

September 25, 2009
Final Report
Expedited System Impact Assessment
Hydro One Networks Inc.

1 GENERAL DESCRIPTION & PROPOSED MODIFICATIONS

This addendum updates the System Impact Assessment (CAA ID 2007-260) originally issued on October 8, 2008 for the new transformer station Rodney TS. Please refer to the original System Impact Assessment report for the assessment details.

In the original assessment, Hydro One proposed to install two 25/33.3/41.7 MVA 230.5/27.6 kV two-winding transformers at the station with an in-service date of December 31, 2010.

Hydro One has since updated its specifications and will install two 75/100/125 MVA 215.5/27.6/27.6 kV three-winding transformers at the station with a new in-service date of December 31, 2011.

It should be noted that since the release of the original SIA, the station has undergone a name change from Rodney TS to Duart TS

	Original Specifications	New Specifications
In-Service Date	December 31, 2010	December 31, 2011
Rating (MVA)	25/33.3/41.7 MVA	75/100/125 MVA
Voltage (kV)	230/27.6 kV	215.5/27.6/27.6 kV
Impedance	7.12 % on 25 MVA and 27.6 kV base	11.5 % on 37.5 MVA and 28 kV base
Summer Continuous Rating (MVA)	42 MVA	125 MVA
10 day Summer LTR (MVA)	56 MVA	170 MVA
ULTC (HV side)	± 30 kV in 24 steps	± 40 kV in 32 steps

Figure 1 shows a diagram of the proposed modified connection arrangement. Initially when the station is to come in-service, two feeder breakers would be installed along with one feeder tie-switch. As load in the station grows, additional feeders, feeder breakers and feeder tie-switches will be installed. Up to ten additional feeder breakers and five additional feeder tie switches can be accommodated at Duart TS. The specifications provided for the transformer, bus tie and feeder breakers corresponding to this modified connection arrangement have not changed from what was previously provided for the original assessment.

