

Submission in Support of the Exemption Application

Background

The 2-75/125 MVA, 230/27.6-27.6 kV transformer station (Leamington DESN # 2) connected to circuits C21J/C22J, and located in the same site as Leamington DESN # 1, was placed in-service in December 2019. The peak load supplied by both DESNs is planned to increase to 410 MW by Q1 2022. This is an increase of 41 MW over the load level assessed in SIA CAA 2018-633.

SIA CAA 2018-633 also considered two customer transformer stations planned to be connected to the Leamington Junction to Leamington Transformer Station (TS) section of the Chatham Switching Station (SS) to Keith TS 230 kV circuits C21J and C22J.

- A 65/86 MVA, 230/13.8 kV customer transformer station (Aphria Leamington Greenhouse) to be connected to circuit C22J and located at about 3.3 km north of the Leamington TS (planned in-service Q2 2022).
- A 38/63 MVA, 230/13.8 kV customer transformer station (Mastron II Greenhouse) to be connected to circuit C21J and located at about 7.2 km north of the Leamington TS (planned in-service Q2 2022).



Figure 1: Map of Windsor – Essex Region Showing Proposed Connections

Description of the Relevant IESO Requirements

This exemption application refers to two requirements outlined in the Ontario Resource and Transmission Assessment Criteria ([ORTAC](#)).

Section 7.1: Load Security Criteria

- The transmission system must be planned to satisfy demand levels up to the extreme weather, median-economic forecast for an extended period with any one transmission element out of service. The transmission system must exhibit acceptable performance, as described below, following the design criteria contingencies defined in sections 2.7.1 and 2.7.2. For the purposes of this section, an element is comprised of a single zone of protection.

Section 7.2: Load Restoration Criteria

- The IESO has established load restoration criteria for high voltage supply to a transmission customer. The load restoration criteria below are established so that satisfying the restoration times below will lead to an acceptable set of facilities consistent with the amount of load affected.

Exemption Requirements

Exemptions are required for the following violations of Ontario Resource and Transmission Assessment Criteria (ORTAC):

- a) Requirement # 1 in the final SIA Addendum report for CAA 2018-633

Requirement # 1 in the Addendum for CAA 2018-633 required Hydro One Networks Inc. to obtain an exemption from satisfying section 7.1 load security criteria in ORTAC, for the loads supplied by Leamington TS before Winter 2021 under the following system conditions:

- 1- Following the loss of any of the circuits C21J or C22J as identified in finding # 1 of the Addendum;
- 2- During either C21J or C22J outage as identified in finding # 2 of the Addendum;
- 3- During either C21J or C22J outage and following the loss of a single unit at Brighton Beach CGS or the entire plant as identified in finding # 3 of the Addendum;
- 4- For a simultaneous outage of C21J and C22J, as identified in finding 4 of the Addendum, up to 608 MW of load may be lost.

While Hydro One has already obtained an exemption for conditions 1 through 3 above, the addition of 41 MW of new load would increase the extent of the violation, and would result in the exceedance of the 600 MW limit for load interruption as described in condition 4.

- b) Requirement # 2 in the Addendum for SIA report for CAA 2018-633

The above requirements required Hydro One Networks Inc. to obtain an exemption from satisfying section 7.2 load restoration criteria in ORTAC, for the loads connected to circuits C21J and C22J when both circuits are out-of-service as identified in finding # 4.

The time it takes to restore load generally depends on the nature of the contingency. If the contingency is due to a lightning strike, all load would be restored in a matter of seconds with automatic reclosure operation at circuit terminals. For a more permanent contingency, it would take longer to restore load but generally, all load would be restored within 8 hours. The requirement to restore 358MW of load (ie load in excess of 250 MW) in 30 minutes may be challenging depending on the nature of the contingency.

Reasons for Exemption Application

The above violations of ORTAC are a result of the weakness of the 230 kV transmission system in the Windsor - Essex Region. This system consists of four circuits from Chatham SS, two of which terminate at Keith TS and the other two at Lauzon TS (Figure 1). While the system is limited in its ability to support load, there has been a substantial increase in the demand forecast in the Region driven primarily by rapid expansion in the greenhouse sector and aggressive uptake of grow lights. The projects in the Municipality of Leamington (Leamington TS, Aphria Leamington Greenhouse and Mastron II Greenhouse) are the consequence of the increase in load demand.

The requested exemptions are required because the three projects are planned to be placed in service well before the completion date for currently planned transmission reinforcement. This planned reinforcement will eliminate the violations.

Impact of Exemption on Hydro One Networks Inc. Customers

The impact of the exemption on customers is expected to be marginal since the contingency events which result in the noted violations are indeed rare events.

Over the past 20 years circuit C21J had a total of 16 forced outages; the corresponding figure for circuit C22J is 18. For the C21J forced outages, 8 were of less than 1 minute duration (typically lightning); and the corresponding figure for C22J is 13. Hence on the average, a C21J contingency may occur once in a year, and for about 50% of such occurrences all load would be restored within a minute by automatic autoreclosure at the circuit terminals; the corresponding figure for C22J being about 70%.

