.

#### 7.3.2.4 Implementation-Ready Actions

The Technical Working Group recommends developing new 230 kV transformer-station capacity in the Oshawa-Clarington area, supplied from the Durham-Kawartha Power Line, to address identified station-capacity, supply-capacity, and load-security needs and accommodate forecast growth.

The final station configuration, ownership, and siting will be determined through subsequent planning and implementation activities.

The recommended station capacity, together with approximately 20 MW of targeted incremental eDSM savings, is expected to address the identified near-term needs within the subregion. However, continued demand growth is expected to fully utilize the additional capacity by approximately the mid-2030s, indicating that additional reinforcements may be required later in the planning horizon.

The current high-level planning cost estimate per station and associated transmission connection facilities of approximately one to four kilometres is approximately $75 million to $110 million.

Facility: New 230 kV transformer-station capacity supplied from the Durham-Kawartha Power Line

Needs addressed: Station-capacity, supply-capacity, and load-security needs within the Oshawa-Clarington subregion

Supporting action: Approximately 20 MW of targeted incremental eDSM savings (3 MW in the Thornton TS area and 17 MW in the Wilson TS area)

#### 7.3.2.5 Future-Consideration Options

While the implementation-ready recommendations address the identified near-term needs, continued demand growth will require additional supply capability in the Oshawa-Clarington subregion later in the planning horizon as seen in **Figure 33** and **Figure 34**.

Two transmission reinforcement pathways have been identified to address the same longer-term need. The purpose of these investments is to enable more supply capacity in the subregion. This means providing potential connection points for future transmission lines, stations, and non-wire solutions.

The first pathway would assess expansion of the 500/230 kV transformation and switching facilities at Clarington TS to provide additional supply capability and support future load growth in the eastern portion of the region. Further assessment would be required to address physical space limitations, short-circuit constraints, and the overall feasibility of station expansion.

The second pathway would assess the development of new 500/230 kV transformation and a 230 kV switchyard at Bowmanville SS, following completion of the planned station expansion. This option could provide additional supply capability for the Oshawa-Clarington subregion while supporting future transmission development, future load growth, and potential generation development.

The Technical Working Group also identified a portfolio of approximately 200 MW of dispatchable generation as a potential future alternative to transmission reinforcements intended to address the residual long-term needs of the Wilson subsystem.

Neither pathway is recommended for implementation at this time. The preferred solution, scope, timing, trigger, and configuration will be determined through future planning activities as forecast growth, generation development, and broader system conditions become more certain.

This assessment remains preliminary and does not constitute a recommendation to proceed. Additional assessment would be required to determine whether such resources represent a technically, economically, and operationally viable alternative to future transmission investments.

The Technical Working Group should continue to monitor demand growth, electrification trends, station loading, and subsystem capability and reassess the timing and nature of future reinforcement requirements through subsequent regional planning cycles.

In summary, the Technical Working Group recommends building one new transformer station in the Oshawa-Clarington subregion connected to the new Durham–Kawartha Power Line and pursuing additional eDSM opportunities at Wilson TS and Thornton TS as shown in **Figure 35**.

