

April 22, 2010

Mr. Farooq Qureshy
Transmission Planning Manager - Central & East
Hydro One Networks Inc.
483 Bay Street, 15th Floor North Tower
Toronto, Ontario
M5G 2P5



Dear Mr. Qureshy:

***Woodroffe TS – Replacing T1, T2, T3, T4 with new T3 and T4
CAA ID Number: 2007-EX367***

Thank you for the information regarding the proposed replacement of transformers T1 through T4 with two new transformers T3 and T4.

We have concluded that the proposed changes will not result in a material adverse impact on the reliability of the integrated power system.

The IESO is therefore pleased to grant **conditional approval** for the modification detailed in the attached assessment report. Any material changes to your proposal may require re-assessment by the IESO in accordance with Market Manual 2.10, and may nullify your conditional approval.

Final approval to connect the facility to the IESO-controlled grid will be granted upon successful completion of the IESO Market Entry process including, without limitation, satisfactory completion of the requirements set out in the System Impact Assessment report. During this process you will be expected to demonstrate that you have fulfilled the requirements and that the facility you have installed is materially unchanged from the proposal assessed by the IESO. Please refer to the '**External Guidelines for Connection to the IESO**' attachment in your approval email for key steps in the Market Entry process. In order to initiate this process, please contact Market Entry at market.entry@ieso.ca as soon as possible prior to your energization date.

For further information, please contact the undersigned.

Yours truly,

Barbara Constantinescu
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cc: IESO Records

**Final Report - Expedited System Impact Assessment
Hydro One Networks Inc.**

1. GENERAL DESCRIPTION & PROPOSED MODIFICATIONS

Woodroffe TS is an outdoor 2 DESN transformer station in the western part of Ottawa. This 115/13.8 kV transformer station currently consists of four transformers rated at 20/33.33 MVA supplied via the 115 kV circuits C7BM and F10MV from Merivale MTS.

Hydro One is planning to replace the four transformers at Woodroffe TS with two 115/14.2/14.2 kV transformers rated at 45/60/75 MVA. The single line diagram showing the final configuration is shown in Figure 3 at the end of this document. The proposed work is scheduled for an in-service date of June 2010.

2. TECHNICAL SPECIFICATIONS

A comparison between the technical specifications of the existing and replacements transformers is given in the following table.

Woodroffe TS		
	Existing T1, T2, T3, T4	Replacement T3 and T4
Configuration	three phase	three phase
Transformation (kV)	T1, T2 & T3: 110.0 / 12.0 T4: 110 / 14.2	110.0 / 14.2 / 14.2
Winding Configuration	Y / D	D / Y / Y
Thermal Rating	20.0 MVA ONAN 26.7 MVA ONAF 33.3 MVA ONAF	45.0 MVA ONAN 60.0 MVA ODAN 75.0 MVA ODAF
Continuous Thermal Rating (summer 30°C)	33.3 MVA	75.0 MVA (37.5 MVA /secondary winding)
15 Minutes Thermal Rating (summer 30°C)	Not known	150.0 MVA (75 MVA /secondary winding)
10 Day Thermal Rating (summer 30°C)	T1: 37.9 MVA T2: 38.4 MVA T3: 46.2 MVA T4: 37.0 MVA	102.6 MVA (51.3 MVA /secondary winding)
Positive Sequence Impedance (H-X)	X = 8.7% (T1 & T2) X = 8.0 % (T3) X = 7.1 % (T4) 20 MVA Base	R = 0.24% X = 9.33% 22.5 MVA Base
Impedance to Ground	Ungrounded	1.25 Ω via neutral reactor

Woodroffe TS - continued		
	Existing T1, T2, T3, T4	Replacement T3/T4
Under-load tap-changer (ULTC)	T1, T2 & T3 12.0 ± 1.2 kV, 16 steps T4 14.2 ± 1.42 kV, 16 steps	14.2 ± 2.84 kV, 32 steps
Off-load tap-changer (OLTC)	T1 & T2 Tap 1 – 118.25 kV Tap 2 – 115.5 kV Tap 3 – 112.75 kV Tap 4 – 110.0 kV Tap 5 – 107.25 kV T3 Tap 1 – 115.5 kV Tap 2 – 112.75 kV Tap 3 – 110.0 kV Tap 4 – 107.25 kV Tap 5 – 104.4 kV T4 Tap 1 – 121.0 kV Tap 2 – 118.25 kV Tap 3 – 115.5 kV Tap 4 – 112.75 kV Tap 5 – 110 kV	Not Applicable
In service off-load tap Position	T1 & T2 - 110 kV T3 – 112.75 kV T4 – 121.0 kV	Not Applicable

