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September 7, 2016

Board of Commissioners
of Public Utilities
P.O. Box 21040
St. John's, NL A1A 5B2

**Attention: Cheryl Blundon – Director of Corporate Services
and Board Secretary**

Dear Ms. Blundon:

Re: Newfoundland and Labrador Hydro – 2017 Capital Budget Application – Revision

Due to a slight calculation error, several incorrect numbers were identified in the 2017 - 2021 Capital Plan, Appendix A. Please find enclosed the revised pages: A2 - Rev 1; A3 - Rev 1; A4 - Rev 1; A5 - Rev 1; and A7 - Rev 1.

Hydro trusts that you will find the enclosed to be in order and satisfactory. Should you have any questions or comments about any of the enclosed, please contact the undersigned.

Yours truly,

NEWFOUNDLAND AND LABRADOR HYDRO



Geoffrey P. Young
General Counsel, Newfoundland and Labrador Hydro

GPY/cp

cc: Gerard Hayes – Newfoundland Power
Paul Coxworthy – Stewart McKelvey Stirling Scales
Dean Porter – Poole Althouse
Sheryl Nisenbaum – Praxair Canada Inc.

Thomas Johnson, Q.C. – Consumer Advocate
Thomas J. O'Reilly, Q.C. – Cox & Palmer
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A Report to the
Board of Commissioners of Public Utilities

2017 - 2021 Capital Plan



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1 INTRODUCTION

Newfoundland and Labrador Hydro (Hydro) has a responsibility to provide safe, reliable, and least-cost service to meet the needs of its customers. Providing a reliable supply of electrical energy depends on maintaining assets in sound condition. Utility assets are kept in reliable working condition by routine maintenance and replacement as necessary. Asset additions are also determined through analysis of long term requirements to address future demands for power and energy.

In Order No. P.U. 30(2007), Hydro was directed to file a five-year capital expenditure plan. The Board of Commissioners of Public Utilities (the Board) indicated the plan should focus on strategic spending priorities beginning with the current year of the Capital Budget Application. As well, the capital expenditure plan should identify shifts in spending priorities over the five-year period, the circumstances contributing to these shifts, and alternative approaches under consideration. Additionally, the Board requested a separate section concerning the Holyrood Thermal Generating Station (Holyrood), which at the time had an uncertain future due to alternative developments under consideration. With the sanction of the Muskrat Falls Project in December 2012, the future of the Holyrood plant has been established. The Holyrood section of this plan addresses Hydro's forecasted maintenance and capital requirements for the plant for the next five years.

Hydro maintains an asset base of \$1.6 billion. Some assets have reached or exceeded their expected service lives and many others are approaching that juncture. Other major assets have not reached their expected service lives but some of their components, auxiliary equipment and systems have, or are about to do so. This includes components of major facilities such as the Bay d'Espoir Generating Station, the Holyrood Thermal Generating Station, the Hardwoods and Stephenville gas turbines and much of Hydro's transmission and distribution systems. Hydro uses an asset management framework to manage these assets.

Hydro has a five year capital plan which contains detail on costs and timing of asset replacement and refurbishment. The five-year plan is a living document and is revised on an ongoing basis as new information about the condition of assets becomes available, as asset management strategies evolve, and as demands and priorities change within asset classes.

The five-year plan supports Hydro's responsibility to maintain its infrastructure providing safe, reliable and least cost electricity for home and business use.

2 FIVE-YEAR PLAN

Hydro plans to invest \$0.97 billion in plant and equipment over the 2017 to 2021 period for an average annual capital expenditure of \$194 million. Individual year expenditures will range from a low of \$129 million in 2021 to a high of \$271 million in 2017. Over the period 2012 to 2015, the average annual capital expenditure was \$123.0 million. The growth in overall capital expenditure reflects the requirement for projects related to replacement and upgrade of deteriorating facilities, ensuring compliance with legislation, additions required to meet load growth, and inflation.

Expenditures for new transmission assets are included in these estimates, specifically for the upgrade of the transmission line corridor between Bay d’Espoir and Western Avalon (TL267) and the transmission line between Soldiers Pond and Hardwoods (TL266), as well as expenditures in terminal stations, including replacing, in an expedited fashion, aging circuit breakers. As well, the Terminal Station Refurbishment and Modernization program groups as many as 15 smaller, separate projects into one program.

3 STRATEGIC SPENDING PRIORITIES

Hydro's strategic spending priorities over the next five years address the following areas:

1. Mandatory Issues:
 - Ensuring the safety of Hydro personnel, its contractors, and the general public;
 - Compliance with legislative and regulatory requirements; and
 - Managing environmental risks.
2. Meeting projected load growth and customer requests;
3. Applying a consistent asset maintenance philosophy to ensure system reliability and maintain acceptable asset performance as identified by:
 - Operating experience;
 - Maintenance history;
 - Condition assessments; and
 - Performance evaluation and monitoring.
4. Achieving cost efficiencies.

Hydro's detailed five year capital investment plan is presented in Appendix A. Over this period, the level of capital expenditure is primarily driven by:

- Growth in system demand; and
- Age and condition of current infrastructure and assets.

4 GENERATION

The requirement to invest sustaining capital in generation facilities increased several years ago as parts of Hydro's generating plants approached or surpassed their normal expected service lives. Primary drivers for these projects are the realization of end of service lives for equipment with resulting deterioration causing reductions in reliability or performance, the availability of more efficient technology, and considerations for safety.

4.1 Hydraulic

The condition of key components of Hydro's hydraulic facilities, including auxiliary systems and equipment as well as the control structures, have deteriorated and some have reached the end of their service lives. Capital investment is required in these areas to ensure the safe reliable operation of the system. The 2017 Capital Plan includes projects to refurbish critical control structures, overhaul turbine/generators in Bay d'Espoir and Cat Arm, and to replace slip rings and exciter controls on units 1 to 6 at Bay d'Espoir. Other projects proposed for the 2017 budget include the refurbishment powerhouse station service and to install an asset health monitoring system in Upper Salmon.

4.2 Thermal

On December 17, 2012, the Government of Newfoundland and Labrador announced official sanction of the Muskrat Falls Project. Holyrood will be required for prime power production until the Labrador Island Link (LIL) is in service, and it is intended that the facility will remain fully available for generation in stand-by mode until the post Winter 2021 timeframe. Unit 3 will operate in synchronous condenser mode during this stand-by production phase, with the option to return to full generating mode if required. Post Winter 2021, Units 1 and 2 and the steam components of Unit 3 at Holyrood will be decommissioned, and Unit 3 will continue to operate in synchronous condenser mode, with no generation capability.

Holyrood Units 1 and 2 are 46 years old, while Unit 3 is 37 years old. The generally accepted life expectancy for thermal plants is 30 years. Holyrood remains critical to the reliable power supply on the Island Interconnected System. The capital upgrades contained in this plan are necessary to replace or refurbish assets which are approaching the end of their useful service lives.