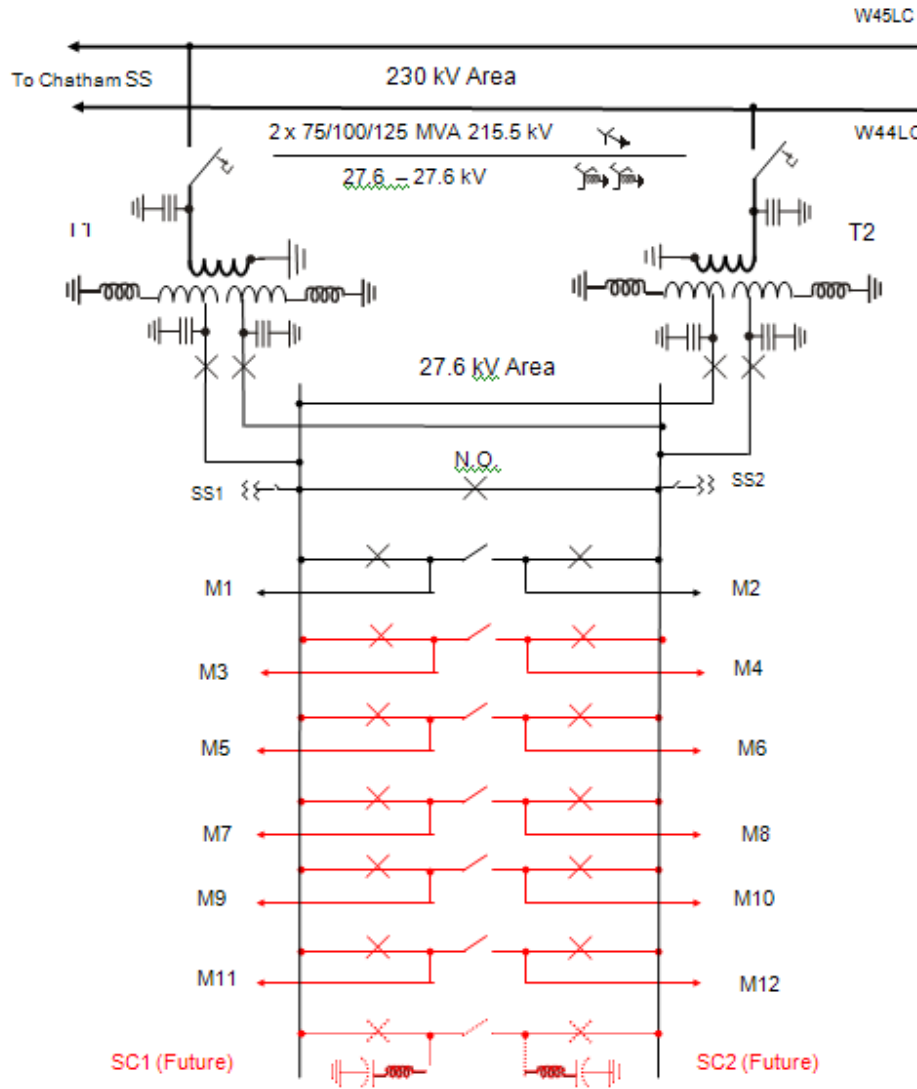


Figure 1: Modified Connection Arrangement

2 ASSESSMENT

2.1 Voltage Declines

In the original assessment, it was determined that the most impactful contingencies on the IESO controlled grid based on voltage declines were the loss of W44LC and the loss of L24L+L26L. The following table shows a comparison of the voltage declines (original specifications versus new specifications) obtained under 2014 conditions for each of these contingencies. In cases where multiple buses exist, the largest voltage decline is presented.

Loss of W44LC ¹								
Specifications	Duart TS 230 kV	Duart TS 27.6 kV	Buchanan 230 kV	Chatham 230 kV	Edgeware 230 kV	Edgeware 27.6 kV	Kent 230 kV	Kent 27.6 kV
Original	1.73%	3.78%*	1.18%	0.59%	2.51%	10.48%*	0.63%	0.59%*
New	1.72%	3.92%*	1.18%	0.59%	2.51%	10.48%*	0.64%	0.62%*

Notes: (1) The voltage declines presented represent the greater of pre-ULTC and post-ULTC conditions

(*) The voltage decline presented represents pre-ULTC conditions.

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Loss of L24L+L26L ¹								
Specifications	Duart TS 230 kV	Duart TS 27.6 kV	Buchanan 230 kV	Chatham 230 kV	Edgeware 230 kV	Edgeware 27.6 kV	Kent 230 kV	Kent 27.6 kV
Original	2.83%	2.71%*	1.76%	2.14%	1.80%	1.63%*	2.02%	1.95%*
New	2.84%	2.71%*	1.76%	2.16%	1.81%	1.63%*	2.03%	1.98%*

Notes: (1) The voltage declines presented represent the greater of pre-ULTC and post-ULTC conditions
 (*) The voltage decline presented represents pre-ULTC conditions.

As shown, the difference in voltage declines between the newly proposed transformers and the transformers studied in the original assessment are not significant. The excessive voltage decline at Edgeware 27.6 kV for the loss of W44LC was previously identified in the original SIA with the recommendation that measures be taken to address this issue. Post-contingency voltage declines on the IESO controlled grid still remain within criteria.

2.2 Power Factor Analysis

It was previously determined that the station would require about 4 Mvar of reactive compensation to ensure that the power factor at the defined metering point would be 0.9 when the design capacity would be reached.

The following table shows the new compensation that would be required under various load forecasts assuming a LV power factor of 0.9, as indicated by Hydro One. As shown, between 2011 and 2014, about 2 Mvar of reactive compensation would be required at the low voltage bus. When the design capacity of 170 MVA is reached, a total of 42 Mvar of LV reach compensation would be needed.

Duart TS	Load Forecasts		
	2011	2014	When Design Capacity is Reached *
P _{load} (MW)	30.60	31.53	153
Q _{load} with 0.9 pf (Mvar)	14.82	15.27	74.10
Q _{load} +Q _{transformer_loss} (Mvar)	16.4	17	116
Power factor at HV side	0.88	0.88	0.8
Compensation needed for 0.9 pf (Mvar)	2	2	42

Note: * Design capacity is assumed to be equal to the proposed 10 day LTR of 170 MVA.

3 CONCLUSIONS

The proposed transformer modifications and connection arrangement will not have a material adverse effect on the IESO-controlled grid.

4 REQUIREMENTS

- Up to 42 Mvar of reactive compensation is required to accommodate the reactive requirements to meet station design capacity. Hydro One is expected to work together with the LDC to formulate a plan, to be submitted to the IESO, for reactive load compensation at the station to ensure compliance with the Market Rules.
- 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 reassessment.

All other requirements specified in the original assessment SIA still remain valid.