Preliminary Connection Guidance and Evaluation Stage Deliverability Test Methodology for the Long-Term 2 Capacity Supply (Window 1) Request for Proposals

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Document Change History

Issue	Reason For Change	Date
1.0	Preliminary Connection Guidance and Methodology for Long-Term 2 Procurement Capacity Window 1 first issued	April 4, 2025
2.0	Updated Section 2.3.4 and Appendix A (**Table 10**) adding requirements for connecting projects to circuits C9 and C12, to support the recommendations of the Burlington-Nanticoke Integrated Regional Resource Plan[1]	May 15, 2025

[1] https://ieso.ca/-/media/Files/IESO/Document-Library/regional-planning/Burlington-to-Nanticoke/b2n-20241218-IRRP.pdf

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Executive Summary

This document provides preliminary connection guidance ("**Connection Guidance**") for proponents interested in participating in the Long-Term Procurement 2 Capacity Supply (Window 1) Request for Proposals ("LT2(c-1) RFP") and describes the methodology that will be used during the evaluation stage deliverability test ("**Deliverability Test**") for evaluating projects submitted into the LT2(c-1) RFP.

The IESO has developed and published similar documents for the energy stream of the LT2 RFP.

The deliverability process for the LT2(c-1) RFP includes the following two steps:

1. Provide Connection Guidance information ahead of proposal submission to help proponents select project locations that will more likely contribute to addressing emerging capacity reliability needs (this document); and
2. Conduct a Deliverability Test for projects submitted to the LT2(c-1) RFP as part of proposal evaluation to assess whether submitted projects can contribute effectively to addressing capacity reliability needs.

As this procurement is focused on meeting capacity reliability needs, the purpose of both the Connection Guidance and Deliverability Test is to ensure that projects awarded contracts can operate with minimized risk of curtailment and congestion on the system during system peak conditions. The following assessments informed the Connection Guidance and will determine individual project deliverability during the Deliverability Test:

1. Area and circuit congestion assessments, as presented in Sections 2.1 and 2.3 of the report;
2. Inverter-Based Resource (IBR) assessment, described in Section 2.2;
3. Protection and short circuit assessment, as presented in Section 2.4; and
4. Distribution asset assessment, as presented in Section 2.5

Connection Guidance

Table 1 summarizes the most constraining area limitations identified when developing the Connection Guidance, indicating the maximum amount of new resources that could connect in a given area. Where multiple limitations apply to a particular location, the most constraining limitation will be used.

Table 1 | Most constraining Area limitations summary

Zone	IBR Limit[1] (MW)	Area Congestion Limit (MW)[2]	Short Circuit Limited Stations (50 km radius)
Northwest	North = 1,000	Northern Ontario[2] = 635 East of Widdifield SS = 0	No limitation observed
Northeast			
Essa	East of Toronto = 1,400	East of Minden TS = 100	No limitation observed
Ottawa		East of Dobbin TS = 700 East of Bowmanville SS =550 East of Hinchinbrooke SS = 600 East of St. Lawrence TS=200	No limitation observed
East			No limitation observed
Toronto	N/A[3]	N/A[3]	Cherrywood TS Clarington TS Richview TS Manby TS
Niagara	West of Toronto = 2,400	West of Detweiler TS = 1,100 West of Middleport TS = 850 West of Milton SS = 900	Allanburg TS Beck 2 TS
Southwest			Trafalgar TS Burlington TS Richview TS Manby TS
Bruce		See West and Southwest Limits	No limitation observed
West		West of Buchanan TS = 1,100 West of Chatham SS = 700 West of Scott TS = 500	No limitation observed

[1] IBR Limits apply to inverter-based resources and depend on the size and location of resources. For example, in Northern Ontario, the "North" IBR limit increases to 1,200 MW if 230 kV circuit connections are limited to 100 MW instead of 200 MW.

[2] Area congestion limits are approximations based on the maximum amount of new resources that could be injected into the station mentioned as the area limit.

[3]Area congestion limits and IBR Limits were not determined for Toronto since short circuit limitations will prevent connections to the entire area for LT2(c-1)

In addition to the zonal and area limitations above, the maximum amount of any type of resources that can connect directly to any circuit is 250 MW. The maximum amount of IBRs that can connect directly to any single circuit is further limited to the bright-line[3] limits as follows:

- 75 MW per 115 kV circuit in both Northern and Southern Ontario; and
- 200 MW per 230 kV circuit in Northern Ontario.

However, there are circuits that are more limiting than the limits above, as well as circuits that will need to be avoided, and circuits where new connections will not be allowed. Appendix A lists the capacity identified for each transmission circuit, based on the most restrictive circuit limitation, and indicates the area where each circuit belongs.

[2] Northern Ontario encompasses all transmission north of X503E and X504E (terminated at Hanmer TS) and/or northwest of D5H (terminated at Otto Holden TS)

[3] Bright-line is a non-objective rule or standard.

The results of the RFP evaluation stage deliverability test will be highly dependent on the size and location of LT2(c-1) RFP proposals in the same electrical proximity – proposals may end up competing for the same transmission system availability as determined using the information in this document, during the evaluation stage deliverability test.

While this document considers only the electricity system impacts of project siting, proponents are encouraged to take a fulsome view of where they site their projects and examine other regulatory, permitting, RFP and policy requirements. For example, IESO received policy direction from the Ministry of Energy and Electrification on project considerations for siting on agricultural land. Section 2.6 of this document lists other connection considerations that the users of this guidance should be aware of.

Proponents are free to submit proposals for projects at locations either not assessed in this document or recommended to "avoid", as well as proposals for project sizes that exceed the circuit congestion limitations presented in this document. However, there is a higher risk that those proposals may be assessed as not deliverable during the evaluation stage deliverability test. Proposals for projects that seek to connect to circuits that are "not allowed" will be deemed "non-deliverable" in the evaluation stage deliverability test.

Deliverability Test

Only proposals that are on the ranked Preliminary List (as determined in Stage 4 of the LT2(c-1) RFP[4]) will have their deliverability assessed in accordance with the Deliverability Test. Proposals will be tested for deliverability sequentially, based on their ranking within the Preliminary List. All proposals that are deemed "deliverable" will remain in the models for subsequent testing of proposals with lower ranking. This sequential testing will continue until the procurement target for LT2(c-1) is met, or there are no eligible proposals left to test.

The Deliverability Test (Section 3) will include a charging assessment for storage projects, which was not performed in the development of the LT2(c-1) Connection Guidance information (Section 2), where only an injection assessment was performed. Charging Assessments will assume storage charging at 50% of rated capacity and are generally, but not always, less restrictive than injection assessments.

At its discretion and in consideration of rules and timing of procurement activities, the IESO will update this document should there be new information or if substantial changes to the procurement are required.

[4] https://www.ieso.ca/-/media/Files/IESO/Document-Library/long-term-rfp/LT2c-RFP-Draft-20241220.pdf

1. Introduction

The Long Term Procurement 2 Capacity Supply (Window 1) Request for Proposals ("LT2(c-1) RFP") is targeting 600 MW for procurement with a target in-service year of 2030 or earlier.

This document is strictly meant to provide preliminary connection guidance ("Connection Guidance") to help project proponents locate capacity projects for the LT2(c-1) RFP and to describe the methodology that will be used to evaluate LT2(c-1) RFP during the evaluation stage deliverability test ("Deliverability Test") for evaluating projects submitted into the LT2(c-1) RFP.

Since the LT2(c-1) RFP is designed to primarily address a capacity need, to ensure the procured resources contribute towards the capacity reliability need, both the Connection Guidance and the Deliverability Test for the LT2(c-1) RFP will evaluate the ability of resources to be delivered at system peak times. The LT2(c-1) RFP deliverability process will comprise two steps:

1. Provide **preliminary connection guidance information** ahead of proposal submission to help proponents select project locations that will more likely contribute to addressing emerging capacity reliability needs (Connection Guidance in this document); and
2. Conduct an **evaluation stage deliverability test** for proposals submitted to the LT2(c-1) RFP, to assess whether submitted projects can contribute effectively to addressing emerging reliability needs. The evaluation stage deliverability test methodology will be based on principles and criteria similar to those used in the development of this guidance document. In accordance with the Minister's Directive dated November 28, 2024 (the "Directive")[5], the deliverability stage of proposal evaluation for LT2 RFP will prioritize energy-producing resources, and all LT2(e-1) projects offered contracts will be accounted for in the LT2(c-1) deliverability test.

Connection Guidance

The Connection Guidance takes into account the following four types of system limitations:

1. Congestion limitations, which identify the total new capacity that can connect into an area or a circuit and result in a minimum risk of capacity curtailments by using load-flow simulations;
2. Inverter-based resource limitations, which identify the total amount of new inverter-based capacity that can connect into a zone or a circuit and minimize the possibility of unwanted sub-synchronous control interactions (SSCI) with other inverter-based resources and sub-synchronous resonance (SSR) with series capacitors;

[5] https://www.ieso.ca/-/media/Files/IESO/Document-Library/corporate/ministerial-directives/Directive-from-the-Minister-of-Energy-and-Electrification-20241128-LT2.pdf

3. Short-circuit & protection limitations (HONI system only), which identify areas where new projects should avoid connecting because short-circuit levels may exceed the capability of the transmission equipment or circuit protections may become inadequate; and
4. Distribution asset limitations (HONI stations only), which identify available capacity at distribution level assets.

Some locations could be subject to multiple types of limitations. For example, availability in a distribution system identified through Section 2.5 could be further restricted by transmission-level limitations that are applicable to the station, circuit or the area the distribution system connects to. As well, multiple types of limitations could apply to the transmission connections. Where multiple limitations apply to a particular location, the most constraining limitation will be used. In general a project must be less than the distribution station connection limitation (if applicable, see Section 2.5), while also being less than the circuit limitations the project will inject into (see Appendix A), which must also be less than the Area congestion limitation(s) applicable to the circuit(s). All projects should stay >50 km away from stations with short circuit restrictions.

The Connection Guidance information in this document is presented to help potential LT2(c-1) RFP proponents identify project locations where a project is more likely to be found deliverable in the Deliverability Test of the LT2(c-1) RFP.

Deliverability Test

The IESO is responsible for establishing the methods and assumptions used in the parts of the Deliverability Test under its purview subject to any applicable standards, codes or other regulatory instruments. The four types of limitations that were considered in the Connection Guidance will also determine individual project deliverability during the evaluation stage Deliverability Test during stage 5 of the LT2(c-1) RFP[6].

As per subsection 5(k) of the Directive, the IESO will reduce the capacity available for LT2 projects proposing to connect to the 230 kV circuits that connect to Nanticoke TS and/or the Niagara Reinforcement Line between Allanburg Transformer Station and Middleport Transformer Station[7] by 300 MW. Further, this 300 MW of capacity will be set aside for any renewable energy projects that are owned by, or have majority equity interest from, Six Nations of the Grand River Development Corporation ("SNGRDC Projects"), as applicable under the agreement between Six Nations of the Grand River, Six Nations of the Grand River Development Corporation and the (then) Ministry of Energy that is posted to the website of Six Nations Future (here). This 300 MW of capacity can be awarded to one or more SNGRDC Projects under LT2 provided they meet all procurement requirements. The set aside capacity will be accounted for during the Deliverability Test.

[6] https://www.ieso.ca/-/media/Files/IESO/Document-Library/long-term-rfp/LT2c-RFP-Draft-20241220.pdf

[7] These circuits include: K40M, N20K, N21J, N22J, N37S, N5M, N6M, Q26M, Q35M and S39M.

2. Connection Guidance

2.1 Area Congestion Assessment

2.1.1 Area Congestion Objective

The goal of the area congestion limitation guidance assessment is to determine the capacity that can connect into an area and have a minimum risk of curtailment during peak demand conditions.

2.1.2 Area Congestion Assessment Assumptions

For the area and circuit congestion assessments, the IESO has developed three main basecases for three larger sub-systems of focus:

- Northern Ontario sub-system – includes the Northwest and Northeast electrical zones;
- West of Toronto sub-system – includes the Southwest, West, Bruce and Niagara electrical zones; and
- East of Toronto sub-system – includes the Essa, East and Ottawa electrical zones.

