



# **CONNECTION ASSESSMENT & APPROVAL PROCESS ASSESSMENT SUMMARY**

**Applicant: Hydro One Networks Inc.**

**Project: Bronte TS: Establish Two New 27.6kV  
Feeder Positions**

**CAA ID: 2002-EX046**

**Long Term Forecasts & Assessments Department  
Consistent Information Set Department**

**Date: November 5, 2002**

## 1.0 Description of Proposal

Burlington Hydro has experienced significant growth in its service area over the last few years and is expecting the trend will continue. It has therefore requested Hydro One Networks Inc. (HONI), the applicant, to add two new 27.6kV feeder positions at the existing HONI station Bronte TS to meet the expected load growth in the area.

Bronte TS, located in the southwest zone, is radially supplied from Burlington TS via two 115kV transmission circuits B7 and B8. The station, as shown in Figure 1, has three 110-28.4kV 50/66.6/83.3MVA transformers T2, T5, and T6. Transformers T5 and T6 form a typical DESN arrangement with a total of eight 27.6kV feeders, while T2 is a stand-alone transformer currently supplying two 27.6kV feeders. The T5/T6 DESN is connected to the 115kV transmission circuits B7 and B8. Transformer T2 is normally supplied from circuit B8 but can be transferred to circuit B7 via a normally open disconnect switch.

The two new feeders will be connected to the T2 transformer. The scheduled in-service date for the work is Q2 of 2003. The initial summer peak loads supplied by the new feeders will be about 20MVA and are forecast to peak at 37MVA by 2007.

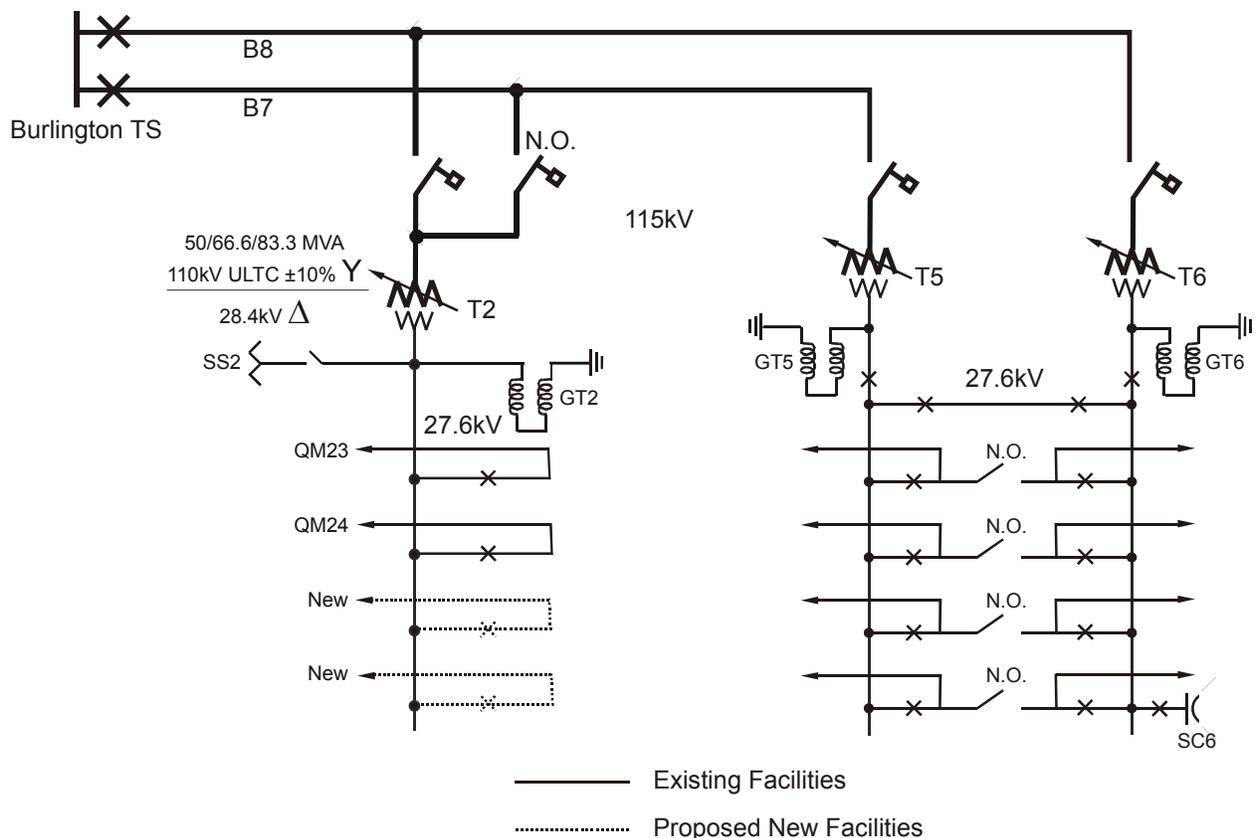


Figure 1: Bronte TS  
 October 2002

## 2.0 Assessment

### *Compliance with Market Rules*

#### Power Factor

Hydro One Networks Inc. indicates that the loads supplied from the two new feeders will be operating at 0.9 lagging power factor.

