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BY COURIER

January 21, 2016

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

Dear Ms. Walli:

**EB-2012-0082 – Hydro One Networks' Section 92 – Lambton to Longwood Transmission Upgrade Project– Hydro One's Post-Construction Report**

The Ontario Energy Board's Conditions of Approval, specifically Sections 3.1 and 3.2, require that Hydro One Networks Inc. provide reports to the Board on the construction impacts of this Project. In accordance with those conditions of approval please find attached Hydro One's Post Construction and Financial Monitoring Report and a log of all comments and complaints made relating to the construction of the Project.

An electronic copy of the complete report has been filed using the Board's Regulatory Electronic Submission System (RESS).

Yours truly,

ORIGINAL SIGNED BY JOANNE RICHARDSON

Joanne Richardson

Attach.

Post Construction Financial and Monitoring Report  
*Lambton to Longwood Transmission Upgrade Project*

Prepared for:  
Ontario Energy Board  
File No. EB-2012-0082

Prepared by:



Hydro One Networks Inc.  
Engineering and Construction Project  
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## 1.0 Introduction

Hydro One Networks Inc. filed an application with the Ontario Energy Board (the "Board"), dated March 28, 2012, under section 92 of the *Ontario Energy Board Act, 1998*, S.O. 1998, c.15, Schedule B. The Board assigned filed number EB-2012-0082. In the application, Hydro One applied for an order or orders of the Board granting leave to construct approval to upgrade 70km of transmission line facilities between Lambton TS and Longwood TS. Hydro One received Leave to Construct approval on November 8, 2012. These facilities were required to increase transfer capability and enable the connection of additional renewable generation to the transmission grid to contribute to meeting the Long Term Energy Plan's target of 10,700 MW of installed non-hydroelectric renewable capacity by 2018; and enhance the deliverability of system resources to enable the area's transmission system to transfer generation not consumed locally.

This upgrade, recommended by Ontario Power of Authority (now operating as the IESO) on June 30, 2011, was to mitigate concerns about the existing system overloading with the upcoming addition of renewable energy. The reconductoring of the existing circuits provided for more thermal capacity and achieved the required LTR (limited time rating) rank of at least 1700A per circuit, which enabled the incorporation of at least 300 MW of renewable generation

## 2.0 Scope of Work

The scope of work was to upgrade 230kV double-circuit lines (L24L/L26L) between Lambton TS and Longwood TS. This work required the reconductoring of approximately 70 km of the double circuit transmission line along with implementing tower reinforcements/refurbishment as well as any associated environmental studies. Further details on the work completed are provided below:

- Upgraded approximately 70 kilometers of existing 230 kV double-circuit transmission line between Lambton TS and Macksville Junction to achieve a summer long-term emergency rating of at least 1700A and less than 1900A per circuit by replacing existing conductor 1192.5 kcmil Aluminum Conductor Steel Reinforced ("ACSR") with high-temperature low-sag conductor. All existing insulators and associated conductor hardware were replaced;
- Ensured prudent measures were taken in the course of reconductoring work to reduce EMF at ground levels, which was achieved via circuit phasing optimization;
- Reviewed and updated easement documents and road authority occupation agreements to meet current and future requirements;
- Determined the environmental approvals and/or permits required for the proposed undertaking;
- Carried out line construction activities that included setting up construction yards, construction crew mobilization at sites, building access roads and stringing pads on the existing right-of-way (ROW), installing gates and fences, clearing trees and brush from the ROW, stringing new and removing old conductors, replacing all insulators and hardware associated with the new conductor, removal of access road and stringing pads, restoration of the lands, and demobilization of construction crews;
- Carried out protection work at Lambton TS and Longwood TS by modifying line protection settings due to line impedance changes.

### 3.0 Schedule Status

	Approved I/S Date	Actual I/S Date
Lambton to Longwood Transmission Upgrade	December 2014	September 2014

### 4.0 Schedule Variance

The Project went in-service on September 25, 2014, approximately 3 months ahead of schedule. This was primarily due to an early project start as materials, field resources and engineering details were available earlier than originally anticipated.

### 5.0 Cost Status Report

Table 1  
Total Project Costs

<b>Lambton to Longwood Transmission Upgrade</b>	<b>Estimated Costs (\$k)</b>	<b>Actual Costs (\$k)</b>	<b>Variance (\$k)</b>
Planning and Estimating	296	410	114
Project Management	1,139	687	(452)
Engineering	1,350	638	(712)
Procurement	15,595	8,073	(7,522)
Construction	10,660	9,421	(1,239)
Commissioning	14	10	(4)
Contingency	4,081	0	(4,081)
Cost Before Overhead and AFUDC	33,135	19,239	(13,896)
Overhead	4,139	3,071	(1,068)
AFUDC	2,724	894	(1,830)
Total Line work	\$39,998	23,204	\$16,794

### 6.0 Cost Change Analysis

The Project was completed for \$23.2M, approximately \$16.8M dollars less than budgeted. The Project was initially granted leave to construct approval based on an estimated cost of \$39.9M. The actual cost of the Project was \$23.2M.