Also see the Holyrood Overview section for further discussion pertaining to the five year plan for Holyrood, and Appendix J - Plan of Projected Operating Maintenance Expenditures 2017 – 2026 For Holyrood Generating Station.

4.3 Gas Turbines

Maintaining the reliability of Hydro's gas turbine assets, which are relied upon to provide emergency and peaking power, and (with the exception of the Holyrood combustion turbine) to function as synchronous condensers to help control voltage on the Island and Labrador Interconnected Systems, is a priority. These facilities accumulate fewer operating hours than other sources generating electricity but are crucial sources of power and energy during emergencies and system peaks and provide voltage support, especially when operating as synchronous condensers.

The 50 MW plants at Hardwoods and Stephenville have required relatively little capital expenditure until recent years. Despite their lower operating hours, these units are beyond their normal life expectancy and are deteriorating, requiring an increase in capital expenditures to extend their reliable economic service lives. Multiyear life extension projects for the Hardwoods plant began in 2010. Similar projects for Stephenville began in 2014.

The new 123.5 MW combustion turbine at Holyrood is available for service and is part of Hydro's fleet. A Turbine Hot Gas Inspection is in the capital plan for this unit in 2018.

Hydro's gas turbine plant located at Happy Valley was constructed in 1992. This plant has required only minor upgrades since that time. No new projects are budgeted for 2017.

Future additional refurbishments will be required at Hardwoods, Stephenville and Happy Valley. Of note, a control system upgrade is planned in Hardwoods and Stephenville starting in 2019, and an engine overhaul will be required at Happy Valley in 2019.

5 TRANSMISSION AND RURAL OPERATIONS

The total investment of capital in transmission and rural operations facilities is seeing an increase for several coming years, primarily due to requirements for new transmission facilities. Other categories of assets are being replaced or refurbished due to condition, and a number of components in various facilities have reached or surpassed their normally expected service lives. Projects in the Transmission and Rural Operations category are to address assets that are at, or near the end of, their service lives, to improve reliability or performance, to improve safety, or to implement more efficient technology.

5.1 Terminal Stations

Increasing load and maintaining reliability are the principal drivers for terminal station expenditures over the next five years. Aging equipment is considered when reviewing short and long term plans. The five-year plan contains expenditures, such as programs to upgrade power transformers, install on-line transformer gas monitoring units, replace circuit breakers, and replace disconnect switches. The plan also contains station-specific projects such as performing site work at various terminal stations to accommodate the mobile substation, and installing fire protection. For 2017, Hydro has consolidated 15 individual terminal station projects into the Terminal Station Refurbishment and Modernization Program, and plans on continuing with this philosophy going forward.

Hydro continues its plan to accelerate air blast circuit breaker replacements and has included the requirements for the 2016 - 2020 accelerated work within its 2017 Capital Budget Application. As part of its Terminal Station Refurbishment and Modernization Project Hydro continues to install breaker failure protection, upgrade fault recorders, upgrade data alarm systems, and upgrade protection and control.

5.2 Transmission

Transmission investment in the five year plan reflects customer growth and reliability requirements. The major project to upgrade the transmission line corridor between Bay d’Espoir and Western Avalon (TL267) is underway to facilitate additional power and energy delivery to the system and meet transmission planning criteria. Hydro received approval for TL267 in Order No. P. U. 53(2014). As part of that approval, Hydro is required to file, with each capital budget application filed until the completion of the project, a report on the construction of TL267 addressing the work progress, the expenditure and budget status, and an explanation for any deviations from the project scope and budget. This report is presented in Appendix B.

Another key investment in the transmission system in the five year plan is the upgrading of the transmission corridor from Soldier’s Pond to Hardwoods (TL266). This project is required to ensure the reliable supply of electricity to the St. John’s area once power is coming to the Island from the Muskrat Falls Project, and the supply from Holyrood diminishes. TL266 is currently in the design phase.

Reliability improvements are also a driver for transmission investment. The wood pole line management program forms the backbone of Hydro’s asset management strategy for these facilities. This strategy has been in place for eleven years and its effectiveness and value have been tested and demonstrated, enabling Hydro to realize the maximum useful life from these transmission systems. The program is based on periodic assessment of the wooden transmission poles and facilitates their replacement before failure, while extracting the maximum possible reliable life from each pole. Hydro is also continuing to replace insulators and associated hardware on transmission lines, reducing the risk of service interruptions for customers due to insulator failure.

5.3 Distribution

New customer additions and maintaining reliability are the strategic areas addressed by the five-year capital plan for distribution assets. Deteriorated portions of distribution assets must be replaced to ensure reliable service. The majority of the distribution system expenditures for the next five years will consist of service extensions and upgrades to distribution systems, distribution pole replacement, and substation upgrading. A significant project for the next five years is the replacement of the submarine cables between Farewell Head, Change Islands and Fogo.

5.4 Rural Generation

The replacement of aging infrastructure is required to ensure reliability for Hydro's 21 isolated electrical systems which are supplied with electricity by diesel generating sets. Hydro's diesel generating sets have the shortest lives of all its generating assets, requiring replacement after approximately 100,000 hours of operation. Chart 1 provides the age distribution of the diesel engines in Hydro's rural generating plants. During the next five years Hydro plans to replace or add generating sets in various isolated diesel plants. These replacements and additions are required to ensure that reliable service is provided to Hydro's isolated rural customers. Many of Hydro's diesel plants will require refurbishment or replacement in the near to medium term. To prioritize this process, Hydro is continuing with its prioritized process to assist in planning the replacement or modification in a logical sequence. Projects for the replacement and upgrade of diesel plant infrastructure and auxiliary systems are included over the coming five years.