Each of these cases was adjusted to deliver energy towards Toronto, and included the following assumptions:

- Summer normal weather coincident system peak load for year 2030, as per the 2025 Annual Planning Outlook (APO) forecast;
- Scheduled long term generation outages and refurbishments were accounted for. The following generation units were additionally considered out of service in each basecase:
    - Northern Ontario sub-system - Atikokan GS;
    - West of Toronto sub-system - one Bruce generating unit;
    - East of Toronto sub-system - one Lennox unit;
- Non-energy-limited resources, such as nuclear generators and gas generators, were assumed in service at their maximum or normal operating output;
- Hydroelectric plants, were assumed at their historic 90th percentile MW production over the Ontario summer peak period[8];
- Existing wind and solar resources were assumed at their historic 90th percentile MW production over the Ontario summer peak period[9];

[8] The 90th percentile of Hydro Output during the five peak Ontario demand hours for each of June, July and August for years 2022-2024

[9] The 90th percentile of Wind and Solar Output during the Ontario peak demand hours (hours 13-20) in July for years 2011-2021

- Storage resources were assumed to be injecting at 100% of rated capacity.
- All resources committed to come into service by 2030 were assumed in service and dispatched according to their resource type as noted above;
- All major transmission projects committed to come into service by 2030 (see details in Table 2 below) were considered, as per 2025 APO.;

Table 2 | Transmission Reinforcement Assumptions

Transmission Projects	Zone	In-service Date
New 2-CCT 230 kV Transmission Line from Lakehead to MacKenzie	Northwest	2025
New 2-CCT 230 kV Transmission Line from Chatham to Lakeshore	West	2025
Richview to Manby Transmission Reinforcement Phase 1	Toronto	2026
Richview to Trafalgar Conductor Upgrade	Toronto	2026
Essa to Orangeville Conductor Upgrade	Southwest	2027
New 2-CCT 230 kV Transmission Line from Lambton to Chatham	West	2028
New 1-CCT 500 kV Transmission Line from Mississagi to Hanmer	Northeast	2029
New 2-CCT 230 kV Transmission Line from Mississagi to Third Line	Northeast	2029
New 2-CCT 230 kV Transmission Line from the GTA to Dobbin	East	2029
New 1-CCT 230 kV Transmission Line from MacKenzie to Dryden	Northwest	2027
New 1-CCT 230 kV Transmission Line from Porcupine to Wawa	Northeast	2030
Richview to Manby Transmission Reinforcement Phase 2	Toronto	2030
Keith TS: PSR5 Replacement	West	2030
New 1-CCT 500 kV Transmission Line from Longwood to Lakeshore	West	2030

The assumptions for the Deliverability Test are discussed in Section 3

2.1.3 Area Congestion Connection Guidance Methodology

For each of the three cases described in Section 2.1.2, power was injected at various major stations until criteria violations were observed. The maximum injection determined using the methodology above was used as an approximation for the amount of resources that could connect into the area upstream[10] of the station under assessment and includes the station under assessment. For those scenarios where any upstream transmission circuits were found to have no available capacity (as per Appendix A), new projects may be required to connect directly into the stations. The methodology for the Deliverability Test is discussed in Section 3.

2.1.4 Area Congestion Assessment Criteria

The Connection Guidance assesses the pre-contingency and post-contingency system performance by monitoring power flows and system voltages. The contingencies that are

[10] Upstream areas highlighted in Figure 1 and Figure 2. Circuits in upstream areas specified in Appendix A

applied are outlined in Section 2.7.1 and 2.7.2 of the Ontario Resource and Transmission Assessment Criteria (ORTAC[11]).

With **all transmission elements in service**, flows must be within the equipment continuous ratings. Following single-element contingencies post-contingency flows must be within the Short-Term Emergency (STE) ratings before re-dispatch of resources, and within the Long-Term Emergency (LTE) ratings after re-dispatching up to 700 MW of resources. Up to 900 MW of resources are allowed to be re-dispatched (or rejected) after double contingencies to bring flows within the LTE ratings.

With **one transmission element on outage**, up to 700 MW of internal resource were allowed to be re-dispatched to re-prepare the system. After the re-dispatch, flows must be within the LTE ratings. Following a subsequent contingency, loadings could exceed the STE ratings, but need to be reduced below the LTE ratings by re-dispatching or rejecting up to:

- 900 MW of resources for a single contingency
- 2700 MW of resources for a double contingency

The assessment relies on existing and new Remedial Action Schemes (RASs), provided that the maximum amount of resources rejected does not exceed 2700 MW in total. LT2(c-1) projects may participate in new or existing RASs.

These criteria will remain the same for the Deliverability Test, as described in Section 3.

2.1.5 Area Congestion Assessment Guidance Results

Northern Ontario includes the Northeast and Northwest zones and can accommodate a total of 635 MW of new capacity. The LT2(c-1) Area Congestion assessment determined the Northern Ontario area limits shown in Table 3 below:

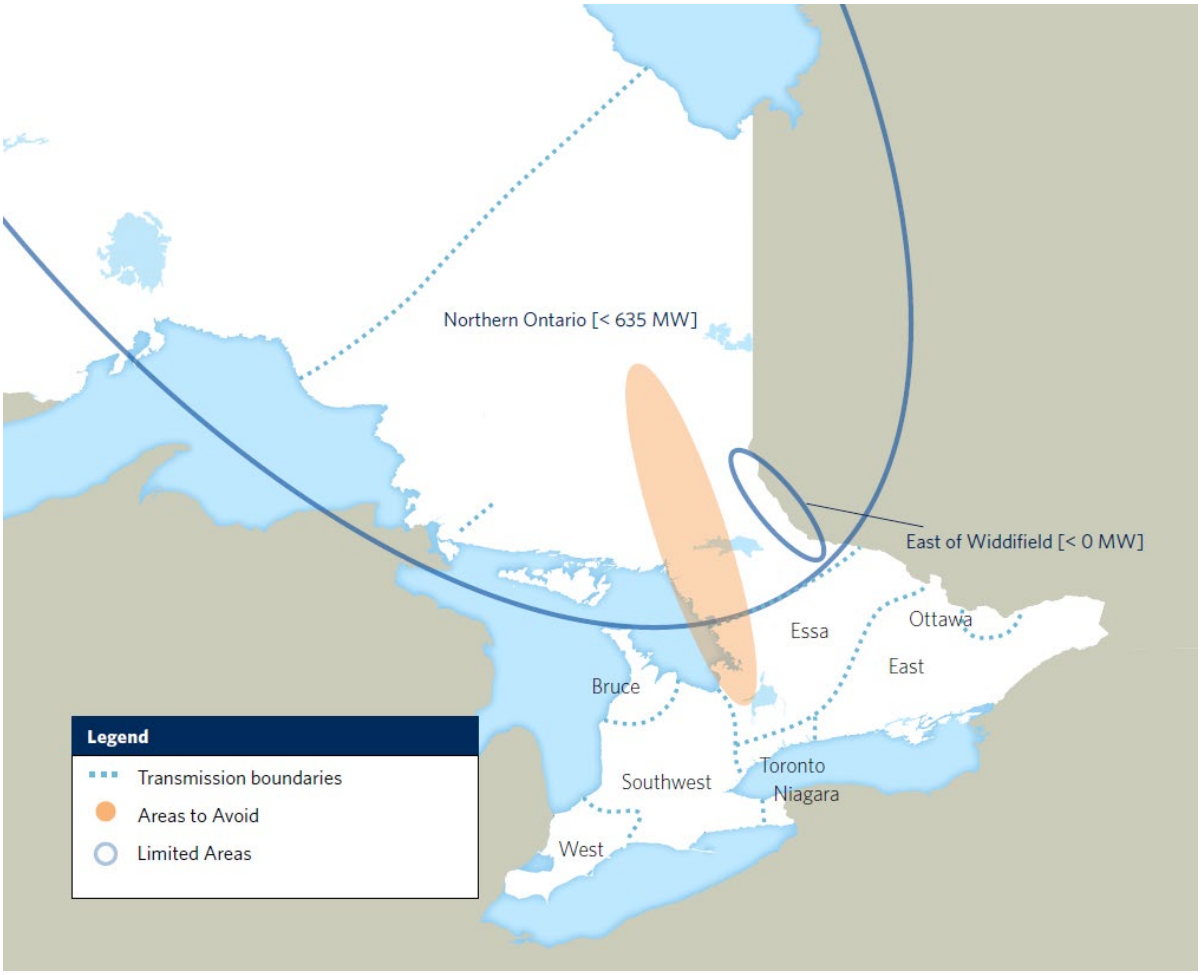
Table 3 | Northern Ontario Area Congestion Limits

Zone	Area Congestion Limit (MW)
Northwest	Northern Ontario = 635
Northeast	East of Widdifield SS = 0

Figure 1 illustrates approximate geographical boundaries for each area above; Appendix A lists the circuits within each area boundary. The areas to avoid highlighted below refer to the 500 kV corridor between Pinard and Essa. In addition, new project connections will not be allowed in certain areas that are prone to transient instability and where congestion is often present, such as North and West of Pinard TS, the 115 kV system North of Lakehead TS and the 115 kV system North of Kenora TS.

[11] https://www.ieso.ca/-/media/Files/IESO/Document-Library/Market-Rules-and-Manuals-Library/market-manuals/connecting/IMO-REQ-0041-TransmissionAssessmentCriteria.pdf

Figure 1 | Area Congestion Limits within Northern Ontario



In the East, until the 500 kV Bowmanville x Cherrywood corridor is reinforced (likely for subsequent procurement windows), additional resources East of this 500 kV corridor will be limited to 550 MW. The new projects would need to be added to the GTA East RAS.

In the West, upgrades to E8V and E9V will be in place by 2027, which will remove the thermal restrictions observed in the LT1 RFP. West of London, bulk reinforcements will also allow for more resource capacity to be connected in the West zone by 2030. Aside from transmission upgrades, general demand forecast increases will also enable more resource capacity connection west of Toronto in general.

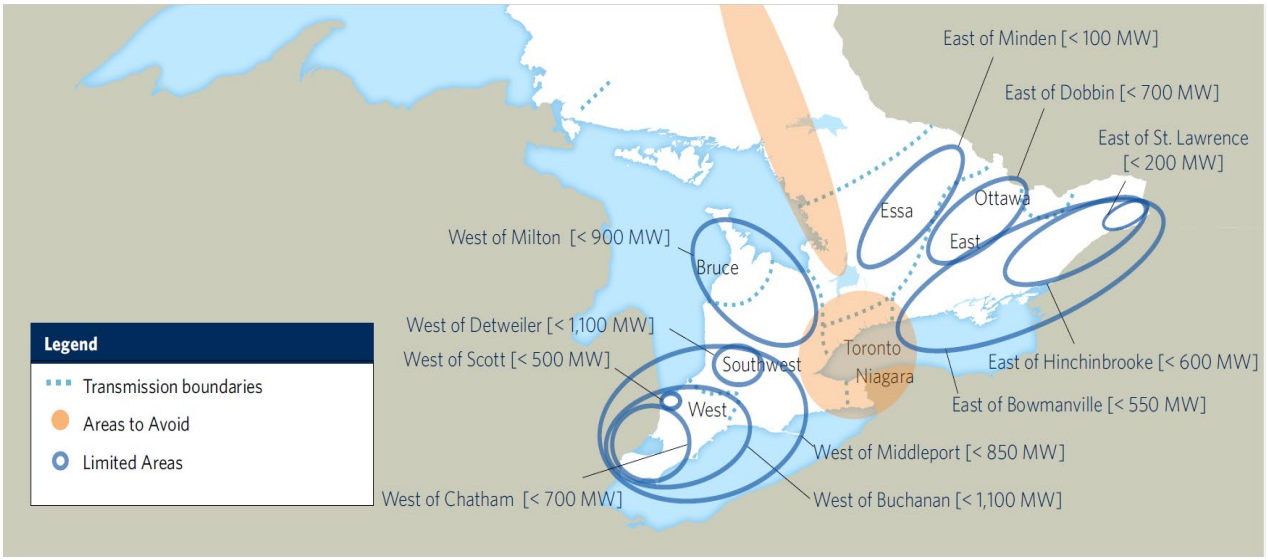
The LT2(c-1) Area Congestion assessment determined the Eastern and Western Ontario limits shown in Table 4 below:

Table 4 | Eastern and Western Ontario Area Congestion Limits

Zone	Area Congestion Limit (MW)
Essa	East of Minden TS = 100
Ottawa	East of Dobbin TS = 700
East	East of Bowmanville SS =550 East of Hinchinbrooke SS = 600 East of St. Lawrence TS =200
Niagara	West of Detweiler TS = 1,100
Southwest	West of Middleport TS = 850 West of Milton SS = 900
Bruce	See West and Southwest limits
West	West of Buchanan TS = 1,100 West of Chatham SS = 700 West of Scott TS = 500

Figure 2 illustrates approximate geographical boundaries for each area above; Appendix A lists the circuits within each area boundary.

Figure 2 | Area Congestion Limits within Eastern and Western Ontario



New project connections will not be allowed in certain areas that are prone to transient instability and where congestion is often present, such as the 115 kV system bounded by the Barrett Chute, Merivale and Cataraqui stations.

As mentioned earlier in the report, the IESO will reduce the capacity available for LT2 projects proposing to connect to the 230 kV circuits that connect to Nanticoke TS and/or the Niagara Reinforcement Line between Allanburg Transformer Station and Middleport Transformer

Station[12] by 300 MW. This 300 MW of capacity can be awarded to one or more SNGRDC Projects under LT2 provided they meet all procurement requirements. The set aside capacity will be accounted for during the Deliverability Test.

[12] These circuits include: K40M, N20K, N21J, N22J, N37S, N5M, N6M, Q26M, Q35M and S39M.

2.2 Inverter Based Resource Assessment

2.2.1 Objectives

The goal of the Inverter Based Resource (IBR) limitations guidance assessment is to provide information on the amounts of IBR capacity that could connect to different parts of the grid with minimal risk of introducing sub-synchronous resonance (SSR) with the existing series capacitors located at the Nobel Switching Station (SS), or introducing undesirable sub-synchronous control interactions (SSCI).

2.2.2 Connection Guidance Assumptions and Methodology

IBRs have a history of oscillating under certain system conditions, typically when they are in proximity of other IBRs in weakly connected systems, or when they are radially connected to series compensated transmission circuits.

In order to avoid potential SSR issues with the series capacitors at Nobel SS on circuits X503E and X504E, the IESO performed a topology scan and excluded certain connection points that could become radially connected to these series capacitors for credible scenarios.

