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BY EMAIL, COURIER, RESS

February 10, 2020

Ms. Christine E. Long  
Board Secretary  
Ontario Energy Board  
Suite 2700, 2300 Yonge Street  
P.O. Box 2319  
Toronto, ON M4P 1E4

Dear Ms. Long,

**EB-2019-0165 – Hydro One Networks Inc. Leave to Construct Application - D6V/D7V  
Transmission Line Refurbishment Project – Final CIA**

Please see attached the final version of the Customer Impact Assessment for the above noted proceeding.

An electronic copy of this correspondence has been filed through the Ontario Energy Board's Regulatory Electronic Submission System.

Sincerely,

ORIGINAL SIGNED BY JOANNE RICHARDSON

Joanne Richardson



Hydro One Networks Inc.  
483 Bay Street  
Toronto, Ontario  
M5G 2P5

## **CUSTOMER IMPACT ASSESSMENT**

**2019-016**

### **D6V AND D7V TRANSMISSION LINE REFURBISHMENT**

CIA ID        2019-016  
Revision:    Final  
Date:        18 November 2019

Issued by:  
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### **Disclaimer**

This Customer Impact Assessment was prepared based on preliminary information available about the new proposed refurbishment of the 230kV double circuit transmission line D6V/D7V between Fergus Jct and Guelph North Jct. in Wellington County. It is intended to highlight significant impacts, if any, to affected transmission customers early in the project development process and thus allow an opportunity for these parties to bring forward any concerns that they may have, including those needed for the review of the connection and for any possible application for Leave to Construct. Subsequent changes to the required modifications or the implementation plan may affect the impacts of the proposed connection identified in this Customer Impact Assessment. The results of this Customer Impact Assessment and the estimate of the outage requirements are subject to change to accommodate the requirements of the IESO and other regulatory or municipal authority requirements. The fault levels computed as part of this Customer Impact Assessment are meant to assess current conditions in the study horizon and are not intended to be for the purposes of sizing equipment or making other project design decisions. Many other factors beyond the existing fault levels go into project design decisions.

Hydro One Networks Inc. shall not be liable, whether in contract, tort or any other theory of liability, to any person who uses the results of the Customer Impact Assessment under any circumstances whatsoever for any damages arising out of such use unless such liability is created under some other contractual obligation between Hydro One Networks Inc. and such person.

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## **CUSTOMER IMPACT ASSESSMENT**

### **D6V AND D7V TRANSMISSION LINE REFURBISHMENTS**

#### **1.0 INTRODUCTION**

##### **1.1 Purpose**

This Customer Impact Assessment (CIA) study assesses the potential impact of the proposed refurbishment of the double circuit 230kV line D6V/D7V between Fergus Jct and Guelph North Jct., on the transmission customers in the Wellington and Waterloo Counties.

This study is in accordance with section 6 of the Ontario Energy Board's (OEB) Transmission System Code ("TSC"), which requires Hydro One Networks Inc. (Hydro One) to carry out a CIA study to assess the impact of the proposed transmission line refurbishment on existing transmission customers in the affected area. This study is intended to supplement the System Impact Assessment (SIA) CAA ID 2019-EX1031 entitled "D6V and D7V Transmission Line Refurbishments", issued by the IESO. In their report, the IESO concluded that there is no adverse impact of this project on the transmission system.

##### **1.2 Background**

The 230 kV D6V/D7V double circuit line connects Orangeville TS to Detweiler TS. The line is 84 km long and is part of bulk power system supplying the Wellington and Waterloo Counties though Fergus TS, Scheifele MTS, Waterloo North MTS #3, Campbell TS and Cedar TS (see Figure 1). There is a continuing need for this line to supply the area loads.

The D6V/D7V line was built in 1950 and is currently 70 years old. The section of the line between Fergus Jct. and Guelph North Jct (about 9.5km) is strung with 795 kcmil ACSR conductor and has been identified as at end of life (see Map 1).