As it is not the practice to take circuit outages under peak load conditions, the violations noted under system conditions #2 and #3 are not expected to materialize frequently. This violation may only happen under forced outage to C21J or C22J under peak load conditions.

Over the past 20 years there was no simultaneous forced outage of circuits C21J and C22J, as distinct from a simultaneous forced maintenance outage of which there was one incident.

The above ORTAC violations and the requirement for an exemption application have been discussed with Hydro One Distribution, the customer for the Leamington DESN#1 and DESN#2. Hydro One Distribution was also provided with a copy of the SIA report and Addendum.

Plan to Achieve Compliance

The noted violations of ORTAC are the result of the weakness of the existing transmission system. The transmission system west of Chatham is unable to adequately support connected loads while meeting ORTAC criteria. The violations will be eliminated with sufficient strengthening of the existing transmission network.

The IESO has responsibility for making decisions and plans relating to improvements to the bulk transmission system. In this regard, the IESO has requested Hydro One Networks Inc. to develop two projects to reinforce the transmission system west of Chatham.

With the incorporation of these two projects in 2026, compliance with the ORTAC load security requirement will be met. However, following the loss of both C21J and C22J, e.g. a permanent fault on C22J under C21J outage condition, the requirement to restore load loss in excess of 250 MW, within 30 minutes, may be challenging without additional transmission reinforcement. Circuits C21J and C22J share a total of 45 double-circuit towers in the Leamington Jct x Leamington TS corridor. The simultaneous loss of two circuits on a common tower is a recognized double contingency. However, as noted above, a loss of both C21J and C22J has not occurred in the past 20 years.

The following are the two projects to reinforce the bulk transmission:

- Building a switching station at (or near) Leamington Junction, and bussing all the existing 230 kV circuits at this junction into the new station (planned in-service Q3, 2022).
- Establishment of a 230 kV 2-circuit Chatham SS x Lakeshore SS line (planned in-service Q3, 2025).

Hydro One Networks Inc. is in the planning stages to implement these two projects. For this purpose, Hydro One has submitted an SIA application (CAA ID 2019-666) to the IESO.

The Environmental Assessment for the switching station was completed in January 2020, and the Environmental Assessment for the new line commenced in January 2020. The existing transmission system is as shown in Figure 1, while Figure 2 shows the system following the incorporation of the two projects.

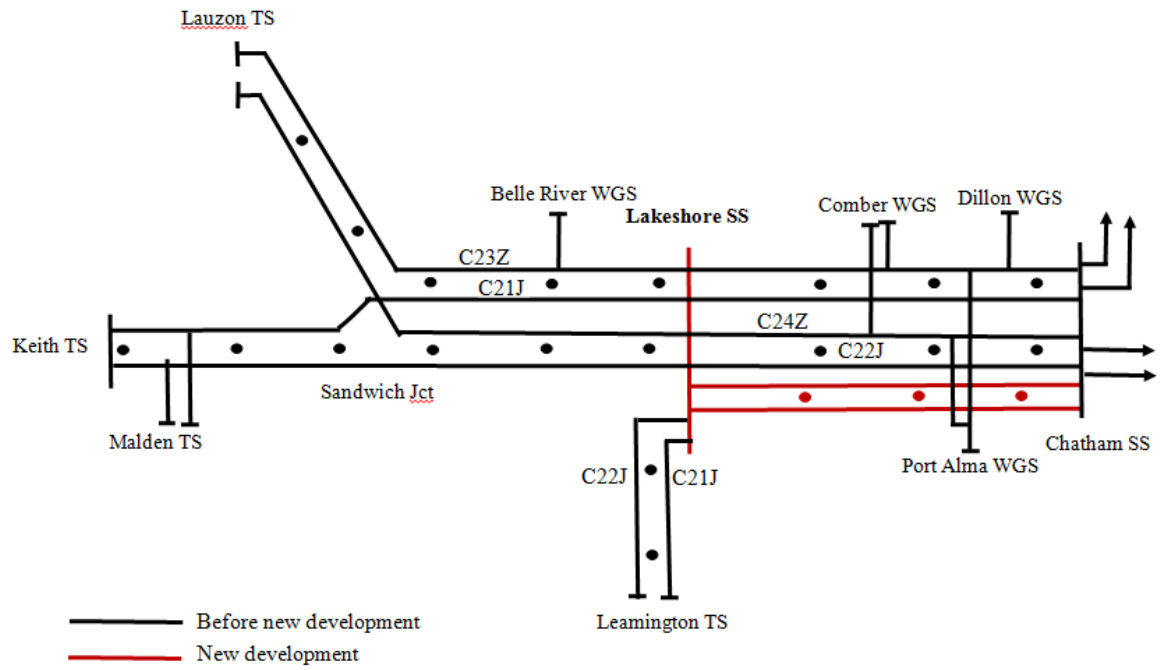


Figure 2: Circuit Configuration with Lakeshore SS and New Chatham SS x Lakeshore SS Line