Potential SSCI were determined by the IESO using a screening tool that was developed in-house and that takes the following factors into consideration:

- System topology;
- Ratings and location of neighbouring IBRs; and
- Minimum short circuit ratio (SCR) specified by the OEM for stable operation of the IBR.

The following was assumed:

- For each IBR, a minimum SCR of 5 at its point of interconnection is assumed for stable operation;
- An SCR of 2-3 is used for existing IBRs at the inverter level; and
- Available Fault Level (AFL) is an indicator of whether the system is strong enough to support stable operation of a new IBR connection at the location measured without the risk of SSCI. It is calculated using the methodology explained in Section 6.6 of 'Connection of wind farms to weak AC networks' [2].

The size and locations of IBR injections were tested as follow

- Northern Ontario (Northeast + Northwest)
    - Tested up to 2,200 MW of IBRs using the following bright-line connection criteria:

        - Limit IBR 115 kV connections to 75 MW per circuit – the 115 kV network was found incapable of accommodating significant IBR injections in comparison to a stronger 230 kV network;
        - Limit IBR 230 kV connections to 200 MW per circuit; and
        - A maximum of one injection per circuit was assessed.
- Southern Ontario
    - Size and location of IBRs were chosen using the following bright-line connection criteria:
        - Avoid the limiting circuits of a major transmission interface – to avoid reducing the transfer capability of those interfaces that may have an imbalance of flows;
        - Limit IBR 115 kV connections to 75 MW per circuit;
        - Limit IBR 230 kV circuit connections to 250 MW per circuit; and
        - A maximum of one injection per circuit was assessed.
    - West of Toronto case – tested up to 2,400 MW of IBRs, following the criteria above.
    - East of Toronto case – tested up to 1,400 MW of IBRs, following the criteria above.

2.2.3 Results

2.2.3.1 Sub-Synchronous Resonance

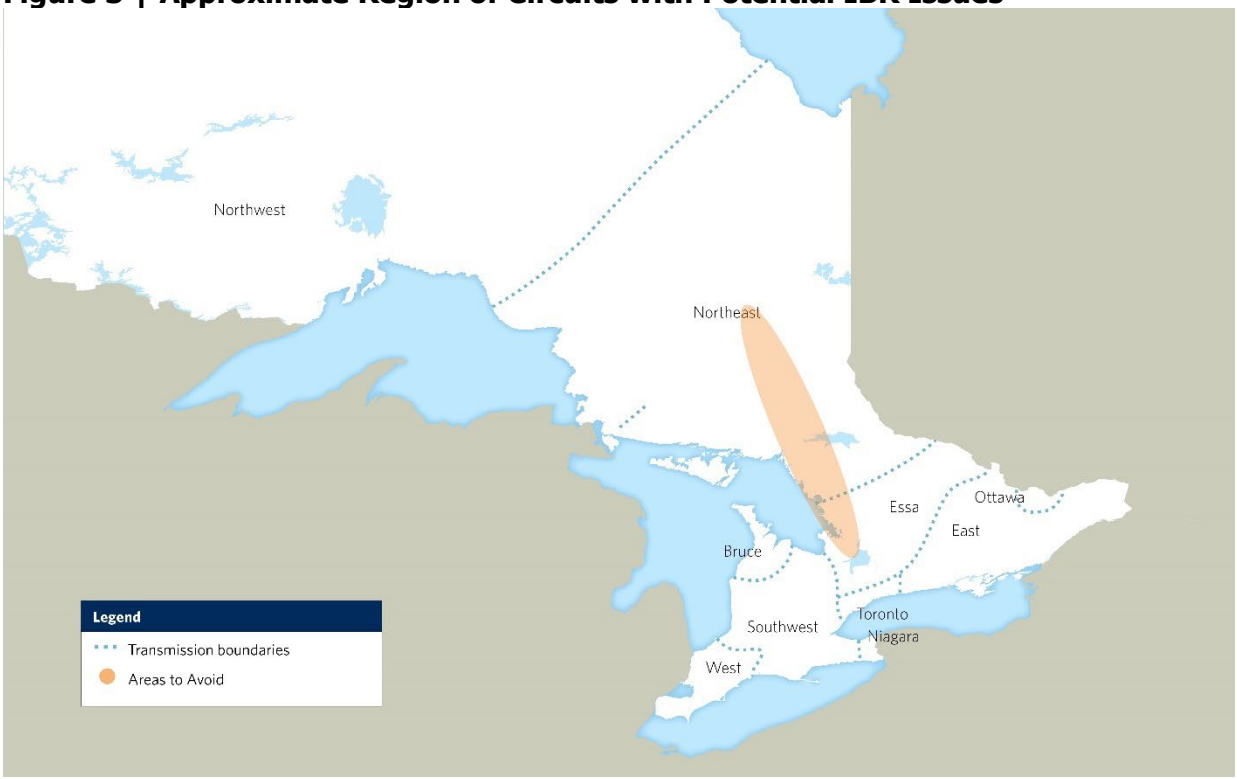
The results of the SSR topology scan identified that the following circuits could end up in a radial connection to the Nobel SS series capacitors for credible contingencies, and as a result connection of any IBRs would not be allowed.

Table 5 | Circuits with Potential SSR Issues

Circuits connected to Hanmer
X503E
X504E

In eliminating the identified circuits for SSR issues, connecting approximately 1,200 MW of IBRs to the remaining northern 230 kV circuits were tested and passed in Northern Ontario. The approximate region where these circuits are located is illustrated in Figure 3.

Figure 3 | Approximate Region of Circuits with Potential IBR Issues



2.2.3.2 Sub-Synchronous Control Interactions

Out of the 1,200 MW of IBRs that passed the SSR scan in Northern Ontario, approximately 1,000 MW were found to be feasible for connection in Northern Ontario due to SSCI, where connection sizes to 115 kV circuits are limited to 75 MW and 230 kV circuits are limited to 200 MW per circuit. Amounts up to 1,200 MW can be connected in Northern Ontario where connections to 115 kV and 230 kV circuits are reduced in size to 30 MW and 100 MW, respectively.

For both West and East of Toronto cases in Southern Ontario, injections of 2,400 MW and 1,400 MW respectively, were found to be feasible from an SSCI perspective, where connections to 115 kV circuits are limited to 75 MW and 230 kV circuits are limited to 250 MW per circuit.

2.2.4 Other Considerations

In regard to utilizing the above results for guidance, the following must be taken into consideration:

- The analysis is meant to be used for high-level screening purposes only, and is not expected to cover all possible LT2(c-1) RFP combinations that may be submitted, as the outcomes of these tests are highly dependent on the size and location of the IBRs modeled;
- A further IBR SSCI assessment will be performed by the IESO during the evaluation stage deliverability test, once the size and location of LT2(c-1) RFP projects are known;

- As per Hydro One, connection of IBRs can introduce voltage unbalance on the transmission system. This issue can be particularly severe for resources connecting to radial circuits. Typically, voltage unbalance will become unacceptable if the product of the line length (in km) and resources (in MW) exceeds 10,000 for 230 kV radial lines (e.g. 100 MW on a 100 km long radial circuit) and 2,500 for 115 kV radial lines (e.g. 50 MW on a 50 km long radial circuit). Proponents will be responsible for mitigating any unacceptable unbalance observed;
- As per Hydro One, voltage unbalance can also occur on (non-radial) network circuits; however, it is most likely to only become an issue under outage conditions (e.g. if one line terminal opens, leaving the resource connected radially to the other terminal). In these scenarios, resources will need to be reduced or curtailed for the duration of the outage to mitigate the issue; and
- More detailed SSR, SSCI, voltage unbalance, and additional Electromagnetic Transient (EMT) studies, will be required once detailed models are known, which will most likely occur during the Connection Assessment stage as part of a System Impact Assessment (SIA).

2.3 Circuit Congestion Assessment

2.3.1 Circuit Congestion Objective

The goal of the circuit congestion assessment is to determine the new capacity that can connect to a circuit and have a minimum risk of curtailment during peak demand conditions.

The circuit congestion assessment assumptions and criteria are identical with the assumptions described in the Area Congestion Assessment Assumptions and Criteria.

2.3.2 Circuit Congestion Methodology

Using the three basecases described in section 2.1.2, the maximum incremental injection into each circuit in each of the three areas of study was calculated by determining the remaining capacity between the STE rating of the circuit and the post-contingency flow through the circuit following the most limiting recognized contingency, for the most limiting section of the main circuit. This methodology assumes resource adjustments (re-dispatch and r) as described in section 2.4 will resolve the issue by reducing flows to within their LTE. While this is expected to be true for the majority of time, it must be confirmed in the Deliverability Test described in Section 3.3.4.

In determining these limits, the following additional criteria was used:

- Circuits that were identified to be on the weak path of an interface, to which a direct connection would result in a material reduction in transfer capability, were deemed as "Not Allowed";
- Available capacity was discounted for circuits on which connecting new resources would have a direct impact on the operability of existing resources, even those dispatchable. Direct impact could occur if a new resource is located in the proximity of an existing resource and the local transmission capability to evacuate energy is limited, and would significantly inhibit the existing resource to generate, requiring frequent redispatch.

2.3.3 Circuit Congestion Results

The results of the circuit congestion assessment are included in the tables presented in Appendix A.

2.3.4 Norfolk-Bloomsburg Area – Non-wires Alternative Need

As described in section 7.4.2 of the Burlington to Nanticoke IRRP[13], there is a need to address supply capacity in the Norfolk-Bloomsburg area. To address this need, any connection to 115 kV circuits C9 and C12, from which the Norfolk-Bloomsburg area is radially supplied, must connect to the C9 and C12 circuits between Norfolk TS and Bloomsburg Junction; and for certainty, no proposal will be permitted to connect to the C9 and C12 circuits between the Caledonia TS and Bloomsburg Junction. In addition, the following requirements will need to be met by any successful proposal:

1. Connect to both circuits C9 and C12 such that the project remains connected and meets its contractual obligations during an outage to any one of the two circuits;

2. Be an energy storage facility with a capacity between 90 MW and 150 MW;

3. Have the capability to provide reactive services up to 33% of the rated active power of the facility to the IESO-controlled grid at all times while not on outage, regardless of its actual active power output level.

4. The project must be submitted to the LT2(c-1) RFP. Connections to 115 kV circuits C9 and C12 are not allowed under the LT2(e-1) RFP.

2.3.5 Other Considerations

- Connection to 500 kV circuits should be avoided;
- Connections to intertie circuits are not allowed to maintain intertie transfer capability with neighboring system operators;
- Any connection to HONI transmission circuits will need to comply with Hydro One Transmission Generation Interconnection Requirements document;
- All Battery Energy Storage System (BESS) connections in the proximity to any HONI transmission infrastructure/facilities will need to comply with setback requirements in Hydro One's BESS Fire Protection Risk & Response Assessment Standard
- Connection to circuits forming a parallel transmission path may require a configuration that balances the flows on all circuits in the path; and
- Connections to new transmission circuits that have a committed in-service date beyond December 31, 2029, as confirmed by the transmission developer at the time of the proposal submission deadline, are not allowed. This is to minimize the risk of procuring new resources that may not be able to connect due to potential delays with the new transmission projects. Connections to these facilities will be reflected in subsequent LT2 capacity stream guidance documents as part of future procurement windows.

[13] https://ieso.ca/-/media/Files/IESO/Document-Library/regional-planning/Burlington-to-Nanticoke/b2n-20241218-IRRP.pdf

2.4 Short-Circuit & Protection Limitations (HONI transmission system only)

2.4.1 Objective

The goal of the short-circuit limitations guidance assessment is to identify areas where the short-circuit levels are close to, or exceed, the short-circuit capability of the transmission equipment, and there are no feasible solutions to be implemented before year 2030. Therefore, those areas should be avoided by the potential proponents in the LT2(c-1) RFP.

2.4.2 Connection Guidance Assumptions and Methodology

HONI has identified transmission stations and equipment with short-circuit capabilities that could be close to their limits or exceeded by 2030 considering committed resources and transmission projects expected to be in-service prior to the connection of the LT2(c-1) RFP projects, as specified by the IESO.

Because any addition of resources will increase the short-circuit levels in the proximity of their connection, HONI has recommended that proposals should avoid connection within a radius of 50 km (electrical) from a station with short-circuit limitations.

A short-circuit assessment will be performed for all proposals in the evaluation stage deliverability test, regardless of their location.

2.4.3 Connection Guidance Results

The following table presents HONI's transmission stations with known short circuit limitations. Stations identified as 'limited room' have limited capacity for new resources nearby as short-circuit levels at these stations are approaching maximum equipment capabilities.

Table 6 | Short-Circuit Limiting Stations (HONI)

Station	Limiting Issue
Allanburg	Strain bus
Beck #2	Breaker rating
Burlington (limited room)	Breaker rating
Cherrywood	Breaker rating
Clarington	Breaker rating
Manby	Station grounding
Richview	Breaker rating
Trafalgar (limited room)	Breaker rating

Other limitations due to station grounding, skywires, strain buses and cable sections will be identified after the size and connection point of the proposed generators are known. Additional constraints may also arise depending on the generation proposing to connect. Although HONI

had indicated that the approximate distance to avoid was 50 km (electrical), to give the reader a rough geographical context, Figure 4 illustrates the approximate regions to avoid by drawing a 50 km radius around each of the stations identified in Table 6.

Figure 4 | Approximate Regions to Avoid Due to Potential Short-Circuit Limitations

2.4.4 Connection Guidance Constraints Due to Protection

The total resource capacity and number of taps that could connect into a circuit may be limited due to line protection considerations. For example, protection may not reliably detect a circuit fault with a new generator connection on the circuit if the circuit is supplied by stations with low short-circuit levels. This determination can be made only after generator parameters and connection points are known.