Table 1 – Comparison of Existing and Replacement Transformers at Woodroffe TS

3. REQUIREMENTS

Hydro One must notify the IESO as soon as it becomes aware of any changes to the assumptions made in the connection assessment. The IESO will determine whether these changes require a re-assessment.

Hydro One is required to meet the requirements with respect to protection systems for the new transformers and coordination with the existing protection systems, as outlined in the Transmission System Code.

The Market rules (Chapter 4 section 7.4) require that transmitter shall provide the IESO on a continual basis with on-line monitored quantities as specified in Appendix 4.16. For this proposed project, the IESO will continue to require the operating quantities associated with these transformers.

The Market Rules require that Hydro One have the capability to maintain a power factor (pF) within the range of 0.9 lagging and 0.9 leading as measured at the defined metering point at Woodroffe TS. This power factor range translates into a load angle range of ± 0.45 radians. All the points above 0.45 radians indicate a lagging power factor below 0.9.

The IESO requires that Hydro One monitor the load angle at this station and if there are occurrences above 0.45 then Hydro One must implement correction measures at this station as soon as practical.

Provided that the TSC requirements are satisfied, the IESO does not have additional requirements.

4. ASSESSMENT & CONCLUSIONS

4.1. Replacement Transformers

The information provided by Hydro One Networks Inc. shows that the technical characteristics of the replacement transformers are an improvement over the existing transformers. The thermal ratings of the replacement transformers will more than double the ratings of the existing transformers. The positive sequence impedances of the new transformers are slightly higher than the original transformers' positive sequence impedances but this does not represent a concern.

Each of the existing transformers has both an OLTC and a ULTC. The replacement transformers will only have a ULTC but with a greater secondary voltage range. According to the Market Rules, Appendix 4.1, the permissible voltage at the primary side of the transformer can vary from 113 kV to 127 kV in southern Ontario. With the voltage at 127 kV, the secondary voltage ranges are given in the table below.

Secondary Voltage Range Primary voltage = 127 kV			
Existing T1 & T2	Existing T3	Existing T4	New T3 & T4
11.6 – 14.2 kV	11.9 – 14.5	13.4 – 16.4 kV	13.1 – 19.7 kV

Table 2 – Secondary Voltage Ranges for Existing and Replacement Transformers at Woodroffe TS

The replacement transformers' ULTCs provide a greater secondary voltage range than was possible with the existing transformers.

4.2. Summer 10-DAY Station Capabilities

The 10-DAY ratings of the existing and replacement transformers are listed in the table below. The summer 10-DAY station capability is determined by removing the transformer with the highest 10-DAY thermal rating from service.

10-DAY Summer Ratings for T3 & T4		
Transformer	10-DAY Thermal Rating (MVA) (summer 30°C)	
	Prior to replacement of T3 & T4	After replacement of T3 & T4
T1	37.9	102.6
T2	38.4	
T3	O/S (46.2)	O/S (102.6)
T4	37.0	102.6
T3/T4 Summer 10-DAY Station Capability (with highest rated transformer out of service)	113.3 MVA	102.6 MVA

Table 3 – 10-DAY Thermal Ratings for Existing and Replacement Transformers at Woodroffe TS

The existing summer 10-DAY station capability with T3 out of service is 113.3 MVA. The summer 10-DAY station capability with the new T3 and T4 will be slightly lower since there will be only 2 transformers.

4.3. Load Peaks and Projections

Figure 1 shows the historic load on T1, T2, T3, and T4 at Woodroffe TS. The peak load on the 4 transformers as measured on the LV side of the transformers for the period between February 1, 2009 and February 28, 2010 was 33.3 MVA and occurred on June 25, 2009 at 1600.