**Figure 33 | Oshawa-Clarington Non-Coincident Summer Reference Forecast**

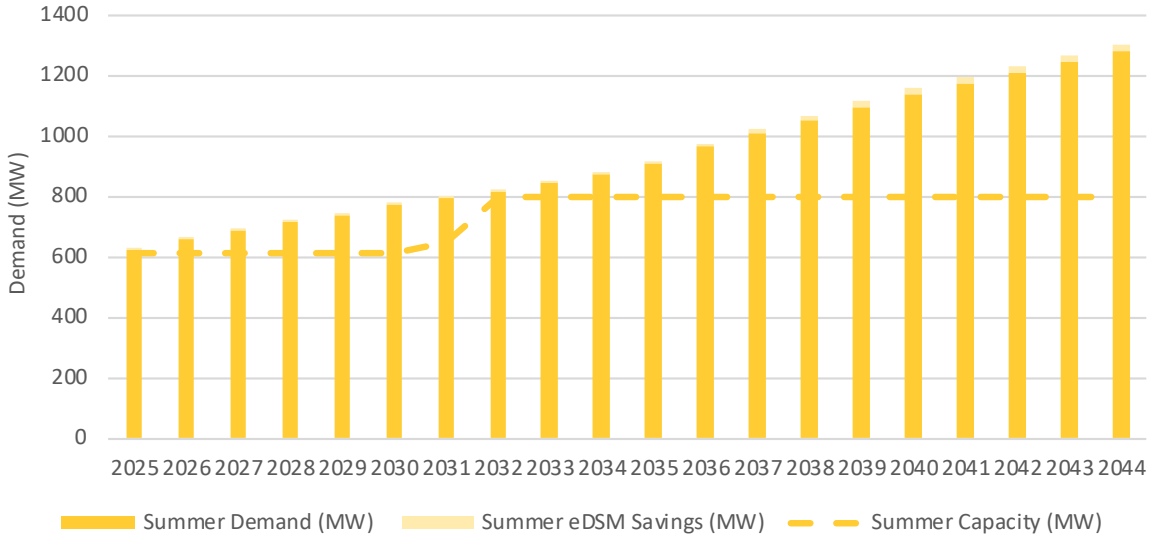
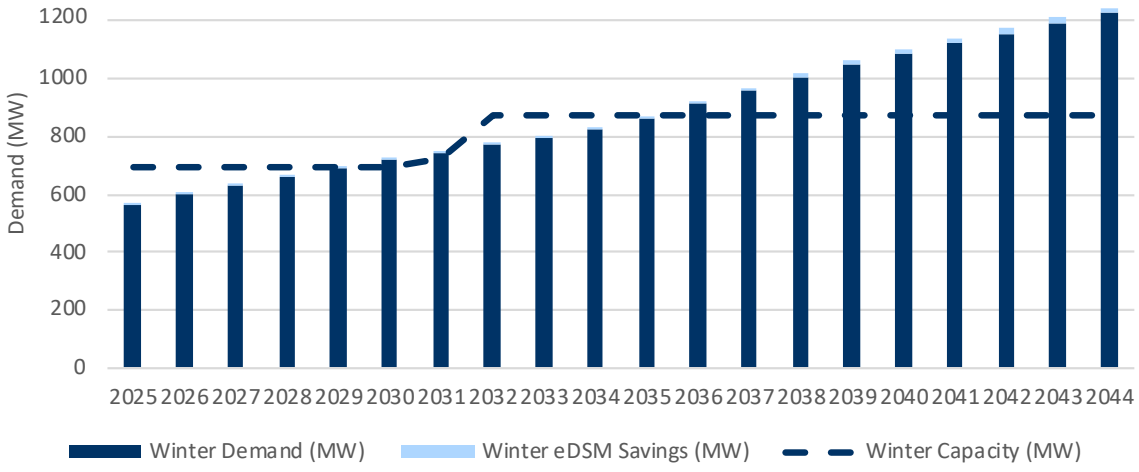
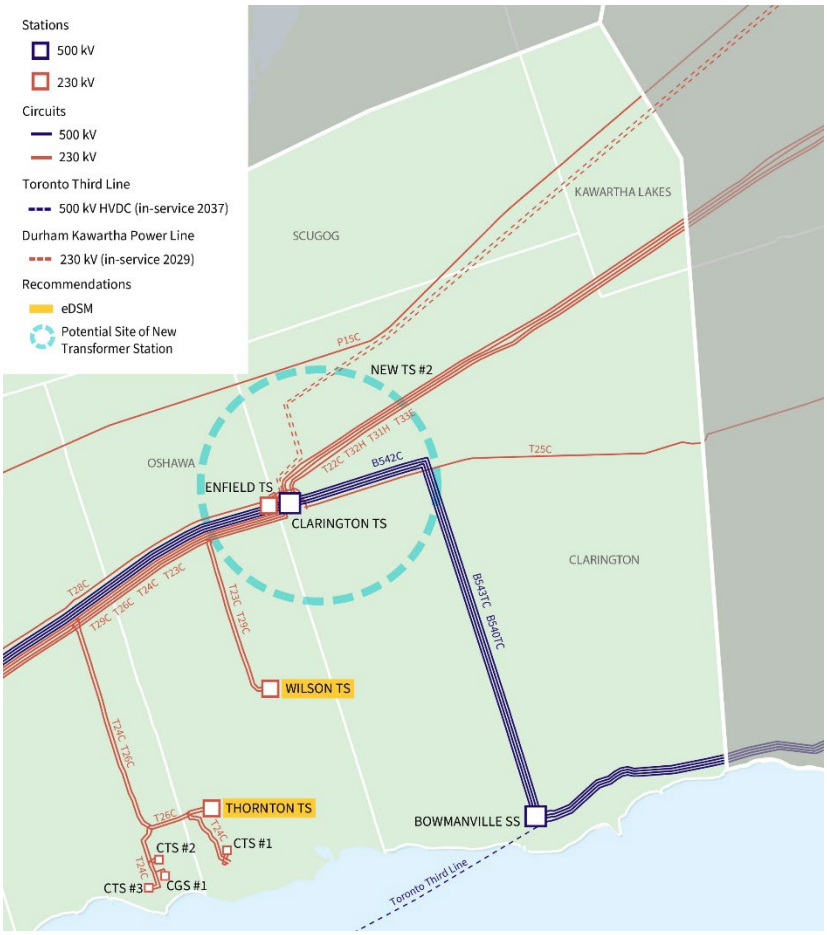