In accordance with the OEB direction for Hydro One to explore line loss mitigation opportunities it is planned to replace the 795 kcmil conductor with new 1443 Compact ACSR/TW conductor. The advantage of the larger size conductor is that it has a lower resistance and would result in reduced transmission line losses compared to the existing conductor.

##### **1.3 Connected Customers**

The focus of this study is impact on transmission stations and customers supplied from the D6V/D7V transmission line.

<b>Station</b>	<b>Customer</b>
Fergus TS	Hydro One Distribution
Scheifele MTS	Waterloo North Hydro
Waterloo North MTS 3	Waterloo North Hydro
Campbell TS	Alectra Utilities
Cedar TS	Alectra Utilities

### 2.0 STUDY RESULTS

Table 1 in Appendix A compares the characteristics of the line using new conductor with the existing conductor.

The conductor replacement results in reduced line resistance for the Fergus Jct to Guelph North Jct. section of the line. However, the new conductor has insignificant effect on the line impedance and therefore power flows, area station voltages and short circuits are not materially impacted by the change.

The existing and new fault levels after implementation of conductor replacement over 9.5kms of D6V/D78V lines are noted in Table 2, Appendix B for reference. All short circuits levels are within rating of Hydro One equipment.

Customers are requested to review these short circuit results and determine if these fault levels are within their equipment ratings and their station grounding system is adequate.

#### 2.1 Customer Reliability and Outage Impact Assessment

The replacement of the aging conductor will reduce the likelihood of conductor failure and thereby result in improved reliability to area customers. Outages will be required during the project's execution but will be managed to minimize any impact to customers.

#### 2.2 Operating Considerations

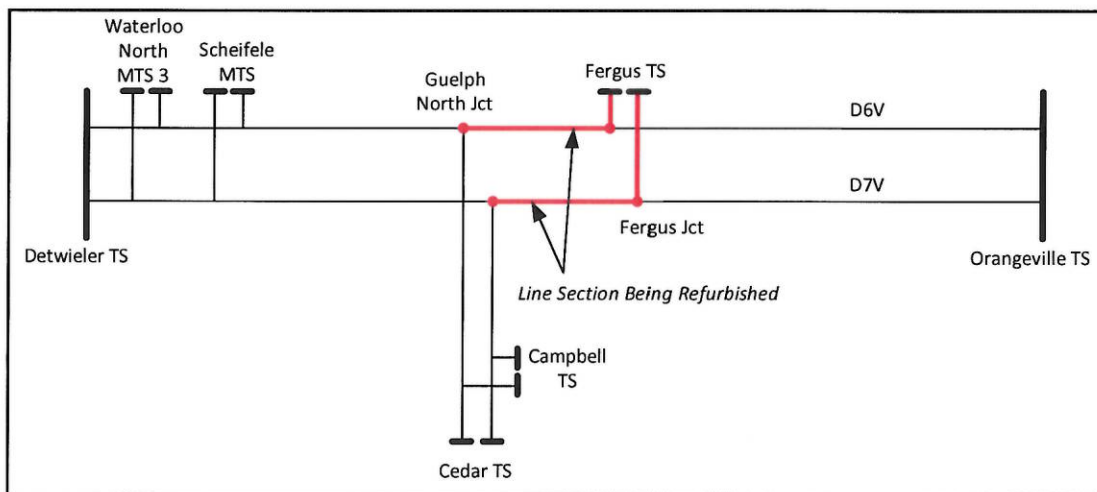
The D6V/D7V line refurbishment is not expected to result in any operational changes.

### 3.0 CONCLUSION

This report concludes that D6V/D7V line refurbishment will reduce the likelihood of conductor failure on an aging section of the line. The power flows, area station voltages and short circuit levels remain materially unchanged and there is no adverse impact on the area customers.

Customers are requested to review the fault levels provided in Appendix B to ensure that the capability of their equipment and grounding system is not exceeded.