Connecting into circuits limited by line protection, especially those protected by line differential may introduce major complexities and costly solutions, from installing sectionalizing breakers and new protection elements, to installing a full switching station at the connection point. It is, therefore, recommended to avoid connecting into these circuits.

A list of circuits recommended to avoid connecting new resources due to these issues, are shown in Table 8. Please note that constraints due to protection adequacy may not necessarily apply to distribution connected projects or projects wishing to connect to existing tap lines to transmission connected customer facilities.

Table 7 | HONI Owned Circuits to avoid due to line protection constraints

Circuit	Voltage (kV)	Reason	Circuit	Voltage (kV)	Reason
J3E	115	Line differential	N37S	230	Line differential
J4E	115	Line differential	Q23BM	230	Line differential
J20B	230	Line differential	Q24HM	230	Line differential
K21C	230	Line differential	Q25BM	230	Line differential
K23C	230	Line differential	Q26M	230	Line differential
L25V	230	Line differential	Q28A	230	Line differential
L27V	230	Line differential	Q29HM	230	Line differential
L28C	230	Line differential	Q30M	230	Line differential
L20H	230	Too many taps	Q35M	230	Line differential
L21H	230	Too many taps	R24C	230	Line differential
L22H	230	Too many taps	S39M	230	Line differential
M20D	230	Too many taps	S47C	230	Line differential
M21D	230	Too many taps	V41N	230	Line differential
M31W	230	Too many taps	V43N	230	Line differential
M32W	230	Too many taps	W44LC	230	Line differential
M33W	230	Too many taps	W45LS	230	Line differential
N20K	230	Line differential			

2.5 Distribution System Assessment

Local Distribution Companies (LDCs) are responsible for performing this assessment. LDCs will check if a project connecting to a distribution system is deliverable to the point of connection with transmitter owned equipment, which includes congestion and short-circuit tests for the distribution network.

Available capacity at HONI distribution assets can be found using HONI's Station and Feeder Capacity Calculator, located here. This list shows an approximate amount of resource capacity that can be added at each bus or station owned by HONI. Please note that upstream restrictions on the high voltage stations may limit the number of resources connecting at the distribution level. Transmission connected resources near a station will increase the fault level in the distribution system of that station and will therefore compete for the available capacity. Connections to *distribution systems* supplied from stations that are directly connected to circuits deemed "Not allowed" in Appendix A will not be allowed.

2.6 General Considerations

- The Connection Guidance provided in this document are intended to only be used in the context of the procurement of capacity under the LT2(c-1) RFP, and only addresses electrical transmission system availability and capacity deliverability limitations. Proponents are encouraged to take a fulsome view of where they site their projects and examine other regulatory, permitting, RFP and policy requirements.
- This Connection Guidance does not take into account any potential reduction of capacity availability due to procurement of energy resources from the LT2(e-1) RFP, however LT2(e-1) projects awarded contracts will be accounted for in the Deliverability Test.
- Some locations could be subject to multiple types of limitations. Where multiple limitations apply to a particular location, the most constraining limitation should be used;
- The conclusions of this document are highly dependent on the size and location of LT2(c-1) RFP proposals in the same electrical proximity. For example, the total amount that could be injected into a multi-circuit line or corridor could be less than the sum of the maximum single circuit injection value. As a result, proposals in LT2(c-1) RFP may compete for the same transmission system availability during the evaluation stage Deliverability Test;
- Direct connections into a transmission station were not assessed for possible limitations due to physical space available, auto-transformer rating and other operability issues at the station, beyond the limitations described in this document;
- In order to avoid a situation where a connection configuration turns out to be infeasible, impractical or too costly, applicants are encouraged to have discussions with transmitters and LDCs prior to making a submission into the LT2 RFP. Connection configurations must meet the transmitter's or LDC's connection requirements;
- The IESO strongly recommends that potential proponents with proposed projects connecting to the transmission system, or proposed projects larger than or equal to 10 MW connecting to the distribution system, delay their SIA applications until the results of the LT2(c-1) RFP are announced. If an applicant chooses to apply for an SIA, it is important to note that the SIA may need to be updated or restarted after the results of the LT2(c-1) RFP are announced, as an SIA completed earlier would not have included all successful projects in the assessment;
- Applicants are precluded from applying for a CIA-DX for *distribution system* connected projects until the conclusion of the LT2(c-1) RFP. For clarity, applicants must rescind any current CIA-DXs related to their proposed project in accordance with the LT2(c-1) RFP. Should this requirement not be met, those projects will not be eligible for the LT2(c-1) RFP; and

- Potential proponents considering projects for future procurement windows should be aware that the outcome of the LT2(e-1) and LT2(c-1) RFPs will affect the Connection Guidance in this document for purpose of siting projects for these future procurements.

3. Deliverability Test Methodology

Only proposals (including any associated Proposal PQ Alternates) that are on the ranked Preliminary List as defined and determined in Stage 4 of the LT2(c-1) RFP proposal evaluation process will have their deliverability assessed in accordance with the Deliverability Test. Proposals will be tested for deliverability sequentially, based on their ranking within the Preliminary List, until the procurement target for LT2(c-1) is met, or there are no more eligible proposals left to test.

3.1 Roles and Responsibilities

The Deliverability Test process will be led by the IESO in collaboration with transmitters and LDCs. The following is an overview of roles and responsibilities of these parties in this process:

- LDCs are responsible for assessing if a project connecting to a distribution system is deliverable to the point of connection with transmitter owned equipment. This assessment includes performing congestion and short circuit tests for the distribution network;
- Transmitters are responsible for assessing deliverability from the point of connection with the distributor to the point of connection with the transmission system (including load transformers), and completing the short-circuit tests for the transmission network;
- The IESO is responsible for assessing if there is sufficient capacity on the transmission system to deliver the energy to meet Ontario's forecasted demand, and for screening for potential Inverter-Based Resource (IBR) specific interactions;
- The IESO is responsible for providing the Deliverability Test results for each eligible project under consideration.

3.2 Deliverability Test Result Explanation

For a project to obtain a "Deliverable" result, it must pass all applicable tests included in the Roles and Responsibilities section above. A project will be deemed "Not Deliverable" if it fails any of these tests. If the test result for a given project is "Not Deliverable", the IESO will identify one of the following reasons for this status:

- Distribution system limitations (e.g. congestion, short-circuit);
- Transmission system limitations (e.g. congestion, short-circuit, potential interaction of inverter-based resources). Transmission system limitations (e.g. congestion, short-circuit, potential interaction of inverter-based resources).

3.3 Deliverability Test Methods and Assumptions

The following sets out the primary assumptions to be used by the IESO in carrying out the Deliverability Test for the LT2(c-1) RFP. The IESO is responsible for establishing the methods and assumptions used in the parts of the Deliverability Test under its purview, subject to any applicable standards, codes or other regulatory instruments. The Deliverability Test will follow similar methods to, but not identical with, those that were used for the development of the Connection Guidance presented in the previous chapter. The two are different as the Deliverability Test is used for evaluating deliverability of specific proposals (e.g., size, location, technology), while the Connection Guidance is used for identifying possible room to connect resources in general. The Deliverability Test will include the following:

- System congestion assessment;
- IBR sub-synchronous control interactions (SSCI) and sub-synchronous resonance (SSR) assessment;
- Short-circuit and protections assessment; and
- A distribution asset assessment.

The Deliverability Test will include a charging assessment for storage projects, which was not performed in the development of the Connection Guidance information. Charging Assessments assume storage charging at 50% of rated capacity and are generally, but not always, less restrictive than injection assessments.

The Six Nations of the Grand River set aside capacity (described in subsection 5(k) of the Directive) will be accounted for during the Deliverability Test, wherein the IESO will reduce the capacity available for LT2 projects proposing to connect to the 230 kV circuits that connect to Nanticoke TS and/or the Niagara Reinforcement Line between Allanburg Transformer Station and Middleport Transformer Station[14] by 300 MW.

The Deliverability Test will not consider system or market conditions outside those conditions defined in this document. Thus, a project that receives a result of "Deliverable" under the Deliverability Test may still encounter situations where their output is curtailed or otherwise constrained due to specific system conditions.

The following sections describe each assessment in the Deliverability Test.

3.3.1 System Congestion Assessment

The goal of this assessment is to determine which projects can be accommodated without causing thermal overloads of transmission equipment in order to minimize the risk of curtailment.

[14] These circuits include: K40M, N20K, N21J, N22J, N37S, N5M, N6M, Q26M, Q35M and S39M.

3.3.1.1 Assumptions

The assumptions, with any needed updates, and criteria outlined in Section 2.1.2, 2.1.3 and 2.1.4 will be used for the Deliverability Test.
In addition, for storage projects, a charging test will be conducted using the following assumptions:

- All storage resources will be assessed when charging at 50% of rated capacity;
- Scheduled long-term generation outages and refurbishments will be accounted for. The following generation units will be additionally considered out of service in each basecase:
    - Northern Ontario sub-system - Atikokan GS;
    - West of Toronto sub-system - one Bruce generating unit;
    - East of Toronto sub-system - one Lennox unit;
- Nuclear generators will be assumed in service at their maximum or normal operating output;
- Gas generators will be assumed in service at 50% of their maximum operating output as a baseline, to be dispatched higher or lower than 50% to meet demand for charging scenario;
- Hydroelectric plants will be assumed at their average output for the sixteen off-peak hours during Ontario's summer peak demand days[15];
- Solar generation will be assumed at zero output, with an assumption that the majority of charging will occur overnight;
- Wind generation will be assumed at a level available 90% of the sixteen off-peak hours during Ontario's summer peak demand days[16].
- All contracted resources will be assumed in service;
- The average demand of the lowest sixteen hours on the day of the Summer normal weather 2030 coincident system peak load will be assumed, based on the 2025 APO demand forecast.
- All major transmission projects committed to come into service by 2030 will be considered.

[15] Average hydro output for the 16 lowest demand hours (Hours 1-12, 21-24) for each Ontario system peak day for months June, July and August for the last 10 years

[16] Historic 90th percentile output for the 16 lowest demand hours (Hours 1-12, 21-24) during the month of July for the last 10 years.

3.3.1.2 Methodology

Each project will be added to the basecases sequentially, based on their ranking within the Preliminary List. All projects that were deemed "deliverable" in previous tests will be maintained in the model for the assessment of proposals lower on the Preliminary List.

For the Deliverability Test, LT2(c-1) RFP projects will be dispatched to their proposed installed capacity as indicated by the Proponent as part of their Proposal. Storage resources will also be dispatched to 50% of their proposed capacity for the withdrawal test. LT2(c-1) RFP projects with parallel circuit connections will be modeled without a low-voltage side connection.

Each project will be tested for pre-contingency and post-contingency system performance by monitoring their impact on power flows and system voltages using the criteria described in Section 2.1.4.
A project that results in unresolved criteria violations will be deemed "non-deliverable".

3.3.2 IBR Assessment

The purpose of this assessment is to check if projects submitted in a given area do not lead to undesirable sub-synchronous control interactions (SSCI) or introduce sub-synchronous resonance (SSR) with the existing series capacitors located at the Nobel Switching Station (SS).

Each project will be tested sequentially, based on their ranking within the Preliminary List. All projects that were deemed "deliverable" in previous tests will be maintained in the SCR assessment model for the assessment of proposals lower on the Preliminary List.

The IBR Assessment assumptions and criteria for the Deliverability Test will be the same as what was described in Section 2.2.

3.3.3 Circuit Congestion Assessment

The Deliverability Test methodology will test circuit congestion as part of the overall System Congestion Assessment described in Section 3.3.1. It will differ from the methodology described in Section 2.3.2 when applying resource redispatch or rejection after a contingency to confirm LTE ratings will be respected with the cumulative effect of the previous projects that were deemed "deliverable".

3.3.4 Transmission Short-Circuit and Protections Assessment

This assessment will be performed by the Transmitters, who will be responsible for assessing deliverability from the point of connection with the distributor to the point of connection with the transmission system (including load transformers), completing a short-circuit test, and any other applicable protections assessments for the transmission network.

Each project will be tested sequentially, based on their ranking within the Preliminary List. All projects that were deemed "deliverable" in previous tests will be maintained in the short-circuit assessment model for the assessment of proposals lower on the Preliminary List.

During the deliverability test, IESO will coordinate with the Transmitters and ensure the short-circuit and protection assessments consider projects from the Preliminary List in their order of ranking.

3.3.5 Distribution System Assessment

LDCs are responsible for performing the distribution system assessment. LDCs will check if a project connecting to a distribution system is deliverable to the point of connection with transmitter owned equipment, which includes congestion and short-circuit tests for the distribution network. The assessment will be conducted with all distribution elements in service (no outage conditions).

Each project will be tested sequentially, based on their ranking within the Preliminary List. All projects that were deemed "deliverable" in previous tests will be maintained in distribution assessment model for the assessment of proposals lower on the Preliminary List.

During the deliverability test, IESO will coordinate with the LDCs and ensure the distribution assessments consider projects from the Preliminary List in their order of ranking.

3.3.6 Remedial Action Scheme Considerations

A project that obtains a contract may need to be part of an existing or a new Remedial Action Scheme (RAS) to minimize resource bottling. This requirement will be determined during the Connection Assessment and Approval Process as part of the System Impact Assessment (SIA).