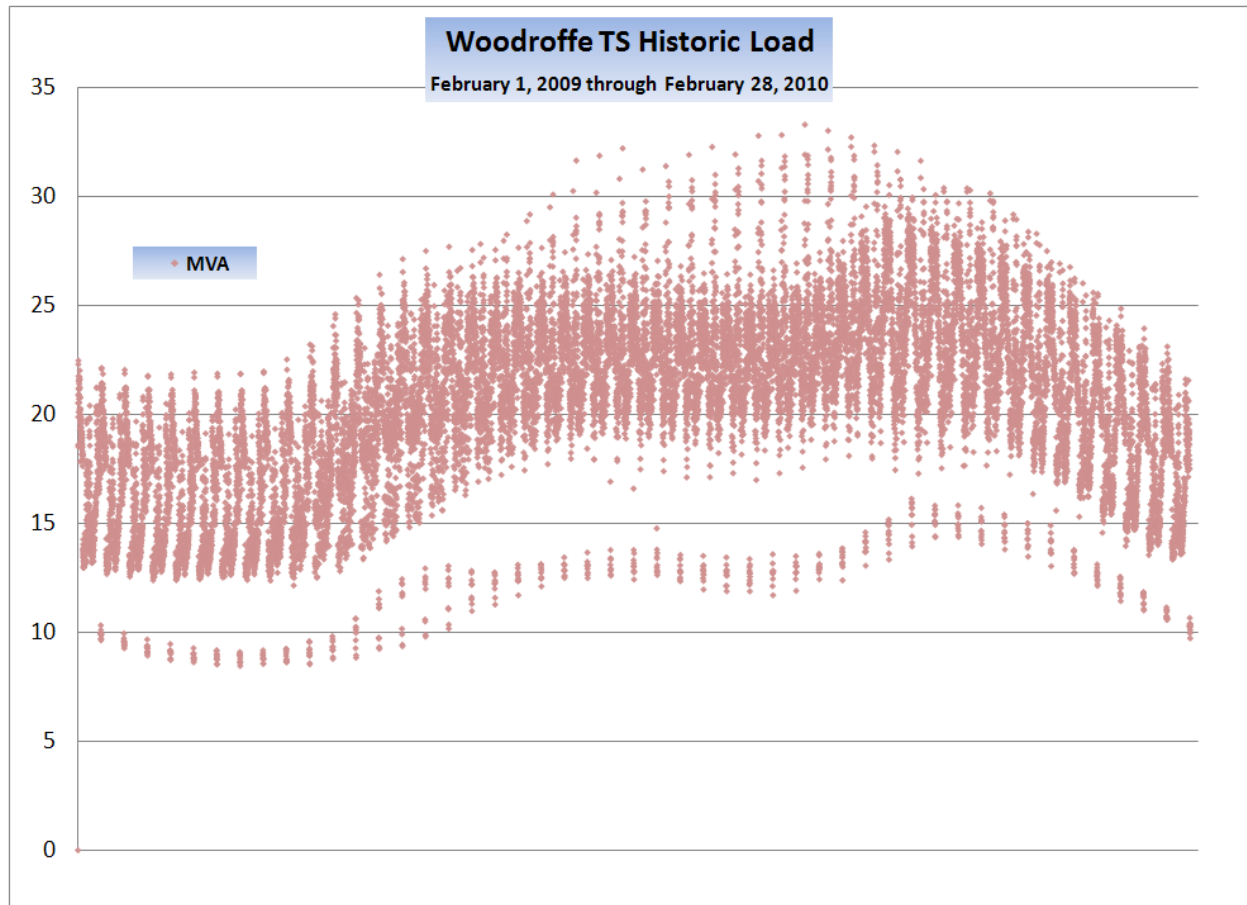


Figure 1 - Woodroffe TS Historic Load (T1, T2, T3 & T4)

The peak load at Woodroffe TS is projected to increase by 1% per year. The continuous ratings of either of the replacement transformers will be more than adequate to carry this projected peak load until well in the future.

4.4. Load Angle & Power Factor

Woodroffe TS is equipped with low voltage shunt capacitors, SC1 and SC5.6, providing reactive compensation totaling 43.2 MX at 14.4 kV. Woodroffe TS usually injects reactive power to the grid.

Revenue meter data from February 1, 2009 through February 28, 2010 was used to calculate the load angle at Woodroffe TS. Figure 2 illustrates the load angle at the LV side of Woodroffe TS during the daily on-peak hours (7 a.m. through 11 p.m.).