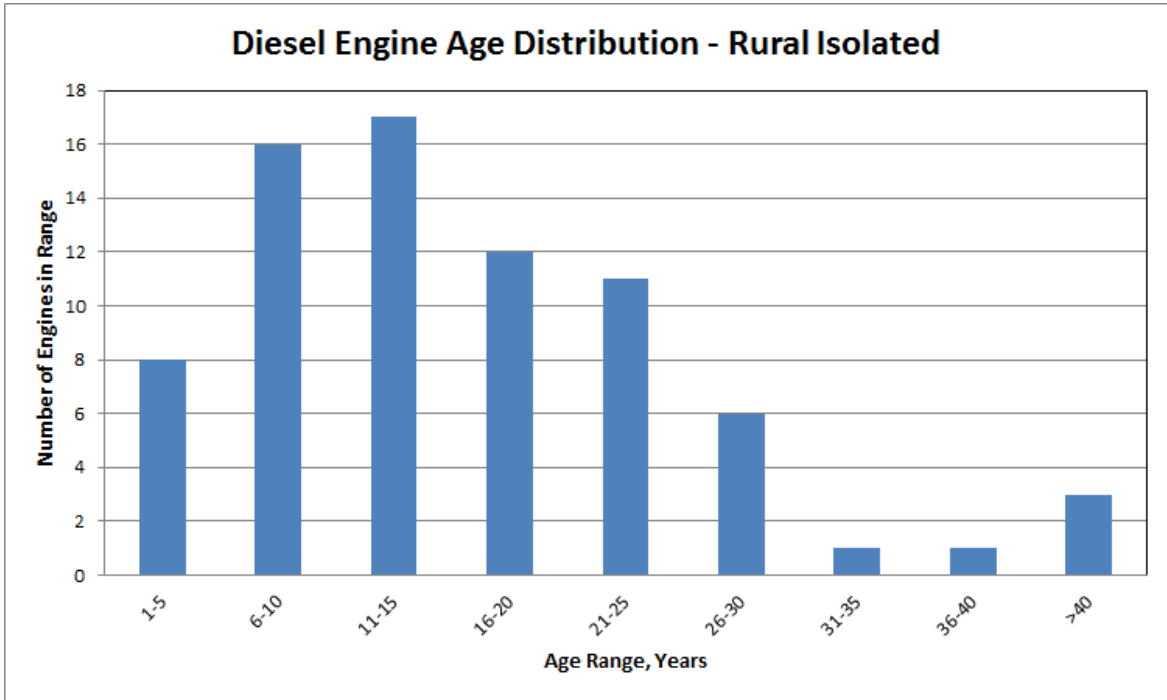


Chart 1: Diesel Engine Age Distribution – Rural Isolated System

6 GENERAL PROPERTY

Hydro's category of general properties is a broad ranging group of assets, and includes assets such as vehicles, facilities of all size, and information systems infrastructure. Similar to other categories, the assets in general properties requires replacement or refurbishment due to deterioration, age, obsolescence, and at times, due to growth constraints.

6.1 Information Systems

Obsolete technology and aging hardware are the strategic drivers which most significantly contribute to the five-year plan for information systems. Hydro's information systems provide the data required to effectively manage and control the activities of the business. Projects in this category include personal computer and software replacements, and this type of replacement is expected to continue over the next five years.

6.2 Telecontrol

Obsolete technology and aging hardware are also the strategic reasons which most significantly contribute to the five-year plan for Telecontrol assets. Hydro's communications network is vital to the operation and control of the power systems. Communications must be reliable and rapid to protect and control the generation, transmission and distribution equipment. The five-year plan contains expenditures in the form of several programs to replace battery banks and chargers, replace air conditioners, refurbish microwave sites, and replace obsolete radio equipment. The plan also includes site-specific projects to replace obsolete teleprotection equipment, upgrade telecontrol facilities, and replace UPS units.

6.3 Transportation

Hydro's vehicles and mobile equipment must continue to be both safe and reliable. Hydro operates a diversified and dispersed fleet of mobile equipment throughout the Province that is required to operate and maintain our facilities in a challenging and sometimes harsh physical environment. Hydro selects, operates and maintains this equipment in a manner designed to achieve the least life cycle cost and replacements are scheduled in accordance with criteria submitted to the Board on previous occasions.

6.4 Administration

Safety, cost efficiencies, reliability and security are the primary drivers of the five-year administration capital plan. Hydro expects to spend an average of over \$1 million annually on items such as office equipment, building auxiliary systems, and building infrastructure, during the next five years.

APPENDIX A
Five-Year Capital Plan

	Expended to 2016	2017	2018	2019 (\$000)	2020	2021	Total
GENERATION	4,690.8	25,556.1	38,718.3	34,000.9	48,554.9	18,685.6	170,206.6
TRANSMISSION AND RURAL OPERATIONS	112,154.0	235,587.4	163,850.3	146,322.3	110,559.9	96,238.3	864,712.2
GENERAL PROPERTIES	2,944.3	9,292.9	8,192.2	9,767.5	7,708.6	13,102.1	51,007.6
ALLOWANCE FOR UNFORESEEN ITEMS		1,000.0	1,000.0	1,000.0	1,000.0	1,000.0	5,000.0
TOTAL CAPITAL BUDGET	<u>119,789.1</u>	<u>271,436.4</u>	<u>211,760.8</u>	<u>191,090.7</u>	<u>167,823.4</u>	<u>129,026.0</u>	<u>1,090,926.4</u>

	Expended to 2016	2017	2018	2019	2020	2021	Total
				(\$000)			
<u>GENERATION</u>							
Hydraulic Plant	1,967.0	13,285.6	20,566.9	13,831.6	30,712.7	9,928.7	90,292.5
Thermal Plant	2,723.8	10,166.2	8,636.7	11,190.3	14,152.1	2,334.8	49,203.9
Gas Turbines		1,974.8	9,263.0	8,879.7	3,650.0	6,381.0	30,148.5
Tools and Equipment		129.5	251.7	99.3	40.1	41.1	561.7
TOTAL GENERATION	4,690.8	25,556.1	38,718.3	34,000.9	48,554.9	18,685.6	170,206.6
<u>TRANSMISSION AND RURAL OPERATIONS</u>							
Terminal Stations	12,235.1	29,434.8	46,500.6	44,417.7	53,289.8	31,148.5	217,026.5
Transmission	93,011.5	173,193.3	79,093.1	65,159.4	3,517.1	9,154.9	423,129.3
Distribution	285.6	14,890.5	14,366.6	13,205.0	27,924.0	34,149.7	104,821.4
Generation	6,172.8	11,780.8	13,454.3	12,513.4	18,082.3	14,248.2	76,251.8
Properties	15.2	4,453.2	6,944.8	7,741.7	5,062.8	4,992.2	29,209.9
Metering	433.8	1,007.7	2,170.2	1,266.7	1,239.6	198.8	6,316.8
Tools and Equipment		827.1	1,320.7	2,018.4	1,444.3	2,346.0	7,956.5
TOTAL TRANSMISSION AND RURAL OPERATIONS	112,154.0	235,587.4	163,850.3	146,322.3	110,559.9	96,238.3	864,712.2
<u>GENERAL PROPERTIES</u>							
Information Systems	366.6	1,339.6	1,616.7	876.2	590.2	963.0	5,752.3
Telecontrol	717.3	3,809.9	2,798.2	4,896.7	4,002.1	9,026.7	25,250.9
Transportation	1,825.8	2,708.3	1,981.6	2,833.3	2,662.0	2,271.2	14,282.2
Administrative	34.6	1,435.1	1,795.7	1,161.3	454.3	841.2	5,722.2
TOTAL GENERAL PROPERTIES	2,944.3	9,292.9	8,192.2	9,767.5	7,708.6	13,102.1	51,007.6
ALLOWANCE FOR UNFORESEEN ITEMS		1,000.0	1,000.0	1,000.0	1,000.0	1,000.0	5,000.0
TOTAL CAPITAL BUDGET	119,789.1	271,436.4	211,760.8	191,090.7	167,823.4	129,026.0	1,090,926.4