3.3.7 System Changes During Final Evaluation Period

The electricity system is dynamic and subject to change during the Deliverability Test process. For fairness and consistency, final test assumptions will be established just before the technical tests for each Deliverability Test is initiated and will remain unchanged throughout the tests. If the test assumptions presented in this document need to be updated prior to a Deliverability Test being initiated, the changes will be publicly communicated.

3.3.8 General Considerations

- All awarded LT2(e-1) projects will be accounted for in the final LT2(c-1) deliverability tests at output levels inline with their capacity factor over system conditions that are tested.
- The electricity system is dynamic and subject to change before and during the Deliverability Test process. For fairness and consistency, final test assumptions will be established just before the technical tests for each Deliverability Test is initiated and will remain unchanged throughout the tests. If the test assumptions presented in this document need to be updated prior to a Deliverability Test being initiated, the changes will be publicly communicated.
- Receiving a result of "Deliverable" in a Deliverability Test does not imply that the project will pass the connection assessment and approval process, or that connection costs or connection in-service dates will be within any specific range or estimate, or otherwise affect a market participant's obligations under the Market Rules.

- For clarity, the Deliverability Test does not evaluate the technical solution to connect a proposed project (e.g. installing a new switching station, upgrading protections). Applicants are encouraged to discuss that aspect with applicable transmitters and Local Distribution Companies (LDCs) prior to bidding into the LT2(c-1) RFP.

The Deliverability Test does not replace or impact any of the connection assessments that are necessary for project connection and required under applicable regulations. The Connection Assessment and Approval process is outlined in Market Manual 1: Connecting to Ontario's Power System - Part 1.4: Connection Assessment and Approval (See Appendix B).
If the test result for a given project is "Not Deliverable", the IESO will identify one of the following reasons for this status:

- Distribution system limitations (e.g. congestion, short-circuit);
- Transmission system limitations (e.g. congestion, short-circuit, potential interaction of inverter-based resources).

Appendix A: Transmission Circuit Capacities

The following tables list the circuits in each of the three sub-systems studied. The tables list the incremental generation that could connect into each circuit based on the assessments performed in Section 2.3. However, the actual capacity that can connect into each circuit may be further restricted by other limitations identified through the assessments described in the other sections of the document. All of the limitations associated with a particular circuit are also identified in the following tables for comparison, and the most limiting should be used.

The actual capacity that can be connected to a specific location on a circuit will be determined by evaluation stage deliverability test.

The following criteria was used to determine if a circuit was classified as "avoid" or "not allowed":

- A circuit is classified as "Not Allowed" if the circuit is:
    - In an area with existing stability issues;
    - Part of an intertie connected to a neighboring transmission system;
    - At a higher risk of potential SSR issues;
    - Identified to be on the weak path of an internal interface; and
    - A new circuit with an in-service date of December 31, 2029 or later. This is to minimize the risk of procuring new resources that may not be able to connect due to potential delays with the new transmission projects.
- A circuit is classified as "Avoid" if the circuit is:
    - A 500 kV circuit. Capacities on these circuits are currently listed as 'n/a' as in the unlikely scenario that connection to the 500 kV system is feasible in terms of timeline and cost, the capacity of connection to a 500kV is highly dependent on connection configuration;
    - Identified to have no capacity based on the congestion analysis performed;
    - Identified to have potential protection limitations; and
    - Identified to be within 50 km of a short-circuit limited station (partial or fully).

Although there are capacities listed for circuits classified as "Avoid", there is a higher risk that a project of that size will not be successful in the energy deliverability test in the evaluation stage of the LT2(c-1) RFP.

The maximum amount of any type of resources that can connect directly to any single circuit is 250 MW. The maximum amount of IBRs that can connect directly to any single circuit is further limited to the bright-line limits as follows:

- 75 MW per 115 kV circuit in both Northern and Southern Ontario; and
- 200 MW per 230 kV circuit in Northern Ontario.

Proponents are allowed to submit proposals for projects that:

- Are at locations either not assessed in this document or on circuits recommended to "avoid";
- Exceed the circuit congestion limitations presented in the tables below; and
- Exceed the IBR bright-line limits if they are not an IBR.

However, there is a higher risk to those proposals during the evaluation stage deliverability test.

Proposals for projects that seek to connect to circuits that are "not allowed" will be deemed "non-deliverable" in the evaluation stage deliverability test.

Table 8 | Transmission Circuit Capacities and Limitations for Northern Ontario

						Areas (Congestion Limit)		
Circuit	**Avoid/ Not Allowed**	**Capacity for IBR [MW]**	**Capacity for Sync. Gen [MW]**	**Voltage [kV]**	**Zone**	**East of Widdifield SS (0 MW)**	**Northern Ontario (635 MW)**	**Notes**
15M1	Not Allowed	0	0	115	Northwest		y	Existing stability issues[17]
29M1		50	50	115	Northwest		y	Circuit Congestion
56M1	Not Allowed	0	0	115	Northwest		y	Existing stability issues[18]
57M1	Not Allowed	0	0	115	Northwest		y	Existing stability issues
A1B		40	40	115	Northwest		y	Circuit Congestion
A21L		200	250	230	Northwest		y	IBR Bright line limit
A22L		200	250	230	Northwest		y	IBR Bright line limit
A23L		200	250	230	Northwest		y	IBR Bright line limit
A23P		200	250	230	Northeast		y	IBR Bright line limit
A24L		200	250	230	Northwest		y	IBR Bright line limit
A24P		200	250	230	Northeast		y	IBR Bright line limit
A3M		75	110	115	Northwest		y	IBR Bright line limit/Circuit Congestion
A4H	Avoid	0	0	115	Northeast		y	Circuit Congestion
A4L	Not Allowed	0	0	115	Northwest		y	Existing stability issues[18]
A5A		20	20	115	Northwest		y	Circuit Congestion
A5H		10	10	115	Northeast		y	Circuit Congestion
A6P	Not Allowed	0	0	115	Northwest		y	Existing stability issues[18]
A7L	Not Allowed	0	0	115	Northwest		y	Existing stability issues[18]
A7V	Not Allowed	0	0	115	Northeast		y	Existing stability issues[19]
A8K		75	75	115	Northeast		y	IBR Bright line limit/Circuit congestion

[17] 115 kV system North of Kenora TS

[18] 115 kV system North of Lakehead TS

[19] North or West of Pinard TS

Circuit	Avoid/ Not Allowed	Capacity for IBR [MW]	Capacity for Sync. Gen [MW]	Voltage [kV]	Zone	Areas (Congestion Limit)		Notes
						East of Widdifield SS (0 MW)	Northern Ontario (635 MW)	
A8L	Not Allowed	0	0	115	Northwest		y	Existing stability issues
A9K		75	80	115	Northeast		y	IBR Bright line limit/Circuit congestion
ALGOMA1		75	90	115	Northeast		y	IBR Bright line limit/Circuit congestion
ALGOMA2		75	120	115	Northeast		y	IBR Bright line limit/Circuit congestion
ALGOMA3		75	120	115	Northeast		y	IBR Bright line limit/Circuit congestion
B15		30	30	115	Northwest		y	Circuit Congestion
B3E		75	90	115	Northeast		y	IBR Bright line limit/Circuit congestion
B4B		75	110	115	Northeast		y	IBR Bright line limit/Circuit congestion
B4E		75	110	115	Northeast		y	IBR Bright line limit/Circuit congestion
B5	Avoid	0	0	115	Northwest		y	Circuit Congestion
B6M		50	50	115	Northwest		y	Circuit Congestion
C1A	Not Allowed	0	0	115	Northwest		y	Existing stability issues[18]
C1C	Not Allowed	0	0	115	Northeast		y	Existing stability issues[19]
C2A	Not Allowed	0	0	115	Northwest		y	Existing stability issues[18]
C2M		30	30	115	Northwest		y	Circuit Congestion
C3A	Not Allowed	0	0	115	Northwest		y	Existing stability issues[18]
C3W	Not Allowed	0	0	115	Northwest		y	Circuit Congestion
CLERGUE1		10	10	115	Northeast		y	Circuit Congestion
CLERGUE2		10	10	115	Northeast		y	Circuit Congestion
D23G	Not Allowed	0	0	230	Northeast		y	Existing stability issues[19]
D26A		200	250	230	Northwest		y	IBR Bright line limit
D2H	Not Allowed	0	0	115	Northeast		y	Existing stability issues[19]
D2L		30	30	115	Northeast		y	Circuit Congestion
D3H	Not Allowed	0	0	115	Northeast		y	Existing stability issues[19]

Circuit	Avoid/ Not Allowed	Capacity for IBR [MW]	Capacity for Sync. Gen [MW]	Voltage [kV]	Zone	Areas (Congestion Limit)		Notes
						East of Widdifield SS (0 MW)	Northern Ontario (635 MW)	
D3K	Not Allowed	0	0	115	Northeast		y	Weak path of an interface
D4	Not Allowed	0	0	115	Northeast		y	Existing stability issues[19]
D4Z	Not Allowed	0	0	115	Northeast		y	Intertie Circuit
D501P	Avoid	n/a	n/a	500	Northeast		y	500 kV Circuit
D5D		75	90	115	Northwest		y	IBR Bright line limit/Circuit congestion
D6T	Not Allowed	0	0	115	Northeast		y	Existing stability issues[19]
E1C		20	20	115	Northwest		y	Circuit Congestion
E2R	Avoid	0	0	115	Northwest		y	Circuit Congestion
E4D		30	30	115	Northwest		y	Circuit Congestion
F1B		30	30	115	Northwest		y	Circuit Congestion
F1E	Not Allowed	0	0	115	Northeast		y	Existing stability issues[19]
F25A		200	250	230	Northwest		y	IBR Bright line limit
F2B		75	110	115	Northwest		y	IBR Bright line limit/Circuit congestion
GARTSHO1	Avoid	0	0	115	Northeast		y	Circuit Congestion
GARTSHO2	Avoid	0	0	115	Northeast		y	Circuit Congestion
GARTSHO3	Avoid	0	0	115	Northeast		y	IBR Bright line limit/Circuit congestion
H22D	Not Allowed	0	0	230	Northeast		y	Existing stability issues[19]
H23S	Avoid	0	0	230	Northeast	y	y	Circuit Congestion
H24S		40	40	230	Northeast	y	y	Circuit Congestion
H2N	Not Allowed	0	0	115	Northeast		y	Existing stability issues[19]
H4Z	Not Allowed	0	0	115	Northeast		y	Intertie Circuit
H6T	Avoid	0	0	115	Northeast		y	Circuit Congestion
H7T	Avoid	0	0	115	Northeast		y	Circuit Congestion
H9K	Not Allowed	0	0	115	Northeast		y	Existing stability issues[19]

Circuit	Avoid/ Not Allowed	Capacity for IBR [MW]	Capacity for Sync. Gen [MW]	Voltage [kV]	Zone	Areas (Congestion Limit)		Notes
						East of Widdifield SS (0 MW)	Northern Ontario (635 MW)	
HARRIS1		10	10	115	Northeast		y	Circuit congestion
HIGHFAL1		10	10	115	Northeast		y	Circuit Congestion
HIGHFAL2		20	20	115	Northeast		y	Circuit Congestion
HOGG1	Avoid	0	0	115	Northeast		y	Circuit Congestion
HOLSWT		20	20	115	Northeast		y	Circuit Congestion
K2		30	30	115	Northeast		y	Circuit Congestion
K21W	Not Allowed	0	0	230	Northwest		y	Intertie Circuit
K22W	Not Allowed	0	0	230	Northwest		y	Intertie Circuit
K23D		200	250	230	Northwest		y	IBR Bright line limit
K24F		200	250	230	Northwest		y	IBR Bright line limit
K24G		200	250	230	Northeast		y	IBR Bright line limit
K2M	Not Allowed	0	0	115	Northwest		y	Existing stability issues[17]
K38S	Not Allowed	0	0	230	Northeast		y	Existing stability issues[19]
K3D		50	50	115	Northwest		y	Circuit Congestion
K4	Avoid	0	0	115	Northeast		y	Circuit Congestion
K4W	Not Allowed	0	0	115	Northwest		y	Existing stability issues[17]
K5A	Not Allowed	0	0	115	Northeast		y	Existing stability issues[19]
K5W	Not Allowed	0	0	115	Northwest		y	Existing stability issues[17]
K6F		40	40	115	Northwest		y	Circuit Congestion
K7K		75	90	115	Northwest		y	IBR Bright line limit/Circuit congestion
L1S		75	80	115	Northeast		y	IBR Bright line limit/Circuit congestion
L20D	Not Allowed	0	0	230	Northeast		y	Existing stability issues[19]
L21S	Not Allowed	0	0	230	Northeast		y	Existing stability issues[19]
L3P		60	60	115	Northwest		y	Circuit Congestion