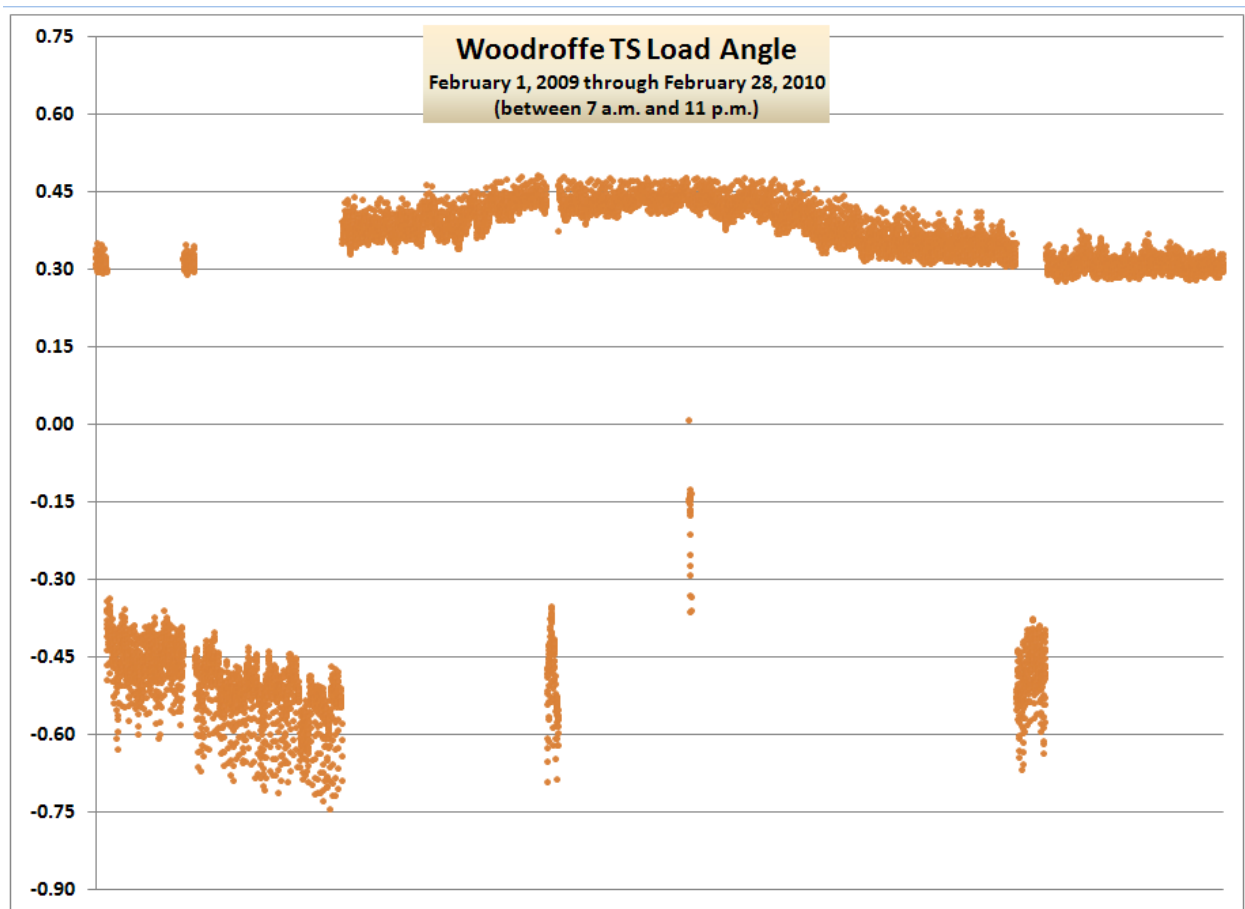


Figure 2 - Load Angle at Woodroffe TS

Between February 1, 2009 and February 28, 2010 the highest load angle of 0.4822 radians at Woodroffe TS occurred on June 27, 2009 at 2300. Neither SC1 nor SC5.6 were in service on June 27, 2009 at 2300 and as a result were not providing any reactive compensation. Since SC1 and SC 5.6 are capable of providing the required reactive compensation, no additional shunt capacitors are required; however, the deployment strategy of the existing shunts needs to be revisited, so that the power factor requirements are met.