## D6V AND D7V TRANSMISSION LINE REFURBISHMENT



**Figure 1.** D6V/D7V Connection Configuration and Line section being refurbished.



**Map 1.** D6V/D7V Transmission Line – Fergus TS to Guelph North TS Section to be refurbished.

## APPENDIX A

Table 1: D6V and D7V electrical characteristics

Circuit	From Bus	To Bus	Length (km)	Existing			New		
				R (pu/km)	X (pu/km)	B (pu/km)	R (pu/km)	X (pu/km)	B (pu/km)
D6V	Guelph North JCT	Fergus JCT	9.43	0.000166	0.001026	0.001615	0.000097	0.001009	0.001646
D7V	Guelph North JCT	Fergus JCT	9.43	0.000166	0.001026	0.001615	0.000097	0.001009	0.001646
D6V	Fergus JCT	Fergus TS	0.112	0.000102	0.000974	0.001689	0.000102	0.000974	0.001689
D7V	Fergus JCT	Fergus TS	0.08	0.000102	0.000974	0.001689	0.000102	0.000974	0.001689



## APPENDIX B

Table 2: Fault Levels

Area Station Buses	Base kV	Existing Fault Level (kA)			New Fault Level (kA)					
		3-phase			Line to Ground			3-phase		
		Sym	Asym		Sym	Asym		Sym	Asym	Line to Ground
Detweiler TS	220	24.6	26.9		23.8	27.7		24.6	26.9	23.8
Orangeville TS	220	19.8	21.6		17.7	20.1		19.8	21.7	17.7
Fergus TS (D6V)	220	13.0	14.0		9.8	10.3		13.0	14.1	9.8
Fergus TS (D7V)	220	13.1	14.1		9.9	10.4		13.1	14.2	9.9
Fergus TS (BY)	44	15.0	15.4		6.9	8.2		15.0	15.4	6.9
Scheifele TS (D6V)	220	16.9	18.1		14.1	14.9		16.9	18.1	14.1
Scheifele TS (D7V)	220	16.9	18.1		14.1	14.9		16.9	18.1	14.1
Scheifele TS (B)	13.8	8.9	9.4		8.9	10.1		8.9	9.4	8.9
Scheifele TS (Y)	13.8	8.8	9.3		8.8	10.1		8.8	9.3	8.8
Scheifele TS (HJ)	13.8	17.0	18.6		17.9	21.4		17.0	18.6	17.9
Scheifele TS (QT)	13.8	16.9	18.4		17.8	21.3		16.9	18.4	17.8
WN MTS #3 (D6V)	220	19.5	20.9		17.3	18.6		19.5	20.9	17.3
WN MTS #3 (D7V)	220	19.4	20.9		17.3	18.6		19.4	20.9	17.3
WN MTS #3 (LV)	27.6	13.3	14.3		10.4	12.4		13.3	14.3	10.4
Cedar TS (D6V)	220	9.3	10.1		8.2	9.2		9.3	10.1	8.2
Cedar TS D7V	220	9.5	10.3		8.4	9.4		9.5	10.4	8.4
Cedar TS (D)	115	16.5	18.0		16.2	18.3		16.5	18.1	16.2
Cedar TS (A)	115	15.2	16.6		15.0	17.1		15.2	16.7	15.0
Cedar TS (EZ)	13.8	16.4	16.9		7.4	8.5		16.4	16.9	7.4
Cedar TS (BY)	13.8	16.6	17.2		7.4	8.6		16.6	17.2	7.4
Cedar TS (JQ)	13.8	17.1	17.1		8.5	8.8		17.1	17.1	8.5
Campbell TS (D6V)	220	10.5	11.4		8.9	9.7		10.5	11.5	8.9
Campbell TS (D7V)	220	10.7	11.6		9.1	9.9		10.7	11.7	9.1
Campbell TS (JQ)	13.8	14.3	15.7		8.0	9.7		14.3	15.7	8.0
Campbell TS (BY)	13.8	15.9	17.2		9.9	11.6		15.9	17.3	9.9
Campbell TS (EZ)	13.8	18.2	18.6		8.7	10.3		18.2	18.7	8.7
Campbell TS (IDL)	13.8	17.3	17.7		8.5	10.1		17.3	17.7	8.5