Circuit	Avoid/ Not Allowed	Capacity for IBR [MW]	Capacity for Sync. Gen [MW]	Voltage [kV]	Zone	Areas (Congestion Limit)		Notes
						East of Widdifield SS (0 MW)	Northern Ontario (635 MW)	
L4P		75	80	115	Northwest		y	IBR Bright line limit/Circuit congestion
L5H		40	40	115	Northeast		y	Circuit Congestion
L8L		70	70	115	Northeast		y	Circuit Congestion
LEISBAY		75	120	115	Northeast		y	IBR Bright line limit/Circuit congestion
M1M		50	50	115	Northwest		y	Circuit Congestion
M1S		10	10	115	Northwest		y	Circuit Congestion
M23L		200	250	230	Northwest		y	IBR Bright line limit
M24L		200	250	230	Northwest		y	IBR Bright line limit
M2D		75	80	115	Northwest		y	IBR Bright line limit/Circuit congestion
M2W	Avoid	0	0	115	Northwest		y	Circuit Congestion
M31		60	60	115	Northeast		y	Circuit Congestion
M37L		200	250	230	Northwest		y	IBR Bright line limit
M38L		200	250	230	Northwest		y	IBR Bright line limit
M3E		30	30	115	Northwest		y	Circuit Congestion
M3K	Not Allowed	0	0	115	Northeast		y	Existing stability issues[19]
M9K	Not Allowed	0	0	115	Northeast		y	Existing stability issues[19]
MACKAY1	Avoid	0	0	115	Northeast		y	Circuit Congestion
MACKAY2	Avoid	0	0	115	Northeast		y	Circuit Congestion
MAGPIE1		10	10	115	Northeast		y	Circuit Congestion
MISSION1		10	10	115	Northeast		y	Circuit Congestion
MxD1		200	250	230	Northwest		y	New circuit - MacKenzie to Dryden
N93A		70	70	230	Northwest		y	Circuit Congestion
NORTHRN1		75	130	115	Northeast		y	IBR Bright line limit/Circuit congestion
P13T		75	110	115	Northeast		y	IBR Bright line limit/Circuit congestion

Circuit	Avoid/ Not Allowed	Capacity for IBR [MW]	Capacity for Sync. Gen [MW]	Voltage [kV]	Zone	Areas (Congestion Limit)		Notes
						East of Widdifield SS (0 MW)	Northern Ontario (635 MW)	
P15T		75	120	115	Northeast		y	IBR Bright line limit/Circuit congestion
P1T		75	90	115	Northwest		y	IBR Bright line limit/Circuit congestion
P21G		200	250	230	Northeast		y	IBR Bright line limit
P22G		200	250	230	Northeast		y	IBR Bright line limit
P23G		200	250	230	Northeast		y	New circuit - Mississagi to Third Line
P24G		200	250	230	Northeast		y	New circuit - Mississagi to Third Line
P25W		200	230	230	Northeast		y	IBR Bright line limit/ circuit congestion
P26W		200	230	230	Northeast		y	IBR Bright line limit/ circuit congestion
P27W	Not Allowed	0	0	230	Northeast		y	New circuit - Porcupine to Wawa
P3B		60	60	115	Northwest		y	Circuit congestion
P502X	Avoid	n/a	n/a	500	Northeast		y	500 kV Circuit
P5M		75	80	115	Northwest		y	IBR Bright line limit/ circuit congestion
P7B		70	70	115	Northwest		y	IBR Bright line limit/ circuit congestion
P7G		50	50	115	Northeast		y	IBR Bright line limit/ circuit congestion
P91G		200	200	230	Northeast		y	IBR Bright line limit/ circuit congestion
R1LB	Not Allowed	0	0	115	Northwest		y	Existing stability issues[18]
R21D	Not Allowed	0	0	230	Northeast		y	Existing stability issues[19]
R2LB	Not Allowed	0	0	115	Northwest		y	Existing stability issues[18]
R9A	Not Allowed	0	0	115	Northwest		y	Existing stability issues[18]
S1C		10	10	115	Northwest		y	Circuit Congestion
S21N		200	250	230	Northeast		y	IBR Bright line limit
S22A		200	250	230	Northeast		y	IBR Bright line limit
S2B		60	60	115	Northeast		y	Circuit Congestion
S5M		75	90	115	Northeast		y	IBR Bright line limit/ circuit congestion

Circuit	Avoid/ Not Allowed	Capacity for IBR [MW]	Capacity for Sync. Gen [MW]	Voltage [kV]	Zone	Areas (Congestion Limit)		Notes
						East of Widdifield SS (0 MW)	Northern Ontario (635 MW)	
S6F		75	180	115	Northeast		y	IBR Bright line limit/ circuit congestion
SAULT3	Avoid	0	0	115	Northeast		y	Circuit Congestion
SK1	Not Allowed	0	0	115	Northwest		y	Intertie Circuit
STEEPHL1		10	10	115	Northeast		y	Circuit congestion
T1B		10	30	115	Northeast		y	Circuit Congestion
T1M		30	30	115	Northwest		y	Circuit Congestion
T27P		90	90	230	Northeast		y	Circuit Congestion
T28P		90	90	230	Northeast		y	Circuit Congestion
T2R		75	110	115	Northeast		y	IBR Bright line limit/ circuit congestion
T61S		75	80	115	Northeast		y	IBR Bright line limit/ circuit congestion
T7M	Not Allowed	0	0	115	Northeast		y	Existing stability issues[19]
T8M	Not Allowed	0	0	115	Northeast		y	Existing stability issues[19]
W21M		200	250	230	Northwest		y	IBR Bright line limit
W22M		200	250	230	Northwest		y	IBR Bright line limit
W23K		200	250	230	Northeast		y	IBR Bright line limit
W2C		40	40	115	Northeast		y	Circuit Congestion
W35M		200	250	230	Northwest		y	IBR Bright line limit
W36M		200	250	230	Northwest		y	IBR Bright line limit
W3C	Not Allowed	0	0	115	Northwest		y	Existing stability issues[17]
W54W		200	250	230	Northwest		y	IBR Bright line limit
W71D	Avoid	0	0	230	Northeast	y	y	Circuit Congestion
X23N		200	250	230	Northeast		y	IBR Bright line limit
X25S		200	250	230	Northeast		y	IBR Bright line limit
X26S		200	250	230	Northeast		y	IBR Bright line limit

Circuit	Avoid/ Not Allowed	Capacity for IBR [MW]	Capacity for Sync. Gen [MW]	Voltage [kV]	Zone	Areas (Congestion Limit)		Notes
						East of Widdifield SS (0 MW)	Northern Ontario (635 MW)	
X27A		200	250	230	Northeast		y	IBR Bright line limit
X29S		200	250	230	Northeast		y	IBR Bright line limit
X503E	Not Allowed	n/a	n/a	500	Northeast		y	500 kV Circuit. Potential SSR Issues.
X504E	Not Allowed	n/a	n/a	500	Northeast		y	500 kV Circuit. Potential SSR Issues.
X74P		200	250	230	Northeast		y	IBR Bright line limit
X75P	Not Allowed	n/a	n/a	500	Northeast		y	New circuit - Mississagi to Hanmer

Table 9 |Transmission Circuit Capacities and Limitations for East of Toronto

Circuit	Avoid/ Not Allowed	Capacity for IBR (MW)	Capacity for Sync. Gen (MW)	Voltage (kV)	Zone	Areas (Congestion Limit)						Notes
						East of St. Lawrence (200MW)	East of Hinchinbrooke (600MW)	East of Minden TS (100 MW)	East of Dobbin TS (700 MW)	East of Bowmanville SS (550 MW)	< 50 km of Short Circuit Limited Station?	
79M1	Not Allowed	0	0	115	Ottawa							Intertie Circuit
A2		75	80	115	Ottawa							IBR Bright line limit/ circuit congestion
A3RM		40	40	115	Ottawa							Circuit congestion
A41T	Not Allowed	0	0	230	Ottawa							Intertie Circuit
A42T	Not Allowed	0	0	230	Ottawa							Intertie Circuit
A4K		75	80	115	Ottawa							IBR Bright line limit/ circuit congestion
A5RK		75	100	115	Ottawa							IBR Bright line limit/ circuit congestion
A6R	Avoid	0	0	115	Ottawa							Circuit congestion
A8M		30	30	115	Ottawa							Circuit congestion

Circuit	Avoid/ Not Allowed	Capacity for IBR (MW)	Capacity for Sync. Gen (MW)	Voltage (kV)	Zone	Areas (Congestion Limit)						Notes
						East of St. Lawrence (200MW)	East of Hinchinbrooke (600MW)	East of Minden TS (100 MW)	East of Dobbin TS (700 MW)	East of Bowmanville SS (550 MW)	< 50 km of Short Circuit Limited Station?	
B1S	Not Allowed	0	0	115	East							Existing stability issues[20]
B31L	Not Allowed	0	0	230	East	y				y		Intertie Circuit
B5D	Not Allowed	0	0	230	Ottawa	y				y		Intertie Circuit
B5QK	Not Allowed	0	0	115	East					y		Existing stability issues[20]
B88H	Avoid	0	0	230	Essa						y (partial)	Circuit Congestion
B89H	Avoid	70	70	230	Essa						y (partial)	Circuit Congestion
C27P		80	80	230	East				y			Circuit Congestion
C25H		50	50	230	East							Circuit Congestion
C3S		250	250	230	Ottawa							
C7BM	Not Allowed	0	0	115	East							Existing stability issues[20]
D1M		50	50	230	Essa			y				Circuit Congestion
D2M		40	40	230	Essa			y				Circuit Congestion
D3M		0	0	230	Essa			y				Circuit Congestion
D4M		0	0	230	Essa			y				Circuit Congestion
D5A	Not Allowed	0	0	230	Ottawa	y						Intertie Circuit
D5H	Not Allowed	0	0	230	Essa							Weak path of an interface
D6		30	30	115	Essa			y				Circuit congestion
E20S		250	250	230	Essa							
E21S		250	250	230	Essa							
E26		0	140	230	Essa							Existing IBR connected
E27		0	140	230	Essa							Existing IBR connected
E28		250	250	230	Essa							

[20] 115 kV system bounded by Barrett Chute, Merivale, and Cataraqui stations.

Circuit	Avoid/ Not Allowed	Capacity for IBR (MW)	Capacity for Sync. Gen (MW)	Voltage (kV)	Zone	Areas (Congestion Limit)						Notes
						East of St. Lawrence (200MW)	East of Hinchinbrooke (600MW)	East of Minden TS (100 MW)	East of Dobbin TS (700 MW)	East of Bowmanville SS (550 MW)	< 50 km of Short Circuit Limited Station?	
E29		250	250	230	Essa							
E34M	Avoid	120	120	230	East							Protection Adequacy, Circuit Congestion
E510V	Avoid	n/a	n/a	500	Essa						y (partial)	500 kV Circuit
E511V	Avoid	n/a	n/a	500	Essa						y (partial)	500 kV Circuit
E8V	Not Allowed	0	0	230	Essa							Weak path of an interface
E9V	Not Allowed	0	0	230	Essa							Weak path of an interface
F10MV		75	90	115	Ottawa							IBR Bright line limit/ circuit congestion
H23B		40	40	230	East							Circuit congestion
H27H		20	20	230	East							Circuit congestion
H9A	Not Allowed	0	0	115	Ottawa							Intertie Circuit
H82V	Avoid	0	0	230	Essa						y	Circuit congestion
H83V	Avoid	70	70	230	Essa						y	Circuit congestion
L1MB		20	20	115	East	y				y		Circuit Congestion
L20H	Avoid	0	0	230	East		y			y		Protection adequacy (Too many taps)
L21H	Avoid	20	20	230	East		y			y		Protection adequacy (Too many taps)
L22H	Avoid	60	60	230	East		y			y		Protection adequacy (Too many taps)
L24A		80	80	230	Ottawa	y				y		Circuit Congestion
L2M		30	30	115	Ottawa	y				y		Circuit Congestion
L2M (north)		40	40	115	Ottawa	y						North of Chesterville
L33P	Not Allowed	0	0	230	East	y				y		Intertie Circuit
L34P	Not Allowed	0	0	230	East	y				y		Intertie Circuit
L5C	Not Allowed	0	0	115	East	y						Intertie Circuit

Circuit	Avoid/ Not Allowed	Capacity for IBR (MW)	Capacity for Sync. Gen (MW)	Voltage (kV)	Zone	Areas (Congestion Limit)						Notes
						East of St. Lawrence (200MW)	East of Hinchinbrooke (600MW)	East of Minden TS (100 MW)	East of Dobbin TS (700 MW)	East of Bowmanville SS (550 MW)	< 50 km of Short Circuit Limited Station?	
M1R		10	10	115	Ottawa							Circuit Congestion
M30A	Avoid	0	0	230	Ottawa							Connection Difficulties
M31A	Avoid	0	0	230	Ottawa							Connection Difficulties
M32S		250	250	230	Ottawa							
M4G		75	110	115	Ottawa							IBR Bright line limit/ circuit congestion
M5G		75	150	115	Ottawa							IBR Bright line limit/ circuit congestion
M6E	Avoid	0	0	230	Essa							Circuit Congestion
M7E		10	10	230	Essa							Circuit Congestion
M80B	Avoid	0	0	230	Essa							Circuit Congestion
M81B		70	70	230	Essa							Circuit Congestion
P15C	Avoid	100	100	230	East						y (partial)	Circuit Congestion
P3S	Avoid	75	90	115	East				y		y (partial)	IBR Bright line limit/ circuit congestion
P4S	Avoid	40	40	115	East				y		y (partial)	Circuit Congestion
PxT1	Avoid	140	140	230	East						y	New circuit - Clarington to Dobbin
PxT2	Avoid	140	140	230	East						y	New circuit - Clarington to Dobbin
Q3K		75	75	115	East					y		IBR Bright line limit/ circuit congestion
Q3M6		60	60	115	East					y		Circuit Congestion
Q6S		30	30	115	East					y		Circuit Congestion
S1K		75	75	115	East					y		IBR Bright line limit/ circuit congestion
S7M	Not Allowed	0	0	115	Ottawa							Existing stability issues[20]
T22C	Avoid	30	30	230	East						y (partial)	Circuit Congestion
T25B	Avoid	240	240	230	East						y (partial)	Circuit Congestion