4.5. CONCLUSIONS

This expedited System Impact Assessment concludes that the installation of new T3 and T4 transformers at Woodroffe TS is not expected to have a material adverse impact on the IESO-controlled grid.

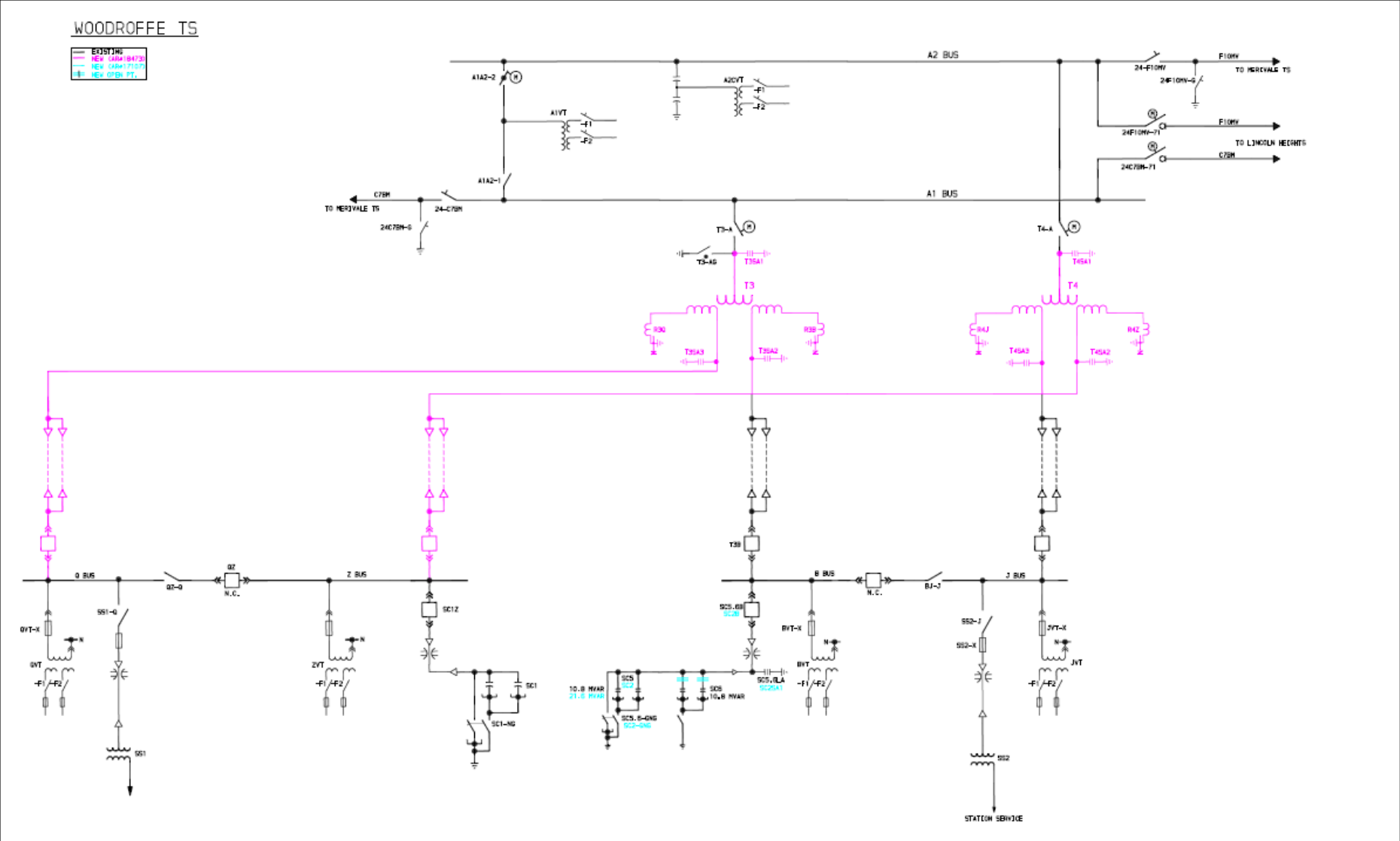


Figure 3 – Final configuration of Woodroffe TS