PROJECT DESCRIPTION	Expended	2017	2018	2019	2020	2021	Total
	to 2016						
				(\$000)			
THERMAL PLANT							
Upgrade Powerhouse Building Envelope - Holyrood	2723.8	2,969.9	784.1				6,477.8
Condition Assessment and Miscellaneous Upgrades- Holyrood		2,437.3	2,267.4	1,858.8			6,563.5
Overhaul Turbine Valves Unit 2 - Holyrood		2,302.1					2,302.1
Upgrade Underground Plant Drainage System - Holyrood		923.1					923.1
Overhaul Pumps - Holyrood		633.0					633.0
Upgrade Holyrood Access Road - Holyrood		579.3	583.4				1,162.7
Purchase Capital Spares - Holyrood		321.5	250.0	250.0	250.0	250.0	1,321.5
Overhaul Unit 1 Turbine Valve - Holyrood			2,485.7				2,485.7
Install Plant Heating System - Holyrood			1,488.8	3,478.7			4,967.5
Overhaul Unit 2 Boiler Feed Pump East - Holyrood			301.8				301.8
Upgrade Fire Systems - Holyrood			180.9				180.9
Install New Raw Water Line - Holyrood			163.5	1,156.0			1,319.5
Upgrade Cranes and Hoists - Holyrood			81.0	282.8			363.8
Overhaul Unit 2 Vacuum Pump South - Holyrood			50.1				50.1
Replace Stage II Electrical Distribution Equipment - Holyrood				2,446.2	2,208.6		4,654.8
Rewind Unit 3 Stator - Holyrood				1,359.6	5,789.0		7,148.6
Replace Unit 3 258VDC Battery Charger and Batteries - Holyrood				358.2			358.2
Overhaul Unit 3 Turbine Valve - Holyrood					2,756.2		2,756.2
Replace Stage 1 4160V AC Breakers - Holyrood					1,030.0		1,030.0
Upgrade Boiler Stop Values Units 1 and 2 - Holyrood					707.6	207.9	915.5
Overhaul Unit 3 Boiler Feed Pump West - Holyrood					335.0		335.0
Upgrade Cooling Water System Wet Well Stop Log Unit 3 - Holyrood					300.0		300.0
Upgrade UPS 3 and 4 - Holyrood					266.7		266.7
Install New Lube Oil / Seal Oil Systems Unit 3 - Holyrood					255.0	765.9	1,020.9
Upgrade UPS 1 and 2 - Holyrood					254.0		254.0
Replace Instrument Air Receiver System Unit 3 - Holyrood						753.0	753.0
Replace Service Air Receivers Unit 3 - Holyrood						308.0	308.0
Upgrade Property Fencing - Holyrood						50.0	50.0
TOTAL THERMAL PLANT	2,723.8	10,166.2	8,636.7	11,190.3	14,152.1	2,334.8	49,203.9

PROJECT DESCRIPTION	Expended	2017	2018	2019	2020	2021	Total
	to 2016						
				(\$000)			
<u>GAS TURBINES</u>							
Replace Fuel Piping - Hardwoods and Stephenville		267.0					267.0
Gas Turbine Life Extension - Stephenville		847.5	505.7				1,353.2
Gas Turbine Life Extension - Hardwoods		675.3	281.4				956.7
Purchase Capital Spares - Gas Turbines		185.0	300.0	300.0	300.0	300.0	1,385.0
Perform Turbine Hot Gas Inspection - Holyrood			5,844.8	4,288.5			10,133.3
Upgrade Electrical Systems - Hardwoods			952.6	1,408.4			2,361.0
Upgrade Air Intake and Exhaust Stack - Stephenville and Hardwoods			829.2				829.2
Replace Compressors - Hardwoods			246.8				246.8
Replace Demister - Hardwoods and Stephenville			197.2	301.0			498.2
Inspect/Align PT Bearing - Hardwoods			105.3				105.3
Overhaul Engine - Happy Valley				1,564.1			1,564.1
Upgrade Control System - Hardwoods and Stephenville				326.9	100.0	1,531.0	1,957.9
Purchase Spare Parts & Heated Lube Oil Storage - Hardwoods and Stephenville				308.0			308.0
Refurbish Bus Duct - Hardwoods and Stephenville				270.5	150.0		420.5
Replace 15kV Cable to 750 kVA Transformer - Hardwoods				112.3			112.3
Perform Combustor Inspection - Holyrood					2,500.0	2,500.0	5,000.0
Install Infrared Scanning Ports - Happy Valley and Stephenville					250.0	250.0	500.0
Inspect Power Turbine Clutch A and B - Various Sites					300.0	100.0	400.0
Replace Fuel Unloading Pumps - Hardwoods and Stephenville					50.0	50.0	100.0
Overhaul Gas Turbine End A - Hardwoods						1,100.0	1,100.0
Replace Snow Doors - Happy Valley						350.0	350.0
Replace Lube Oil and Glycol Pumps - Happy Valley						100.0	100.0
Inspect PT - Happy Valley						50.0	50.0
Replace Voltage Regulator - Happy Valley						50.0	50.0
TOTAL GAS TURBINES	0.0	1,974.8	9,263.0	8,879.7	3,650.0	6,381.0	30,148.5
<u>TOOLS AND EQUIPMENT</u>							
Purchase Tools and Equipment Less than \$50,000		129.5	251.7	99.3	40.1	41.1	561.7
TOTAL TOOLS AND EQUIPMENT		129.5	251.7	99.3	40.1	41.1	561.7
TOTAL GENERATION	4,690.8	25,556.1	38,718.3	34,000.9	48,554.9	18,685.6	170,206.6