#### Under Frequency Load Shedding

Under frequency load shedding (UFLS) facilities are available at Bronte TS. As specified in Chapter 5 Section 10.4.6 of the Market Rules, the applicant shall extend the UFLS facilities to cover at least 30% of the total station peak demand, with the setting of 12% at 59.3 Hz and the remaining percentage at 58.8 Hz.

### *System Impact*

#### Thermal Capacities of Transformer T2 and 115kV Transmission Circuits B7/B8

Table 1 lists the 10-year forecast of summer peak loads at Bronte TS. The total demand supplied from the two new feeders is based on information provided by the applicant. The forecast summer peak loads for the T5/T6 DESN and for the two existing feeders supplied from transformer T2 are projected with an annual growth rate of 1.29%, which is the 10-year preliminary forecast average annual summer peak growth rate for the southwest zone.

Year	Summer Peak Loads (MVA)				
	Supplied from T2			T5/T6 DESN <sup>2</sup>	Station Total
	New Feeders <sup>1</sup>	Existing Feeders <sup>2</sup>	T2 Sub-Total		
2003	20.1	21.2	41.3	90.5	131.8
2004	24.7	21.4	46.1	91.6	137.7
2005	29.0	21.7	50.7	92.8	143.5
2006	33.0	22.0	55.0	94.0	149.0
2007	37.1	22.3	59.4	95.2	154.6
2008	32.7	22.6	55.3	96.4	151.7
2009	32.7	22.9	55.6	97.7	153.3
2010	32.7	23.2	55.9	98.9	154.8
2011	32.7	23.5	56.2	100.2	156.4
2012	32.7	23.8	56.5	101.5	158.0

Notes:

1. Based on information provided by Hydro One Networks Inc. and 0.9 lagging power factor
2. Based on 2002 station summer peak co-incident with system peak and annual average growth rate of 1.29%

**Table 1**

Table 2 lists the summer current carrying capacities of the 115kV transmission circuits B7 and B8.

Circuit	Limiting Conductor Size	Maximum Operating Temperature (°C)	Summer Continuous Rating <sup>1</sup> (A/MVA <sup>3</sup> )	Summer Emergency Rating <sup>2</sup> (A/MVA <sup>3</sup> )
B7	477 ACSR 26/7	127	590/122	770/160
B8	477 ACSR 26/7	121	590/122	740/153

Notes:

1. Based on 35°C ambient temperature, 4km/hr wind at 20° incident angle, and 93°C operating temperature
2. Based on 35°C ambient temperature, 4km/hr wind at 20° incident angle, and maximum operating temperature
3. Based on 120kV operating voltage

**Table 2**

Transformer T2, with a thermal rating of 50/63.3/83.3MVA, would be adequate to supply the forecast demands for the existing and the new feeders.

Under normal operating conditions, when both circuits B7 and B8 are in service, the two transmission circuits are capable of supplying Bronte TS and respect the circuits' continuous ratings. However, with the station configuration and switching arrangement at Bronte TS, when either circuit B7 or circuit B8 is out of service, the remaining circuit will have to carry the total demands at Bronte TS. Within five years, if the load at Bronte TS grew at the forecast or higher rate, the post-contingency thermal loading on circuit B8 could exceed its emergency rating during peak load periods unless its maximum operating temperature is increased to 127°C so that it is the same as that for circuit B7.

#### Short Circuit Capability

The loads that will be supplied from the new feeders are not expected to increase the short circuit levels at Bronte TS or at Burlington TS. The existing circuit breakers at these two stations are adequate to interrupt the expected short circuit currents at these stations.

#### Burlington Local Supply Area

In a separate study related to another connection assessment application for a new supply point in the Burlington local area, the IMO has raised concerns regarding the load meeting capability of the Burlington TS beyond 2004.

Two potential problems have been identified:

1. The pre-contingency voltage of the 115kV bus at Burlington TS could be as low as 117kV and the operating voltage at some stations that are supplied from Burlington TS could be below the minimum performance standard of 113kV specified in the Market Rules for 115kV system.
2. The load at Burlington TS will shortly reach a level that under transformer outage conditions, the loading on the remaining 230-115kV transformers will exceed their 10-day limited time ratings (LTR). Under certain contingency conditions, the transformer loading could even exceed the 15-minute LTR.

### **3.0 Conclusions and Recommendations**

The proposed addition of two new feeders at Bronte TS would not, at this time, materially impact on the IMO-controlled grid and that a Connection Assessment study would not be necessary.

However, in a few years the post-contingency thermal loading on circuit B8 could exceed its emergency rating. Also in a separate study related to another connection assessment application, the IMO has identified that the increasing demands in the Burlington local area will shortly exceed the load meeting capability of the Burlington TS. It is, therefore, recommended that Hydro One Networks Inc. should immediately initiate a study and identify options to address these concerns.

### **4.0 IMO's Requirements for Connection**

The applicant shall ensure loads connected to the Bronte TS T2 transformer shall operate at a power factor within the 0.9 lagging to 0.9 leading range when measured at the defined metering point. The existing under frequency load shedding facilities at Bronte TS shall be extended to cover at least 30% of the total station demand supplied from transformers T2, T5, and T6.

## **5.0 Notification of Approval**

Based on the above assessment, it is recommended that, subject to the applicant meeting the requirements outlined in Section 4.0, a Notification of Approval for this proposal be issued.