**Figure 34 | Oshawa-Clarington Non-Coincident Winter Reference Forecast**



## Figure 35 | Oshawa-Clarington Recommendations



## 7.4 Summary of Recommended Actions and Next Steps

Based on the options assessments above, this section consolidates the preferred approaches into the actions recommended by the Technical Working Group. The actions are distinguished between implementation-ready recommendations that should proceed now and future-considerations that require further assessment as conditions evolve. The implementation-ready actions can be found in **Table 11** while the future-considerations can be found in **Table 12**.

**Table 11 | Implementation-Ready Actions**

| Action | Solution Type | Needs Addressed | Implementation | Expected In-Service | High Level Planning Cost Estimate ($) |
|---|---|---|---|---|---|
| Address Pickering-Ajax-Whitby needs | Build a new 230 kV transformer station in north Pickering/Whitby area connected to P15C and T28C | Cherrywood TS, Whitby TS T1/T2, Whitby TS T3/T4 station capacity, load security | Elexicon, Hydro One Transmission | 2031 | $90M - $135M |
| Address Oshawa-Clarington needs | Develop new 230 kV transformer station capacity in the Oshawa-Clarington area supplied from the Durham-Kawartha Power Line. | Thornton TS, Wilson TS T3/T4, Wilson TS T7/T8 station capacity, load security, load supply Wilson subsystem, load supply CTS subsystem | Oshawa Power, Hydro One Distribution, Hydro One Transmission | 2032-2034 | $75-$110 M per station |
| Address GTA East needs | Pursue additional eDSM programs for Cherrywood TS, Whitby TS, Wilson TS, and Thornton TS to reduce electricity demand by a total of 75 MW by 2042 | Cherrywood TS, Whitby TS, Wilson TS, Thornton TS station capacity | IESO, LDCs | 2027-2044 | System cost effective |

**Table 12 | Future-Consideration Options**

| Action | Solution Type | Needs Addressed | Implementation |
|---|---|---|---|
| Address Pickering-Ajax-Whitby needs | Further assess 27.6 kV supply constraints and identify a preferred reinforcement strategy. | Seaton MTS, Whitby TS T1/T2 station capacity | Technical Working Group |
| Address Oshawa-Clarington needs | Assess expansion of the 500/230 kV transformation and switching facilities at Clarington TS to provide additional supply capability and support future load growth in the eastern portion of the region. | Wilson TS T3/T4, Wilson TS T7/T8 station capacity | Technical Working Group |
| Address Oshawa-Clarington needs | Assess new 500/230 kV transformation and a 230 kV switchyard at Bowmanville SS to provide additional supply capability and support future load growth. | Wilson TS T3/T4, Wilson TS T7/T8 station capacity | Technical Working Group |
| Address Oshawa-Clarington needs | Assess approximately 200 MW of dispatchable distribution-connected resources as a potential alternative to future Clarington and Bowmanville transmission reinforcements. | | Technical Working Group |

# 8. Community and Sector Engagement

Engagement is critical in the development of an IRRP. Providing opportunities for input in the regional planning process enables the views and perspectives of the public, which for these purposes, refers to market participants, municipalities, stakeholders, communities, Indigenous communities, customers and the general public, to be considered in the development of the plan, and helps lay the foundation for successful implementation. This section outlines the engagement principles and activities undertaken to date for the GTA East IRRP.