PROJECT DESCRIPTION	Expended						Total
	to 2016	2017	2018	2019	2020	2021	
				(\$'000)			
TERMINAL STATIONS							
Upgrade Circuit Breakers - Various Sites (2016-2020)	6,969.1	10,808.7	15,408.6	15,247.3	13,026.8		61,460.5
Upgrade Circuit Breakers - Various Sites						5,200.0	5,200.0
Replace Instrument Transformers - Various Sites	3,196.1	471.9					3,668.0
Replace Protective Relays - Various Sites	700.6	1,156.4					1,857.0
Replace Disconnect Switches - Various Sites (2016-2017)	646.9	1,320.9					1,967.8
Install Fire Protection in 230 kV Stations - Bay d'Espoir	200.0	566.0					766.0
Upgrade Digital Fault Recorders - Various Sites	197.9	304.6					502.5
Replace Surge Arrestors - Various Sites	144.4	53.0					197.4
Upgrade Data Alarm Systems - Stony Brook	74.4	234.1					308.5
Install Breaker Failure Protection - Various Sites	65.7	211.3					277.0
Upgrade Terminal Station for Mobile Substation - Cow Head	40.0	444.7				194.6	679.3
Upgrade Terminal Station for Mobile Substation - Various Sites			1,017.7				1,017.7
Terminal Station Refurbishment and Modernization - Various Sites		10,831.3	21,697.2	21,534.5	22,669.1	12,523.1	89,255.2
In Service Failures - Various Sites		1,000.0	1,000.0	1,000.0	1,000.0	1,000.0	5,000.0
Purchase Capital Spares - Terminals		495.8	500.0	500.0	500.0	500.0	2,495.8
Replace Substation - Holyrood		439.4	758.6				1,198.0
Upgrade Aluminum Support Structures - Holyrood		352.9	342.7				695.6
Replace Power Transformers - Oxen Pond		297.5	850.1				1,147.6
Upgrade Corner Brook Frequency Converter - Corner Brook		194.6	2,749.2				2,943.8
Purchase Backup Diesel for Station Service - Grand Falls and Buchans		188.9					188.9
Replace 66 kV Station Service Feed - Holyrood		62.8	1,198.6				1,261.4
Install Remote Control Sectionalizer TL251, TL252 and TL253 - Hampden			395.5	1,525.5			1,921.0
Perform Condition Assessment of Substation - Wabush			191.1				191.1
Upgrade Reclosing for Circuit Breakers - Various Sites			168.6	233.2	100.0	300.0	801.8
Install Firewall Between Transformer and GT - Stephenville			139.5	617.0			756.5
Install 66 kV Breaker By-Pass Switches - Various Sites			83.2	1,440.9	802.2	500.0	2,826.3
Upgrade Substation - Wabush				1,000.8	7,242.3	6,816.3	15,059.4
Purchase New Mobile Substation - Bishop's Falls				809.4	3,714.1		4,523.5
Install Alternate Station Service - Grand Falls				351.8			351.8
Install Fire Barriers Between T10 and T12 and Between T10 and T11 - Bay d'Espoir				157.3	1,175.1		1,332.4
Install Data Acquisition and Trending - Corner Brook					500.0	200.0	700.0
Install Telephone System - Bottom Waters					500.0		500.0
Upgrade Control Building for Staff Working Spaces - South Brook and Doyles					453.4	773.5	1,226.9
Replace Capacitor Bank C1 - Oxen Pond					363.6	369.8	733.4
Construct Fire Separation Wall between Transformers - Happy Valley					300.0		300.0
Upgrade Access Road with New Topping - Buchans					243.4		243.4
Replace Corroded Junction Boxes - Various Sites					200.0	200.0	400.0
Upgrade Station Lighting - Various Sites					200.0	200.0	400.0
Install Fire Barriers between T1, T2 and T3 and the Substation - Massey Drive					100.0	400.0	500.0
Upgrade AC_DC Station Service - Various Sites					75.0	150.0	225.0
Install Drainage to Stop Surface Flooding - Various Sites					67.8	457.2	525.0
Replace Telecontrol Building and Upgrade Equipment - Daniel's Harbour					57.0	764.0	821.0
Upgrade Station Access Road - Various Sites						400.0	400.0
Upgrade Drainage to Stop Frost Heaving - Various Sites						200.0	200.0
TOTAL TERMINAL STATIONS	12,235.1	29,434.8	46,500.6	44,417.7	53,289.8	31,148.5	217,026.5

TRANSMISSION

Construct 230 kV Transmission Line - Bay d'Espoir to Western Avalon	87,444.6	149,895.7	54,317.7				291,658.0
Construct 230 kV Transmission Line - Soldiers Pond to Hardwoods	3,699.0	17,489.8	5,372.1				26,560.9
Refurbish Anchors and Footings TL202 and TL206 - Bay d'Espoir to Sunnyside	1,278.3	901.6					2,179.9
Replace Aircraft Markers at Grand Lake Crossing - TL228	589.6	978.3					1,567.9
Perform Wood Pole Line Management Program - Various Sites		2,404.1	3,593.7	2,761.9	2,181.1	3,228.1	14,168.9
Transmission Line Upgrades - TL212 and TL218		1,378.2	1,133.3				2,511.5
Replace Insulators - TL227		145.6	271.3				416.9
Interconnect Muskrat Falls to Happy Valley - L1302			13,909.9	61,319.9			75,229.8
Replace Dampers - TL247			495.1				495.1
Upgrade Tower Foundations (2019) - Various Sites				1,077.6	1,085.2	1,130.4	3,293.2
Replace Line - TL218						1,700.0	1,700.0
Reliability Improvements for Terminal Station - Hawkes Bay						1,540.0	1,540.0
Replace Line - TL203						1,300.0	1,300.0
Conduct LIDAR Surveys - Various Sites					250.8	256.4	507.2
TOTAL TRANSMISSION	93,011.5	173,193.3	79,093.1	65,159.4	3,517.1	9,154.9	423,129.3

DISTRIBUTION

Upgrade Distribution System - Various Sites (2016-2017)	285.6	6,350.3					6,635.9
Distribution Upgrades - Various Sites (2017-2018)		64.2	1,130.9				1,195.1
Upgrade Distribution System - Various Sites			173.3	3,060.5	5,782.4	7,016.0	16,032.2
Provide Service Extensions - All Service Areas		4,330.0	4,920.0	5,020.0	5,130.0	5,240.0	24,640.0
Upgrade Distribution Systems - All Service Areas		3,810.0	3,820.0	3,630.0	3,610.0	3,680.0	18,550.0
Replace Recloser - Wabush		199.2					199.2
Install Demand Metering - Various Sites		89.7					89.7
Install Recloser Remote Control - Bottom Waters		47.1	418.6				465.7
Install Recloser Remote Control - Various Sites			46.7	339.6	207.0	550.0	1,143.3
Increase Feeder Capacity for Cold Load Pickup - Happy Valley			2,099.3				2,099.3
Additions for Load - Distribution Systems			1,499.2	1,000.0	500.0	500.0	3,499.2
Install Recloser - English Harbour West			258.6				258.6
Replace Submarine Cable Farewell Head to Change Islands - Fogo				121.8	11,867.4	16,748.7	28,737.9
Install Sectionalizer and Replace Poles, L3 - Bottom Waters				33.1	442.2		475.3
Install Sectionalizing for Cold Load Pickup - Port Hope Simpson					250.0		250.0
Implement Geographical Information System - Various Sites					100.0	100.0	200.0
Convert La Scie L7 to 25 kV - Bottom Waters					35.0	315.0	350.0
TOTAL DISTRIBUTION	285.6	14,890.5	14,366.6	13,205.0	27,924.0	34,149.7	104,821.4