Circuit	Avoid/ Not Allowed	Capacity for IBR (MW)	Capacity for Sync. Gen (MW)	Voltage (kV)	Zone	Areas (Congestion Limit)					< 50 km of Short Circuit Limited Station?	Notes
						East of St. Lawrence (200MW)	East of Hinchinbrooke (600MW)	East of Minden TS (100 MW)	East of Dobbin TS (700 MW)	East of Bowmanville SS (550 MW)		
T32H	Avoid	100	100	230	East						y (partial)	Circuit Congestion
T31H	Avoid	90	90	230	East						y (partial)	Circuit Congestion
T33E	Avoid	140	140	230	East						y (partial)	Circuit Congestion
V12M		60	60	115	Ottawa							Circuit Congestion
W3B	Not Allowed	0	0	115	East							Existing stability issues[20]
W6CS	Not Allowed	0	0	115	East							Existing stability issues[20]
X1H		220	220	230	East		y			y		Circuit Congestion
X1P	Not Allowed	0	0	230	East				y			Existing stability issues[21]
X21		250	250	230	East					y		
X22		250	250	230	East					y		
X2H		200	200	230	East		y			y		
X2Y	Not Allowed	0	0	115	Ottawa							Intertie Circuit
X3H		250	250	230	East		y			y		
X4H		180	180	230	East		y			y		Circuit Congestion
X503E	Not Allowed	n/a	n/a	500	Toronto							500 kV Circuit. Potential SSR Issues.
X504E	Not Allowed	n/a	n/a	500	Toronto							500 kV Circuit. Potential SSR Issues.
X520B	Avoid	n/a	n/a	500	East					y	y (partial)	500 kV Circuit
X521B	Avoid	n/a	n/a	500	East					y	y (partial)	500 kV Circuit
X522A	Avoid	n/a	n/a	500	Ottawa					y		500 kV Circuit
X523A	Avoid	n/a	n/a	500	Ottawa					y		500 kV Circuit
X526B	Avoid	n/a	n/a	500	East					y	y (partial)	500 kV Circuit

[21] System East of Dobbin

Circuit	Avoid/ Not Allowed	Capacity for IBR (MW)	Capacity for Sync. Gen (MW)	Voltage (kV)	Zone	Areas (Congestion Limit)						Notes
						East of St. Lawrence (200MW)	East of Hinchinbrooke (600MW)	East of Minden TS (100 MW)	East of Dobbin TS (700 MW)	East of Bowmanville SS (550 MW)	< 50 km of Short Circuit Limited Station?	
X527B	Avoid	n/a	n/a	500	East					y	y (partial)	500 kV Circuit
X534N	Avoid	n/a	n/a	500	East					y		500 kV Circuit
X538N	Avoid	n/a	n/a	500	East					y		500 kV Circuit
X6	Not Allowed	0	0	115	East							Existing stability issues[21]

Table 10 |Transmission Circuit Capacities and Limitations for West of Toronto

						Areas (Congestion Limit)								
Circuit	**Avoid/ Not Allowed**	**Capacity for IBR (MW)**	**Capacity for Sync. Gen (MW)**	**Voltage (kV)**	**Zone**	**West of Scott TS (500MW)**	**West of Burlington TS (2,200MW)**	**West of Chatham SS (700 MW)**	**West of Buchanan TS (1,100 MW)**	**West of Detweiler TS (1,100 MW)**	**West of Middleport TS (850 MW)**	**West of Milton SS (900 MW)**	**< 50 km of Short Circuit Limited Station?**	**Notes**
A36N	Avoid	75	160	115	Niagara								y	IBR Bright line limit/ circuit congestion
A37N	Avoid	75	80	115	Niagara								y	IBR Bright line limit/ circuit congestion
A565L	Avoid	n/a	n/a	500	Bruce									500 kV Circuit
A6C	Avoid	75	100	115	Niagara								y	IBR Bright line limit/ circuit congestion
A7C	Avoid	70	70	115	Niagara								y	Circuit Congestion
B10	Avoid	75	200	115	Southwest		y						y (limited)	IBR Bright line limit/ circuit congestion
B11	Avoid	75	200	115	Southwest		y						y (limited)	IBR Bright line limit/ circuit congestion
B12BL	Avoid	0	0	115	Southwest		y						y (partial)	Circuit Congestion
B13BL	Avoid	0	0	115	Southwest		y						y (partial)	Circuit Congestion
B18H	Avoid	220	220	230	Southwest		y						y	Circuit Congestion
B2	Avoid	75	90	115	Southwest								y (limited)	IBR Bright line limit/ circuit congestion
B20H	Avoid	220	220	230	Southwest		y						y	Circuit Congestion
B20P		190	190	230	Bruce							y		Circuit Congestion
B22D		50	50	230	Southwest					y	y			Circuit Congestion
B23D		170	170	230	Southwest					y	y			Circuit Congestion
B24P		250	250	230	Bruce							y		Circuit Congestion
B27S		170	170	230	Bruce									Circuit Congestion
B28S		230	230	230	Bruce									Circuit Congestion
B3	Avoid	0	0	115	Southwest		y						y (partial)	Circuit Congestion

Circuit	Avoid/ Not Allowed	Capacity for IBR (MW)	Capacity for Sync. Gen (MW)	Voltage (kV)	Zone	Areas (Congestion Limit)								
						West of Scott TS (500MW)	West of Burlington TS (2,200MW)	West of Chatham SS (700 MW)	West of Buchanan TS (1,100 MW)	West of Detweiler TS (1,100 MW)	West of Middleport TS (850 MW)	West of Milton SS (900 MW)	< 50 km of Short Circuit Limited Station?	Notes
B3N	Not Allowed	0	0	230	West	y		y	y		y			Intertie Circuit
B4	Avoid	0	0	115	Southwest		y						y (partial)	Circuit Congestion
B40C	Avoid	250	250	230	Southwest		y						y	
B41C	Avoid	250	250	230	Southwest		y						y	
B4V	Avoid	20	20	230	Southwest							y		Protection Adequacy, Circuit Congestion
B501M	Avoid	n/a	n/a	500	Southwest							y	y (partial)	500 kV Circuit
B502M	Avoid	n/a	n/a	500	Southwest							y	y (partial)	500 kV Circuit
B560V	Avoid	n/a	n/a	500	Toronto							y	y (partial)	500 kV Circuit
B561M	Avoid	n/a	n/a	500	Bruce							y	y (partial)	500 kV Circuit
B562E	Avoid	n/a	n/a	500	Bruce									500 kV Circuit
B563A	Avoid	n/a	n/a	500	Bruce									500 kV Circuit
B569B	Avoid	n/a	n/a	500	Bruce							y		500 kV Circuit
B5C	Avoid	20	20	115	Southwest		y						y (partial)	Circuit Congestion
B5V	Avoid	60	60	230	Southwest							y		Protection Adequacy, Circuit Congestion
B6C	Avoid	20	20	115	Southwest		y						y (partial)	Circuit Congestion
B7	Avoid	70	70	115	Southwest		y						y (partial)	Circuit Congestion
B8	Avoid	0	0	115	Southwest		y						y (partial)	Circuit Congestion
BP76	Not Allowed	0	0	230	Niagara								y	Intertie Circuit
C12		75	0	115	Southwest						y		y (limited)	Projects connecting to C9 and C12 must fulfill requirements identified in section 2.3.4
C2P	Avoid	75	90	115	Niagara								y	IBR Bright line limit/ circuit congestion

Circuit	Avoid/ Not Allowed	Capacity for IBR (MW)	Capacity for Sync. Gen (MW)	Voltage (kV)	Zone	Areas (Congestion Limit)								Notes
						West of Scott TS (500MW)	West of Burlington TS (2,200MW)	West of Chatham SS (700 MW)	West of Buchanan TS (1,100 MW)	West of Detweiler TS (1,100 MW)	West of Middleport TS (850 MW)	West of Milton SS (900 MW)	< 50 km of Short Circuit Limited Station?	
C31	Avoid	0	150	230	West			y	y		y			Proximity of other IBRs
C42H		0	200	230	West			y	y		y			Proximity of other IBRs
C43H		30	30	230	West			y	y		y			Circuit Congestion
C64H		0	250	230	West			y	y		y			Proximity of other IBRs
C65H		200	200	230	West			y	y		y			Circuit Congestion
C87H		250	250	230	West			y	y		y			
C88H		250	250	230	West			y	y		y			
C9		75	0	115	Southwest						y		y (limited)	Projects connecting to C9 and C12 must fulfill requirements in section 2.3.4.
D10H		10	10	115	Southwest					y	y	y		Circuit Congestion
D10S	Avoid	50	50	115	Niagara								y	Circuit Congestion
D11K		70	70	115	Southwest					y	y			Circuit Congestion
D12K		75	75	115	Southwest					y	y			IBR Bright line limit/ circuit congestion
D1A	Avoid	75	80	115	Niagara								y	IBR Bright line limit/ circuit congestion
D1W		75	75	115	Southwest					y	y			IBR Bright line limit/ circuit congestion
D3A	Avoid	50	50	115	Niagara								y	Circuit Congestion
D4W		230	230	230	Southwest					y	y			Circuit Congestion
D5W		230	230	230	Southwest					y	y			Circuit Congestion
D6V		70	70	230	Southwest							y		Circuit Congestion
D7F		75	90	115	Southwest					y	y			IBR Bright line limit/ circuit congestion
D7V		100	100	230	Southwest							y		Circuit Congestion

Circuit	Avoid/ Not Allowed	Capacity for IBR (MW)	Capacity for Sync. Gen (MW)	Voltage (kV)	Zone	Areas (Congestion Limit)								Notes
						West of Scott TS (500MW)	West of Burlington TS (2,200MW)	West of Chatham SS (700 MW)	West of Buchanan TS (1,100 MW)	West of Detweiler TS (1,100 MW)	West of Middleport TS (850 MW)	West of Milton SS (900 MW)	< 50 km of Short Circuit Limited Station?	
D8S		75	80	115	Southwest					y	y			IBR Bright line limit/ circuit congestion
D9F		75	100	115	Southwest					y	y			IBR Bright line limit/ circuit congestion
D9HS	Avoid	60	60	115	Niagara								y	Circuit Congestion
E564L	Avoid	n/a	n/a	500	Bruce									500 kV Circuit
E578P	Avoid	n/a	n/a	500	Bruce									500 kV Circuit
E8F		40	40	115	West			y	y		y			Circuit Congestion
E9F		75	110	115	West			y	y		y			Circuit Congestion
F11C	Avoid	60	60	115	Southwest					y	y			Protection adequacy, Circuit Congestion
F12C	Avoid	70	70	115	Southwest					y	y			Protection adequacy, Circuit Congestion
H25J		30	30	230	West			y	y		y			Circuit Congestion
H26J		10	10	230	West			y	y		y			Circuit Congestion
H38		250	250	230	West				y		y			
H39		250	250	230	West				y		y			
H53Z		250	250	230	West			y	y		y			
H54Z		210	210	230	West			y	y		y			Circuit Congestion
H5K	Not Allowed	0	0	115	Southwest								y (limited)	short cables
H6K	Not Allowed	0	0	115	Southwest								y (limited)	short cables
H75		250	250	230	West			y	y		y			
H76		90	90	230	West			y	y		y			Circuit Congestion
H9W	Avoid	0	150	115	West				y		y			Proximity of other IBRs

Circuit	Avoid/ Not Allowed	Capacity for IBR (MW)	Capacity for Sync. Gen (MW)	Voltage (kV)	Zone	Areas (Congestion Limit)								Notes
						West of Scott TS (500MW)	West of Burlington TS (2,200MW)	West of Chatham SS (700 MW)	West of Buchanan TS (1,100 MW)	West of Detweiler TS (1,100 MW)	West of Middleport TS (850 MW)	West of Milton SS (900 MW)	< 50 km of Short Circuit Limited Station?	
HL3	Avoid	75	120	115	Southwest								y (limited)	IBR Bright line limit/ circuit congestion
HL4	Avoid	75	150	115	Southwest								y (limited)	IBR Bright line limit/ circuit congestion
J1B	Avoid	0	0	115	West			y	y		y			IBR Bright line limit/ circuit congestion
J20B	Avoid	250	250	230	West			y	y		y			Protection adequacy (Line differential)
J2N		40	40	115	West			y	y		y			Circuit Congestion
J3E	Avoid	75	75	115	West			y	y		y			Protection adequacy (Line differential)
J4E	Avoid	75	75	115	West			y	y		y			Protection adequacy (Line differential)
J5D	Not Allowed	0	0	230	West			y	y		y			Intertie Circuit
K12		75	180	115	Southwest						y			IBR Bright line limit/ circuit congestion
K2Z	Avoid	0	10	115	West			y	y		y			Proximity of other IBRs
K40M*	Avoid	250	250	230	Southwest						y		y (limited)	
K6Z	Avoid	0	80	115	West			y	y		y			Proximity of other IBRs
K7		75	140	115	Southwest						y			IBR Bright line limit/ circuit congestion
L23N		250	250	230	West	y		y	y		y			
L24L		240	240	230	West			y	y		y			Circuit Congestion
L25V	Avoid	250	250	230	West			y	y		y			Protection adequacy (Line differential)
L26L		220	220	230	West			y	y		y			Circuit Congestion
L27V	Avoid	250	250	230	West			y	y		y			Protection adequacy (Line differential)