**Cost variance** from \$39.9M to \$23.2M is primarily attributable to:

- Planning and Estimating

Part of the conceptual and basic engineering was done during the planning phase to order the conductor (Additional cost of \$0.1M)

- Project Management

Real estate costs were captured under Project Management; which were significantly reduced as a result of the change in construction method discussed in the access roads variance (Overall Saving of \$0.5M)

- Engineering

Hydro One used aluminum conductor steel supported (ACSS) conductor for the first time in a major project. There was no previous in-house experience with the design, material and equipment required for this type of conductor. After training from the vendor, work proceeded with minimal engineering issues and led to significant savings on engineering costs (Overall saving of \$0.4M)

The original budget included an estimate for third party approvals that did not materialize (Overall savings of \$0.3M)

- Material

Conductor - As noted, Hydro One used ACSS conductor for the first time in a major project. As a result historical information was not available to determine what material, equipment and tools would be required. (Overall saving of \$4.5M)

Access Roads – Hydro One eliminated the requirement for access roads for the majority of locations considered within the estimate by changing the construction method to climb the towers instead of using crane and heavy equipment. Additionally, Hydro One eliminated the cost of road removal material costs as this material was delivered to the municipality and private land owners eliminating the disposal fees. As a result originally anticipated road removal costs were significantly reduced. These activities resulted in overall savings for construction material and disposal fees. (Overall saving of \$3M)

- Construction

Reduced the civil scope of work to build and remove access roads by changing the construction method to climb the towers instead of using crane and heavy equipment as previously mentioned under material.

Originally within the estimate Hydro One considered compressive sleeves for splicing of conductor; however, by working with the ACSS manufacturer and local authorities to obtain required approvals, we were able to utilize implosive connectors, which significantly reduced the time and level of effort required when executing the cable splicing and terminations. (Overall saving of \$1.2M)

- Contingency

\$4 M (10%) Contingency budget was not required.

- Interest

The L26L Circuit going back in service in December of 2013 (3 months early) and lower than forecast OEB prescribed CWIP interest rates both contributed to lower AFUDC costs. (Overall saving of \$1.8M)

- Overhead

Overhead costs were lower due to lower project and interest costs therefore savings were realized (Overall savings of \$1.1M)

## 7.0 Environmental Monitoring and Complaints

The Project was deemed to have minimal environmental impact and was screened out under the Class Environmental Assessment for Minor Transmission Facilities in accordance with standard process. Two public information sessions were held in January 2012 in Glencoe and Brigden. The environmental services development plan was written and reviewed with the Project Manager and the Construction Foremen. It outlined environmental permits and approvals for the project and site specific requirements such as archaeological monitoring when crews were working in specific locations. The environmental services development plan was followed during the upgrading of the transmission lines and there was no evidence of long or short term effects of construction.

The Complaints Log is included in Appendix A.

	Signature	Name	Title	Date
<b>Submitted by:</b>	ORIGINAL SIGNED BY TINA KIANZAD	Tina Kianzad	Project Manager	Jan, 2016
<b>Approved by:</b>	ORIGINAL SIGNED SCOTT VICARY	Scott Vicary	Manager- Projects	Jan, 2016

**Appendix A  
EB-2012-0082**

**Hydro One - Lambton to Longwood Transmission Upgrade Project  
Complaint Log**

Complaint					Action Taken		
Number	From	Received	Type of Complaint	Complaint Details	By	Date of Action	Actions Taken
1	Ron Morris	27 May 2012	Tall Grass	The Right-of-way adjacent Mr. Ron Morris property has grass about 3 feet tall and multiple weeds along the ditch on the north boundary. Land Owner wanted to see it cut before it is out of hand.	Danny White	7 Jun 20102	The project to be carried out by Hydro One will be completed within the ownership of the Hydro One Lands (Bill 58 Lands, Infrastructure Ontario). The Grass complaint was out of the area covered by Project scope. Therefore the complaint was forwarded to and addressed by the Hydro One ground and sites Department.
2	Eldon form the Township Adelaide-Metcalf	8-May-2013	Road Damage	The City complained of road damage caused by the heavy vehicles use. As a result the City had to grade the road a number of times and add 8 loads of stone to keep the road safe for the general public to travel on.	Tina Kianzad	8 -May-13	Informed construction contractor's trucks to follow the route approved by the municipalities. Followed up several times in 2013 and 2014 with city for possible invoice for 8 trucks of stone and repaired road But City didn't want to send invoice and case was closed
3	Duncan McTavish	26-Jun-2013	Use of Approved truck Routes in the Municipality of Enniskillen	Complaint of traveling a semi with float trailer oversized loads east, on Shiloh Line from Oil Heritage Road. Red cab- float trailer license J44 56W.	Tina Kianzad	26 Jun 2013	Communicated with both civil and electrical crews, Truck wasn't related to any of Hydro one crews and crews were not working in that area on Jun 26th