PROJECT DESCRIPTION	Expended	2017	2018	2019	2020	2021	Total
	to 2016						
				(\$000)			
GENERATION							
Install Fire Protection in Diesel Plants - Various Sites	3,030.7	1,376.4	176.0	1,754.4	999.7	1,000.0	8,337.2
Replace Diesel Units - Charlottetown	1,384.9	46.1					1,431.0
Additions for Load Growth - Isolated Generation Stations - Various Sites	883.4	4,746.0	1,556.6	1,237.6	1,853.6	500.0	10,777.2
Replace Programmable Logic Controllers - Various Sites	712.9	245.1			250.0	250.0	1,458.0
Replace Human Machine Interface - Various Sites	114.0	320.0	167.4	159.3	299.0	400.0	1,459.7
Install Variable Frequency Drives - Grey River	46.9	123.0					169.9
Overhaul Diesel Engines - Various Sites		2,095.9	2,339.0	2,319.8	2,370.3	2,424.2	11,549.2
Inspect Fuel Storage Tanks - Various Sites		1,058.8	1,031.2	856.3	714.8	700.0	4,361.1
Diesel Plant Engine Auxiliary Upgrades - Various Sites		790.6	416.3				1,206.9
Diesel Genset Replacements - Charlottetown and Port Hope Simpson		658.8	5,148.0				5,806.8
Replace Fuel Tank 22E - St. Anthony		199.8					199.8
Replace Automation Equipment - Mary's Harbour		120.3	1,021.7				1,142.0
Replace Unit 2059 - Makkovik			576.5	4,244.0			4,820.5
Replace Radiators - Various Sites			527.3	562.6			1,089.9
Install Fire Detection System - North Bay			338.3				338.3
Upgrade Fuel Piping - McCallum			156.0				156.0
Replace Unit 2052 - Cartwright				1,009.5	2,665.4		3,674.9
Replace Unit 2037 - Mary's Harbour				369.9	1,464.9		1,834.8
Purchase Mobile Diesel - Bishop's Falls					1,400.0		1,400.0
Perform Plant Improvements - Various Sites					1,011.0	3,058.5	4,069.5
Install Unit Fuel Metering - Various Sites					600.0		600.0
Replace Existing Bus with 1,600 Amp Bus - Hopedale					500.0		500.0
Replace Main Breaker and Extend Plant - Little Bay Islands					500.0		500.0
Upgrade Septic System - Nain					500.0		500.0
Build Roadway for Freight Delivery - North Bay					307.0		307.0
Construct Site Fencing - North Bay and Port Hope Simpson					300.0		300.0
Install Sequence of Events Monitor in Diesel Plants - Various Sites					281.0	289.1	570.1
Upgrade Water Line to Diesel Plant - Makkovik					250.0		250.0
Replace Diesel Plant - Rigolet					210.2	2,101.4	2,311.6
Purchase and Install Sewage Lift System - Rigolet					210.1		210.1
Install Automatic Oil Filling System - Various Sites					200.0		200.0
Install Engine Starting System - Various Sites					200.0		200.0
Replace Unit Breakers - Port Hope Simpson					200.0		200.0
Upgrade and Add Site Fencing - L'Anse Au Loup					200.0		200.0
Replace Unit 2039 - St. Lewis					150.0	1,300.0	1,450.0
Install Waste Oil Storage Tank - Various Sites					150.0		150.0

PROPERTIES

Upgrade Warehouse Lighting - Bishop's Falls	15.2	180.4					195.6
Upgrade Office Facilities & Control Buildings - Various Sites		2,197.3	1,603.0	2,370.4	1,779.9	1,951.7	9,902.3
Line Depot Condition Assessment and Refurbishment Program - Various Sites		1,458.8					1,458.8
Construct New Facilities - Various Sites		422.0	1,034.1				1,456.1
Install Fall Protection Equipment - Various Sites		194.7	199.7	199.8	209.6	215.3	1,019.1
Upgrade Line Depots - Various Sites			1,742.2	1,785.6	1,829.1	1,875.7	7,232.6
Upgrade Services and Warehouse Facilities - Bishop's Falls			688.7				688.7
Widen Right Of Ways for Distribution and Transmission Lines - Various Sites			673.7	558.5			1,232.2
Upgrade Outside Property - Various Sites			602.9	376.2	120.0		1,099.1
Upgrade Classroom and Boardroom in Main Office - Bishop's Falls			165.3				165.3
Construct Storage Building - Springdale			125.9	691.6			817.5
Upgrade Fire System - Bishop's Falls			109.3	860.0			969.3
Install Pole Storage Ramps - Various Sites				899.6	924.2	949.5	2,773.3
Replace Roof on Garage - Bishop's Falls					100.0		100.0
Upgrade HVAC System - Stephenville					100.0		100.0
TOTAL PROPERTIES	15.2	4,453.2	6,944.8	7,741.7	5,062.8	4,992.2	29,209.9

METERING

Install Automated Meter Reading - Happy Valley (2017-18)		78.6	1,891.6				1,970.2
Install Automated Meter Reading - Labrador West	433.8	533.4					967.2
Install Automated Meter Reading - Various Sites			80.7	1,067.0	1,041.0		2,188.7
Purchase Meters and Metering Equipment- Various Sites		198.8	197.9	199.7	198.6	198.8	993.8
Purchase New Meter Calibration Test Console - Hydro Place		196.9					196.9
TOTAL METERING	433.8	1,007.7	2,170.2	1,266.7	1,239.6	198.8	6,316.8

TOOLS AND EQUIPMENT

Purchase Tools and Equipment Less than \$50,000		423.0	497.7	375.5	300.4	253.0	1,849.6
Replace Light Duty Mobile Equipment - Various Sites		270.9					270.9
Purchase Front End Loader with Backhoe - Wabush		133.2					133.2
Replace Light Duty Mobile Equipment - Various Sites			436.3				436.3
Replace Off Road Track Vehicle Unit No. 7954 - Bay d'Espoir			200.0				200.0
Replace Front End Loader Unit No. 9628 - Bay d'Espoir			173.0				173.0
Replace Off Road Track Vehicle Unit No. 7239 - Bishop's Falls			13.7	986.3			1,000.0
Replace Light Duty Mobile Equipment - Various Sites				469.6			469.6
Replace Back Hoe Unit No. 9813 - Holyrood				173.0			173.0
Replace Off Road Track Vehicle Unit No. 7565 - Stephenville				14.0	441.9		455.9
Replace Light Duty Mobile Equipment - Various Sites					484.4		484.4
Replace Off Road Track Vehicle Unit No. 7799 - Springdale					200.0		200.0
Replace Off Road Track Vehicle Unit No. 7974 - Stephenville					8.8	741.2	750.0
Replace Off Road Track Vehicle Unit No. 7698 - Stephenville					8.8	455.2	464.0
Replace Light Duty Mobile Equipment - Various Sites						620.6	620.6
Replace Excavator Unit No. 7063 - Bay d'Espoir						92.0	92.0
Replace Excavator Unit No. 7064 - Springdale						92.0	92.0
Replace Excavator Unit No. 7065 - Bay d'Espoir						92.0	92.0
TOTAL TOOLS AND EQUIPMENT	0.0	827.1	1,320.7	2,018.4	1,444.3	2,346.0	7,956.5