## 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. We are committed to engaging with purpose to foster trust and build understanding as seen in **Figure 36**.

**Figure 36 | The IESO's Engagement Principles**




## 8.2 Engagement Tactics

To ensure that the IRRP reflects the needs of market participants, municipalities, stakeholders, communities, Indigenous communities, customers and the general public, engagement tactics involved:

- Leveraging the GTA East engagement webpage to share information including engagement opportunities, meeting materials, input received and the IESO's response to feedback;

- Leading targeted discussions with municipal staff and transmission-connected customers to help inform the engagement approach and solicit input for this planning cycle;
- Hosting public webinars at major junctions in the plan development to share plan details, understand feedback and answer questions, and;
- Providing written updates through email and IESO's weekly Bulletin updates to all subscribers.

## 8.3 Engagement Approach

Four public engagement webinars were held at major stages during the Scoping and IRRP development to give interested parties an opportunity to hear about its progress and provide comments on key components of the plan.

Public engagement webinars were attended by municipal staff, community representatives, businesses, Indigenous communities, and other interested parties and written feedback was collected following a comment period after each webinar. The four stages of engagement at which input was invited were:

- The draft scoping outcome assessment report to share the planning approach before delving into the full IRRP study.
- The draft engagement plan and electricity demand forecast to set the foundation of this planning work.
- The electricity needs for the region and an overview of wire and non-wire options that could meet the needs, as well as
- The detailed analysis of all feasible wire and non-wire options and draft IRRP recommendations.

Comments received during the development of the IRRP primarily focused on:

- Accounting for growth and economic development projects across the region;
- Ensuring environmental impacts are accounted for throughout the development of the IRRP, and;
- Prioritizing non-wire options to meeting the area's electricity needs.

Feedback received during the written comment periods for these webinars helped to guide further discussions throughout the development of this IRRP, as well as add due consideration to the final recommendations, and are outlined in the stages below.

### 8.3.1 Scoping Assessment

The GTA East region was anticipated to have several electricity needs as identified in the Needs Assessment, leading to Hydro One's recommendation to proceed with an IRRP. Once the Scoping Assessment milestone launched, email communications were sent to all subscribers of the GTA East region, including municipalities, Indigenous communities, and those with an identified interest in regional issues, to announce the commencement of a new planning cycle and encourage participation on the GTA East Scoping Assessment Report finalization. A pre-recorded narrated presentation was posted on April 1, 2025, to provide an overview of the regional electricity planning process, the draft report and proposed approach. No feedback was received during this milestone.

### 8.3.2 Demand Forecast

Following the finalization of the Scoping Assessment, the GTA East TWG began the development of the region's electricity demand forecast. IRRP recommendations are typically driven by the Reference Demand Forecast, which includes firm loads (current and planned), organic growth, residential, electrification and energy plans, and industrial growth. In addition to the reference forecast, a high growth scenario was developed to capture growth and trends that are less certain, such as large-scale customer connections. A low growth scenario was also developed to capture a slower pace of growth.

To develop these forecast scenarios, the IESO engaged with impacted municipalities to share a draft forecast and understand any other development or growth to consider. The IESO also engaged with transmission-connected loads to understand their growth plans and ensure it was captured in the draft forecast. The draft forecast scenarios were shared through the launch of a broader public engagement initiative. Communications to IESO subscribers of the GTA East region ensured all interested parties were made aware of the opportunity for input.

During this milestone, the GTA East TWG shared that electricity demand is forecast to grow by 98% in summer and 126% in winter by 2044. The primary drivers of increasing demand growth were electrification and growth across several sectors including residential, commercial and industrial. The reference forecast will be used to drive recommended solutions, however the GTA East TWG will identify options for long-term electricity needs, refining these options in future planning cycles and activating them as growth occurs.

