

# IESO Expedited System Impact Assessment

## INSTALLATION OF LV BUS TIE REACTORS AT MARKHAM MTS#1, MTS#2, MTS#3 & MTS#3E

### 2013-EX692

### FINAL REPORT

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## Executive Summary

### Conditional Approval for Connection

PowerStream Inc. (the “connection applicant”) is proposing to install a 0.75  $\Omega$  reactor between the LV tie breaker and one of the LV buses at each of Markham MTS#1, Markham MTS#2, Markham MTS#3 and Markham MTS#3E.

This assessment concluded that the proposed changes are expected to have no material adverse impact on the reliability of the IESO-controlled grid. Therefore, the IESO recommends that a *Notification of Conditional Approval for Connection* be issued for the proposed project, subject to implementation of the requirements outlined in this report.

The connection applicant shall satisfy all applicable requirements and standards specified in the Market Rules and the Transmission System Code. The following requirements summarize some of the general requirements that are applicable to the proposed project.

### Requirements

1. The connection applicant must complete the IESO Facility Registration/Market Entry process for the project in a timely manner before the IESO final approval for connection is granted.
2. The voltage drops across the bus tie reactors during a contingency of the loss of a transformer breaker must be taken into account by the LDC.

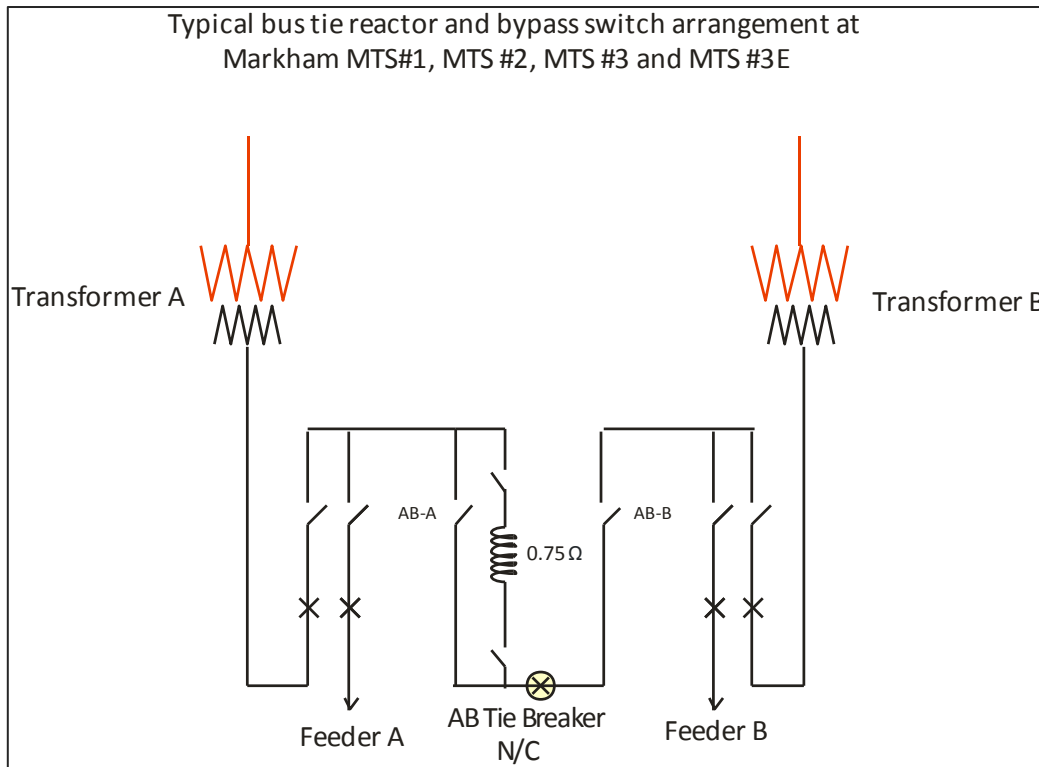
### 1.0 Project Description

The applicant is proposing to install 0.75 Ω reactors between the tie breaker and one of the buses to increase the short circuit capacity at the following municipal transformer stations:

- Markham MTS #1
- Markham MTS #2
- Markham MTS #3 &
- Markham MTS #3E

The planned in-service dates of new reactors will be communicated to the IESO.

A typical configuration for a station with 2 transformers is shown in Figure 1.



**Figure 1 – Typical Reactor Configuration for 2 Transformer Station**

The switches on either side of the reactors are manually operated. The existing disconnect switch (AB-A in this diagram) on the reactor side of the transformer will operate normally open and will by-pass the reactor in the event of a reactor failure.

The technical specifications for the new bus tie reactors are listed in the table below.

<b>New Reactor Specifications</b>	
<b>Markham MTS#1, Markham MTS#2, Markham MTS#3 and Markham MTS#3E</b>	
<b>Configuration</b>	3 single phase units
<b>Nominal Voltage (kV)</b>	27.6
<b>Reactance at 60 Hz</b>	0.75 Ω per phase
<b>Continuous Current Rating (A)</b>	2000 (min)

The specifications of any additional LV equipment (< 50 kV) needed for these reactors are not relevant to this assessment and therefore are not included in this report.

## **2.0 Assessments**

The Distribution System Code advises that fault levels are limited to a maximum of 17 kA. At the present time, PowerStream customers could experience fault levels in excess of 17 kA when FIT projects are connected.

The connection applicant provided the expected short circuit levels after the installation of the reactors.

### **2.1 Markham MTS #1**

The installation of a 0.75  $\Omega$  reactor between the B-Y bus tie breaker and the B bus will reduce the fault level to 16.15 kA (3  $\Phi$ ).

### **2.2 Markham MTS #2**

The installation of a 0.75  $\Omega$  reactor between the J-Q bus tie breaker and the J bus will reduce the fault level to 16.5 kA (3  $\Phi$ ).

### **2.3 Markham MTS #3 (T1 & T2 transformers)**

The installation of a 0.75  $\Omega$  reactor between the E-Z bus tie breaker and the Z bus will reduce the fault level to 15.1 kA (3  $\Phi$ ).

### **2.4 Markham MTS #3E (T3 & T4 transformers)**

The installation of a 0.75  $\Omega$  reactor between the J-Y bus tie breaker and the J bus will reduce the fault level to 15.1 kA (3  $\Phi$ ).

## **2.5 Conclusions**

This expedited System Impact Assessment concludes that the installation of these reactors is not expected to have a material adverse impact on the IESO-controlled grid.

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