TOTAL TRANSMISSION AND RURAL OPERATIONS

	112,154.0	235,587.4	163,850.3	146,322.3	110,559.9	96,238.3	864,712.2
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PROJECT DESCRIPTION	Expended to 2016	2017	2018	2019	2020	2021	Total
				(\$000)			
<u>INFORMATION SYSTEMS</u>							
<u>SOFTWARE APPLICATIONS</u>							
Upgrade of Technology							
Upgrade Microsoft Office Products - Hydro Place	683.7	953.4	957.3				2,594.4
Cost Recovery	(317.1)	(442.2)	(444.0)				(1,203.3)
Upgrade Energy Management System - Hydro Place		427.0	352.0	361.5	371.5	381.5	1,893.5
TOTAL SOFTWARE APPLICATIONS	366.6	938.2	865.3	361.5	371.5	381.5	3,284.6
<u>COMPUTER OPERATIONS</u>							
Infrastructure Replacement							
Replace Personal Computers - Hydro Place		401.4	493.1	425.9	76.5	371.2	1,768.1
Replace Peripheral Infrastructure - Hydro Place			258.3	88.8	142.2	210.3	699.6
TOTAL COMPUTER OPERATIONS	0.0	401.4	751.4	514.7	218.7	581.5	2,467.7
TOTAL INFORMATION SYSTEMS	366.6	1,339.6	1,616.7	876.2	590.2	963.0	5,752.3

PROJECT DESCRIPTION	Expended	2017	2018	2019	2020	2021	Total
	to 2016						
				((\$000)			
TELECONTROL							
NETWORK SERVICES							
Replace Battery Banks and Chargers - Various Sites (2016- 2017)	425.0	456.6					881.6
Replace Battery Banks and Chargers - Various Sites (2017-2018)		379.3	566.2				945.5
Replace Battery Banks and Chargers - Various Sites			230.5	578.3	663.5	800.0	2,272.3
Upgrade Telecontrol Facilities - Sandy Brook Hill	101.6	462.4					564.0
Upgrade Telecontrol Facilities - Mary March Hill and Blue Grass Hill		91.2	665.9				757.1
Upgrade Telecontrol Facilities - Various Sites				96.0	796.9	716.4	1,609.3
Replace MDR 4000 Microwave Radio East - Various Sites	77.4	1,093.1					1,170.5
Replace Powerline Carrier - Various Sites	73.4	763.4					836.8
Replace Air Conditioners - Massey Drive and Happy Valley	39.9	152.0					191.9
Replace Air Conditioners - Various Sites			75.7	173.9	150.0	150.0	549.6
Replace Network Communications Equipment - Various Sites		199.3	206.6	199.9	185.0	180.0	970.8
Upgrade Access Roads to Microwave Sites - Various Sites		118.4	124.5	127.6	127.2	132.0	629.7
Upgrade Site Facilities - Various Sites		49.0	49.8	49.8	49.1	48.0	245.7
Purchase Tools and Equipment Less than \$50,000		45.2	46.0	47.1	48.2	49.3	235.8
Replace Radomes - Various Sites			385.6	257.4	185.0	180.0	1,008.0
Replace RTUs - Various Sites			109.6	109.1	100.0	100.0	418.7
Replace GPS Clocks - Various Sites			96.9				96.9
Replace PBX Phone Systems - Various Sites			88.5	1,153.2			1,241.7
Replace Teleprotection - TL244 & TL256			87.3	830.5			917.8
Replace Massey Drive 6000 Microwave Radio (East) - Various Sites			65.1	1,095.5			1,160.6
Replace Teleprotection - TL202 & TL206				89.2	848.6		937.8
Replace Teleprotection - TL261 & TL259				89.2	848.6		937.8
Replace VHF Mobile Radio System - Various Sites						5,000.0	5,000.0
Replace SCADA Communications Equipment - TL241						805.0	805.0
Replace SCADA Communications Equipment - TL221						666.0	666.0
Replace Back-up Generators - Microwave Sites						200.0	200.0
TOTAL TELECONTROL	717.3	3,809.9	2,798.2	4,896.7	4,002.1	9,026.7	25,250.9

TRANSPORTATION

Replace Vehicles and Aerial Devices - Various Sites (2016-2017)	1,443.3	534.2					1,977.5
Purchase Vehicles and Aerial Devices - Various Sites	382.5	172.7					555.2
Replace Vehicles and Aerial Devices - Various Sites (2017-2018)		2,001.4	398.8				2,400.2
Replace Vehicles and Aerial Devices - Various Sites			1,582.8	2,833.3	2,662.0	2,271.2	9,349.3
TOTAL TRANSPORTATION	1,825.8	2,708.3	1,981.6	2,833.3	2,662.0	2,271.2	14,282.2

ADMINISTRATION

Replace Air Conditioning Units 8 and 14 - Hydro Place	34.6	229.5					264.1
Replace Roof - Hydro Place		923.4					923.4
Remove Safety Hazards - Various Sites		198.6	198.1	197.9	214.2	219.6	1,028.4
Purchase Office Equipment - Various Sites		83.6	90.0	39.1	40.1	71.6	324.4
Upgrade Exterior of Building - Hydro Place			651.9				651.9
Construct Additional Parking Spaces and Access Ramp - Hydro Place			371.9				371.9
Makkovike Security Improvements - Hydro Place			245.7				245.7
Replace Washroom Fixtures - Hydro Place			129.0				129.0
Replace Parking Lot Light Poles - Hydro Place			109.1				109.1
Replace Transfer Switch - Hydro Place				427.5			427.5
Pave Middle Parking Lot and Replace Curb & Drainage - Hydro Place				323.1			323.1
Refurbish Stairways, Railings and Entrance Ways - Hydro Place				126.3			126.3
Replace Domestic Water Entrance - Hydro Place				47.4			47.4
Replace Elevator Motors and Controls Equipment - Hydro Place					200.0		200.0
Replace Roof on Office Building - Bishop's Falls						300.0	300.0
Upgrade HVAC System - Bishop's Falls and William's Harbour						200.0	200.0
Replace Warehouse Ramps - Postville						50.0	50.0
TOTAL ADMINISTRATION	34.6	1,435.1	1,795.7	1,161.3	454.3	841.2	5,722.2
TOTAL GENERAL PROPERTIES	2,944.3	9,292.9	8,192.2	9,767.5	7,708.6	13,102.1	51,007.6

APPENDIX B
TL267 PROJECT – 230 kV Transmission
Bay d’Espoir to Western Avalon
Report

SUMMARY

The Board of Commissioners of Public Utilities (the Board) approved the Newfoundland and Labrador Hydro (Hydro) Upgrade of Transmission Line Corridor (the Project) on December 12, 2014, with a total capital expenditure of approximately \$291M and an in-service date of May 1, 2018. As TL267 has a material impact on system reliability and eliminates system constraints relating to power flow to the Avalon Peninsula, the schedule has recently been accelerated to be in service by October 31, 2017.