Feedback received during this engagement emphasized the importance of ensuring climate impacts are considered in the demand forecast and resiliency in considered in recommended actions. In response, the IESO shared the draft forecast reflects extreme weather conditions in various scenarios, which includes the system's ability to respond to disturbances, and committed to ongoing discussions about resiliency throughout plan development. Several municipal inputs were also received and incorporated into the demand forecast including growth plans and developments. Additionally, feedback was centred around reducing the need for new transmission infrastructure by evaluating eDSM and opportunities to increase energy conservation, as well as prioritizing non-wire options. The IESO committed to sharing a detailed options evaluation in future IRRP milestones.

Lastly, during this milestone the IESO became aware of a District Energy project as part of the Courtice Transit Oriented Community. The IESO began engaging with the Regional Municipality of Durham to understand expected impacts of this project.

### 8.3.3 Electricity Needs and Options Identification

During this milestone, the GTA East TWG shared a final electricity demand forecast with electricity demand forecasted to increase by up to 104% in summer and 129% in winter. Using this forecast, the GTA East TWG identified 13 electricity system needs over the 20-year planning timeframe with several needs emerging in the near-term. The GTA East TWG shared the options screening process, and which wire and non-wire options were screened in for each need type for further analysis.

Feedback at this stage of the engagement sought to confirm key municipal inputs in the demand forecast. Other feedback sought clarification if non-wire options will be considered. The GTA East TWG confirmed the inputs considered in the forecast and committed to sharing a detailed options analysis in the upcoming milestone. Additionally, feedback received sought to understand impacts and next steps, which in response, the GTA East TWG provided additional context that the IRRP is limited to assessing potential solutions from a system planning perspective and is not an environmental assessment, project approval process or detailed project evaluation. These are outside the scope of the IRRP and will be addressed in subsequent stages of project development, if and when a transmission solution is advanced and a transmitter is selected.

### 8.3.4 Options Analysis and Draft Recommendations

During this milestone, the TWG shared the options analysis for all feasible wire and non-wire options and the draft recommendations through targeted municipal discussions and a public engagement webinar. The draft recommendations included two new transmission stations with a wire-tap connection and targeted incremental eDSM at four transmission stations.

Feedback at this stage of the engagement expressed appreciation for an integrated approach of electricity demand side management and wire solutions to meeting near-term needs. A stronger emphasis on non-wire options playing a larger role in meeting regional needs was shared, in which the IESO shared that the draft recommendations do not preclude non-wires from playing a role to meet electricity needs in the region, and encouraged discussions with the local distribution companies on exploring potential opportunities.

## 8.4 Involving Municipalities in the Plan

Throughout the IRRP engagement, valuable feedback was received and incorporated into the final IRRP including:

- Accounting for the District Energy project's effect on the forecasted electricity demand. Expected impacts from this project have been incorporated into the reference demand forecast used for the IRRP. As a result, the timing and energy savings currently anticipated from this project are reflected in the timing of the GTA East IRRP's recommendations.
- A strong interest in non-wire alternatives and the need to develop a detailed options analysis to share wire and non-wire options that can meet the identified electricity needs.
- Ensuring communication on next steps and further engagement from the IESO and future asset owners as the recommendations from this IRRP are implemented.

## 8.5 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 integrated regional 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 July 16, 2025, April 20, 2026, and September 14, 2026. To share

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

- Alderville First Nation
- Beausoleil First Nation
- Chippewas of Georgina Island First Nation
- Chippewas of Rama First Nation
- Curve Lake First Nation
- Hiawatha First Nation
- Kawartha Nishnawbe First Nation
- Mississaugas of Scugog Island First Nation
- Mississaugas of the Credit First Nation

The following Métis communities were invited to participate in engagement activities, including webinars:

- Métis Nation of Ontario

### 8.5.1 Indigenous Engagement Feedback

Detailed non-confidential feedback submitted to the IESO and the IESO's responses can be viewed on the Regional Electricity Planning - GTA East 2025 webpage. At a high level, the IESO received the following feedback from the following Indigenous communities:

#### 8.5.1.1 The Mississaugas of Scugog Island First Nation (MSIFN) highlighted:

- the role of non-wire solutions in deferring, downsizing or phasing traditional infrastructure.
- that planning should integrate distributed energy resources (DERs) and distributed battery storage, renewable energy and renewable natural gas (RNG).
- recommended a regional cumulative impact framework that spans IRRP, Bulk Plan and LDC infrastructure initiatives and incorporates Indigenous knowledge and monitoring into cumulative assessment design.
- that any HVDC or in-water transmission infrastructure under Lake Ontario triggers significant rights-based concerns and requested that Lake Ontario-specific rights analysis be integrated into the GTA East IRRP.