Circuit	Avoid/ Not Allowed	Capacity for IBR (MW)	Capacity for Sync. Gen (MW)	Voltage (kV)	Zone	Areas (Congestion Limit)								Notes
						West of Scott TS (500MW)	West of Burlington TS (2,200MW)	West of Chatham SS (700 MW)	West of Buchanan TS (1,100 MW)	West of Detweiler TS (1,100 MW)	West of Middleport TS (850 MW)	West of Milton SS (900 MW)	< 50 km of Short Circuit Limited Station?	
L28C	Avoid	160	160	230	West			y	y		y			Protection adequacy (Line differential)
L29C		190	190	230	West			y	y		y			Circuit Congestion
L34C		250	250	230	West				y		y			New circuit - Lambton to Chatham
L35C		250	250	230	West				y		y			New circuit - Lambton to Chatham
L4D	Not Allowed	0	0	230	West				y		y			Intertie Circuit
L51D	Not Allowed	0	0	230	West				y		y			Intertie Circuit
L7S	0	10	10	115	Southwest					y	y			Proximity of other IBRs
LxL1	Not Allowed	0	0	500	West				y		y			New 500 kV circuit - Longwood to Lakeshore
M18	0	40	40	115	Southwest					y	y			Proximity of other IBRs
M20D	Avoid	20	20	230	Southwest						y		y (limited)	Protection adequacy (Too many taps)
M21D	Avoid	0	0	230	Southwest						y		y (limited)	Protection adequacy (Too many taps)
M27B	Avoid	150	150	230	Southwest		y						y (partial)	Circuit Congestion
M28B	Avoid	150	150	230	Southwest		y						y (partial)	Circuit Congestion
M31W	Avoid	0	0	230	Southwest						y		y (limited)	Protection adequacy (Too many taps)
M32W	Avoid	250	250	230	Southwest						y		y (limited)	Protection adequacy (Too many taps)
M33W	Avoid	0	0	230	Southwest						y		y (limited)	Protection adequacy (Too many taps)
M34H	Avoid	140	140	230	Southwest								y (partial)	Circuit Congestion
M570V	Avoid	n/a	n/a	500	Toronto								y	500 kV Circuit

Circuit	Avoid/ Not Allowed	Capacity for IBR (MW)	Capacity for Sync. Gen (MW)	Voltage (kV)	Zone	Areas (Congestion Limit)								
						West of Scott TS (500MW)	West of Burlington TS (2,200MW)	West of Chatham SS (700 MW)	West of Buchanan TS (1,100 MW)	West of Detweiler TS (1,100 MW)	West of Middleport TS (850 MW)	West of Milton SS (900 MW)	< 50 km of Short Circuit Limited Station?	Notes
M571V	Avoid	n/a	n/a	500	Toronto								y	500 kV Circuit
M572T	Avoid	n/a	n/a	500	Southwest								y	500 kV Circuit
M573T	Avoid	n/a	n/a	500	Southwest								y	500 kV Circuit
M585M	Avoid	n/a	n/a	500	Southwest							y	y (partial)	500 kV Circuit
N1S		75	80	115	West			y	y		y			IBR Bright line limit/ circuit congestion
N20K*	Avoid	250	250	230	Southwest						y			Protection adequacy (Line differential)
N21J*		250	250	230	Southwest						y			
N21W	Avoid	80	80	230	West	y		y	y		y			Circuit Congestion
N22J*		250	250	230	Southwest						y			
N22W	Avoid	80	80	230	West	y		y	y		y			Circuit Congestion
N37S*	Avoid	250	250	230	Southwest						y			Protection adequacy (Line differential)
N4S		75	100	115	West	y		y	y		y			IBR Bright line limit/ circuit congestion
N580M	Avoid	n/a	n/a	500	Southwest						y		y (partial)	500 kV Circuit
N581M	Avoid	n/a	n/a	500	Southwest						y		y (partial)	500 kV Circuit
N582L	Avoid	n/a	n/a	500	Southwest						y		y (limited)	500 kV Circuit
N5M*	Avoid	170	170	230	Southwest						y		y (limited)	Circuit Congestion
N6C		75	90	115	West	y		y	y		y			IBR Bright line limit/ circuit congestion
N6M*	Avoid	250	250	230	Southwest						y		y (limited)	
N6S		10	10	230	West	y		y	y		y			Circuit Congestion
N7C		75	90	115	West	y		y	y		y			IBR Bright line limit/ circuit congestion
N7S	Avoid	0	0	230	West	y		y	y		y			Circuit Congestion

Circuit	Avoid/ Not Allowed	Capacity for IBR (MW)	Capacity for Sync. Gen (MW)	Voltage (kV)	Zone	Areas (Congestion Limit)							< 50 km of Short Circuit Limited Station?	Notes
						West of Scott TS (500MW)	West of Burlington TS (2,200MW)	West of Chatham SS (700 MW)	West of Buchanan TS (1,100 MW)	West of Detweiler TS (1,100 MW)	West of Middleport TS (850 MW)	West of Milton SS (900 MW)		
PA27	Not Allowed	0	0	230	Niagara								y	Intertie Circuit
PA301	Not Allowed	0	0	230	Niagara								y	Intertie Circuit
PA302	Not Allowed	0	0	230	Niagara								y	Intertie Circuit
Q10P	Avoid	60	60	230	Niagara								y	Circuit Congestion
Q11S	Avoid	75	120	115	Niagara								y	IBR Bright line limit/ circuit congestion
Q12S	Avoid	75	120	115	Niagara								y	IBR Bright line limit/ circuit congestion
Q23BM	Avoid	50	50	230	Niagara		y						y (partial)	Protection adequacy (Line differential)
Q24HM	Avoid	40	40	230	Niagara								y (partial)	Protection adequacy (Line differential)
Q25BM	Avoid	20	20	230	Niagara		y						y (partial)	Protection adequacy (Line differential)
Q26M*	Avoid	220	220	230	Niagara								y (partial)	Protection adequacy (Line differential)
Q28A	Avoid	130	130	230	Niagara								y	Protection adequacy (Line differential)
Q29HM	Avoid	60	60	230	Niagara								y (partial)	Protection adequacy (Line differential)
Q2AH	Avoid	50	50	115	Niagara								y	Circuit Congestion
Q30M	Avoid	150	150	230	Niagara								y (partial)	Protection adequacy (Line differential)
Q35M*	Avoid	220	220	230	Niagara								y (partial)	Protection adequacy (Line differential)
Q3N	Avoid	40	40	115	Niagara								y	Circuit Congestion
Q4N	Avoid	50	50	115	Niagara								y	Circuit Congestion
S1H	Avoid	0	0	115	Southwest							y		Circuit Congestion

Circuit	Avoid/ Not Allowed	Capacity for IBR (MW)	Capacity for Sync. Gen (MW)	Voltage (kV)	Zone	Areas (Congestion Limit)								Notes
						West of Scott TS (500MW)	West of Burlington TS (2,200MW)	West of Chatham SS (700 MW)	West of Buchanan TS (1,100 MW)	West of Detweiler TS (1,100 MW)	West of Middleport TS (850 MW)	West of Milton SS (900 MW)	< 50 km of Short Circuit Limited Station?	
S2N		30	30	115	West	y		y	y		y			Circuit Congestion
S2S	Avoid	0	0	115	Southwest							y		Circuit Congestion
S39M	Avoid	250	250	230	Southwest						y		y (limited)	Protection adequacy (Line differential)
S47C	Avoid	250	250	230	West				y		y			Protection adequacy (Line differential)
T36B	Avoid	250	250	230	Southwest		y						y	
T37B	Avoid	250	250	230	Southwest		y						y	
T38B	Avoid	250	250	230	Southwest		y						y	
T39B	Avoid	250	250	230	Southwest		y						y	
V41N	Avoid	250	250	230	West	y		y	y		y			Protection adequacy (Line differential)
V43N	Avoid	230	230	230	West	y		y	y		y			Protection adequacy (Line differential)
V586M	Avoid	n/a	n/a	500	Southwest							y	y (partial)	500 kV Circuit
W12		75	100	115	West				y		y			IBR Bright line limit/ circuit congestion
W14	Avoid	0	130	115	West				y		y			Proximity of other IBRs
W1W		75	150	115	West				y		y			IBR Bright line limit/ circuit congestion
W2S		60	60	115	West				y		y			Circuit Congestion
W36		220	220	230	West				y		y			Circuit Congestion
W37		190	190	230	West				y		y			Circuit Congestion
W42L		170	170	230	West				y		y			Circuit Congestion
W43L		170	170	230	West				y		y			Circuit Congestion
W44LC	Avoid	0	0	230	West				y		y			Protection adequacy (Line differential)

Circuit	Avoid/ Not Allowed	Capacity for IBR (MW)	Capacity for Sync. Gen (MW)	Voltage (kV)	Zone	Areas (Congestion Limit)								Notes
						West of Scott TS (500MW)	West of Burlington TS (2,200MW)	West of Chatham SS (700 MW)	West of Buchanan TS (1,100 MW)	West of Detweiler TS (1,100 MW)	West of Middleport TS (850 MW)	West of Milton SS (900 MW)	< 50 km of Short Circuit Limited Station?	
W45LS	Avoid	0	0	230	West				y		y			Protection adequacy (Line differential)
W5N		75	130	115	West				y		y			IBR Bright line limit/ circuit congestion
W6NL		75	120	115	West				y		y			IBR Bright line limit/ circuit congestion
W7		75	100	115	West				y		y			IBR Bright line limit/ circuit congestion
W8T	Avoid	75	130	115	West				y		y			Proximity of other IBRs
W9L		75	120	115	West				y		y			IBR Bright line limit/ circuit congestion
WT1A	Avoid	0	90	115	West				y		y			Proximity of other IBRs
WT1T	Avoid	0	80	115	West				y		y			Proximity of other IBRs
X520B	Avoid	n/a	n/a	500	West				y		y			500 kV Circuit
X521B	Avoid	n/a	n/a	500	West				y		y			500 kV Circuit
X526B	Avoid	n/a	n/a	500	West				y		y			500 kV Circuit
X527B	Avoid	n/a	n/a	500	West				y		y			500 kV Circuit
Z1E	Avoid	0	0	115	West				y		y			Circuit Congestion
Z7E		10	10	115	West				y		y			Circuit Congestion

*Subject to Section 5(K) of Ministerial Directive: https://www.ieso.ca/-/media/Files/IESO/Document-Library/corporate/ministerial-directives/Directive-from-the-Minister-of-Energy-and-Electrification-20241128-LT2.pdf

Appendix B: Connection Process considerations

All projects proposing to connect to the Ontario electricity grid must apply for a connection assessment as part of the connection assessment and approval process. Transmission connection assessments will include an SIA carried out by the IESO and a CIA-TX carried out by a *transmitter*. Distribution connection assessments will include a CIA-DX carried out by an LDC. A distribution connected project that is ≥ 10 MW also requires an SIA and a CIA-TX.

These assessments examine the equipment that is proposed to be connected and verify that it will meet the requirements of the *Market Rules,* Transmission System Code and/or Distribution System Code, and that the manner in which the facility is connected would not result in an adverse impact on system reliability or to connected customers.

On the transmission side, an SIA does not assess whether or not the electricity moving to/from the proposed project can be delivered, because when it can't be delivered, the assumption in an SIA is that the facility will be constrained off. This is the reason that a project which may have already obtained an SIA and/or a CIA-TX cannot be deemed to be "Deliverable" for the purposes of IESO procurements without first applying for a Deliverability Test. In addition, a completed SIA does not reserve connection capacity. As stated previously, before deciding on siting a project, applicants should have preliminary discussions with their *transmitters* or LDC.

Similarly, on the distribution side, a project that has already obtained a CIA-DX will not be deemed to be "Deliverable" without going through the Deliverability Test.

Applicants are precluded from applying for a CIA-DX for *distribution system* connected projects until the conclusion of the LT2(c-1) RFP. For clarity, applicants must rescind any current CIA-DXs related to their proposed project in accordance with the LT2(c-1) RFP. Should this requirement not be met, those projects will not be eligible for the LT2(c-1) RFP.

After the Deliverability Test for the LT2(c-1) RFP is concluded*,* projects that obtained "Deliverable" results and that propose to connect to a *distribution system* may apply for a CIA-DX.

Similar to the requirement under the E-LT1 and LT1 RFPs, since CIA-DXs reserve capacity on the *distribution system*, it is expected that applicants (and contracted facility expansion applicants) that are not offered contracts through the LT2(c-1) RFP will be required to rescind any CIA-DXs associated with the projects submitted. The return of Proposal Security submitted as part of the LT2(c-1) RFP is tied to an applicant rescinding any CIA-DX for an unsuccessful project per section 5.4(a)(ii) of the LT2(c-1) RFP document (a draft of this document can be found here).

The IESO strongly recommends that potential applicants proposing *transmission system* projects or ≥ 10 MW *distribution system* projects delay their SIA applications until the results of the LT2(c-1) RFP are announced. If an applicant chooses to apply for an SIA, it is important to note that the SIA may need to be updated or restarted after the results of the LT2(c-1) RFP are announced, as an SIA completed earlier would not have included all successful projects as firm projects (and as noted above, a completed SIA does not reserve connection capacity).