# 9. Conclusion

This IRRP identifies a coordinated and phased approach to address the electricity system needs emerging across the GTA East region over the next 20 years. Significant population growth, expanding employment lands, and increasing electrification of buildings, transportation, and industry are expected to drive substantial increases in electricity demand throughout Pickering, Ajax, Whitby, Oshawa, Clarington, Scugog, and Uxbridge. The analysis completed for this IRRP demonstrates that implementation-ready actions are required to maintain reliability and ensure the electricity system can continue to support the region's long-term growth and economic development objectives.

The Technical Working Group evaluated a range of wires and non-wires alternatives to address identified station-capacity, supply-capacity, and load-security needs. Consistent with regional planning objectives, solutions were assessed based on technical feasibility, cost-effectiveness, timing, flexibility, and consistency with broader provincial and regional planning initiatives. Targeted incremental electricity demand-side management (eDSM) was identified as a cost-effective complementary resource that can help optimize the utilization of existing infrastructure and support the recommended station investments. The recommended incremental eDSM savings include approximately 55 MW in the Pickering-Ajax-Whitby subregion and approximately 20 MW in the Oshawa-Clarington subregion, with required delivery dates to be determined through implementation planning.

**Implementation-Ready Actions**

To address the identified needs in the Pickering-Ajax-Whitby subregion, the Technical Working Group recommends the development of a new 230 kV transformer station in the north Pickering-Whitby area connected to the existing transmission network near P15C and T28C, supported by approximately 55 MW of targeted incremental eDSM savings. Together, these actions address the identified 44 kV station-capacity needs and load-security requirements and are expected to provide sufficient 44 kV supply capability through approximately 2040 under the reference forecast.

For the Oshawa-Clarington subregion, the Technical Working Group recommends developing new 230 kV transformer-station capacity supplied from the Durham-Kawartha Power Line, supported by approximately 20 MW of targeted incremental eDSM savings. These actions address identified station-capacity, supply-capacity, and load-security needs while accommodating forecast growth in the subregion. The final station configuration, ownership, and siting will be determined through subsequent planning and implementation activities.

**Future-Consideration Options**

While the implementation-ready recommendations are expected to address the identified near-term needs and most forecast needs over the planning horizon, additional needs are expected to emerge in the longer term and should be reassessed through future planning activities.

In the Pickering-Ajax-Whitby subregion, forecast constraints on the 27.6 kV system remain a future-consideration. Additional assessment will be required through future regional planning cycles to determine the timing, scope, and preferred reinforcement strategy. Longer-term supply limitations

associated with the existing transmission infrastructure, including the Cherrywood supply corridor, should also continue to be monitored.

In the Oshawa-Clarington subregion, continued demand growth may require additional transmission-supply capability later in the planning horizon. Two potential transmission-reinforcement pathways have been identified for future-consideration: expansion of the 500/230 kV transformation and switching facilities at Clarington TS, and development of new 500/230 kV transformation and 230 kV switching facilities at Bowmanville SS. Neither pathway is recommended for implementation at this time, and further planning will be required to determine the preferred solution, scope, timing, and trigger.

The Technical Working Group also identified approximately 200 MW of dispatchable generation as a potential future alternative to transmission reinforcements intended to address the residual long-term needs of the Wilson subsystem. This assessment remains preliminary and additional technical, economic, operability, environmental, and implementation assessmenst will be required before determining whether such resources represent a viable alternative to future transmission investments.

The implementation-ready actions identified in this IRRP should proceed to development and implementation to address confirmed reliability and growth needs across the GTA East region. At the same time, ongoing monitoring of demand growth, electrification trends, customer requirements, and system performance will help inform future planning decisions and determine when additional reinforcements may be required. This phased approach enables the region to support continued population growth, economic development, and electrification while maintaining flexibility to respond to evolving system needs and planning uncertainties.

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