The Project includes two terminal station expansions and 188 km of 230 kV transmission line. Engineering for both the transmission line and terminal stations is ongoing and is on schedule. Procurement plans are on track with purchase orders and contracts in place for the majority of items. The first construction activity began on June 27, 2016 with the commencement of transmission line clearing.

The environmental assessment (EA) process was protracted, with the project submitted for registration on July 16, 2015 and environmental assessment release only granted on June 15, 2016. Overall, at this early point of execution, the project is tracking on schedule to meet the in-service date of October 31, 2017. Given the late release from the EA process, the schedule is considered challenging; however, Hydro has taken steps to mitigate the delays caused by the late EA release, such as advancing procurement, and tendering construction contracts, in parallel with the EA review period.

Cost expenditure is tracking as expected, with much of the cost to occur in the 2016 to 2017 years. The re-baselined schedule has been developed based on the new start date and is being used for tracking and control purposes.

Overall, the project is on target for completion, earlier than originally planned and within budget.

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1 INTRODUCTION

The Board approved the Project on December 12, 2014. The Project, now known as TL267, involves design and construction of 188 km of 230 kV steel tower transmission line, as well as station expansions at Bay d'Espoir and Western Avalon at Chapel Arm. The approved capital expenditure is \$291,658,000. As directed by the Board as part of the approval of the Project, an annual report shall be filed with each capital budget application until completion of the Project. The Project will continue with scheduled commissioning on or before October 31, 2017.

2 PROJECT DESCRIPTION

On April 30, 2014, Hydro filed an application for approval to construct a 230 kV transmission line between Bay d’Espoir (BDE) Hydroelectric Generation Station and Western Avalon Terminal Station (WAV) at Chapel Arm, including upgrades at both stations to accommodate the new infrastructure. The Project was justified based on maintaining system reliability and meeting the long-term power requirements of the Island Interconnected System. It will provide additional capacity, enhance resiliency to system faults and relieve congestion on the existing transmission system. Based on the information supplied by Hydro as part of the Project review process, the Board released Order P.U. 53(2014) on December 12, 2014 approving the Project as described.

The Project is comprised of three distinct projects, and two sub projects. The three distinct projects are:

- 1) the addition of portions of a third breaker and one half station diameter including two circuit breakers, four disconnect switches and associated electrical and protection and control equipment in BDE Terminal Station 2 (BDE-TS2) using traditional Air Insulated Switchgear (AIS),
- 2) the addition of gas insulated switchgear (GIS) ring bus in WAV at Chapel Arm , and
- 3) a new 230 kV transmission line 188 km in length linking the two stations.

The two sub-projects are:

1. modifications to BDE-TS2 to allow for independent isolation of TL206, converting the existing ring bus to a breaker and one half scheme, and
2. modifications to WAV to connect TL208, which currently services the VALE site, to the new station expansion.

Given limited outage opportunities, the two sub-projects will be executed after TL267 goes in service, and as outage coordination and limitations permit.

3 ENGINEERING

The Project, including all station modifications and line designs, will utilize all of the latest industry standards and practices and design criteria currently in use by Hydro. Modifications to the stations will include the latest electrical and protection and control equipment that is currently maintained in the system and form the basis of new designs going forward.

Transmission line design will utilize Hydro's operational experience and design criteria applicable along the existing corridor to ensure a reliable addition to the Island Interconnected grid. Two icing zones have been identified for the transmission line: between Bay d'Espoir and Pipers Hole Park with 50 mm radial glaze and between Pipers Hole Park and WAV with 75 mm radial glaze.

The engineering for TL267 involves the creation of a new tower family capable of structurally maintaining reliable service with the inclusion of shield wire for lightning outage protection. This new tower family includes two new suspension towers, modelled along the same design fundamentals of the 315 kV lines for the Lower Churchill Project. These towers follow the guyed-Y configuration (see Section 9) with the A-Type tower capable of 0° to 1° line angles, and a B-Type tower designed for angles of 0° to 6°. Two new strain towers are required, with a self-supported C-Type tower capable of angles from 0° to 30°, and a full-tension deadend D-Type tower for 0° to 45°. The D-Type tower is capable of anti-cascade failure containment within the range of angles of the tower. The existing Hydro NDD-Type tower, designed for the Avalon Upgrade in the early 2000s, has been verified as adequate for this application and will be utilized for angles between 45° and 90°. Shield wires, including one standard overhead ground wire and one optical ground wire which includes optical fibres for the communication system, will be utilized along the entire length.

Design for the new tower family commenced in January 2015, and foundation design began in May 2015 once tower loads and reaction forces were finalized. All towers are being fully designed in-house, including all necessary documentation for eventual detailing of the tower

connection plates, prototype assembly of all towers, full-scale tower testing of the A-type and D-type towers, as well as mass production by the tower manufacturer.

To date, and as planned, all tower designs are 100% complete. Tower foundations are also 100% complete. The contract for the supply of the towers and tower foundations has been awarded and work is well underway. Prototype assembly of the each tower type is complete and the full-scale tower testing of the A-type tower and D-type were successfully completed. Tower foundation prototyping is also complete and mass fabrication is underway. The first foundation deliveries are expected in August 2016 and the first tower deliveries are expected in September 2016.

The first step in line design is assessing and selecting a line route. The line route has been finalized since the environmental assessment release has been granted. Preliminary line design, which has been completed as planned, quantifies the number, types and heights of the required towers for the entire line using “stick models”. Stick models are representative towers used in the design software and are based on the "as-designed" capacity. Final line design requires the use of the final tower model capacities after detailing by the manufacturer, and will be completed in 2016. The preliminary line design allows for quantification of the towers and hardware for tendering purposes, allowing for accurate bid quantities and initial ordering of the first material deliveries.

Station design involves a significant amount of detailed engineering prior to tendering, given that both station modifications are in existing terminal stations, and it is more efficient to provide the design details to the potential bidders.

For the BDE-TS2, the original station design included space for an additional electrical breaker and one-half diameter, and therefore expansion outside the existing station footprint is not required. The new station diameter will include standard AIS using modern circuit breakers and associated equipment and infrastructure. Support equipment, including take-off structures for

the overhead lines, will be similar to the existing infrastructure. New protection and control panels will be required in the existing control building, as well as associated station modifications to run the control wiring. Connection to the SCADA system for communication with the Energy Control Centre is also required.

The WAV station involves a new GIS module given the lack of easily usable space around the station, and the cost of developing new land in the area. An investigation confirming the requirement for GIS was completed and verified that GIS is the most economical solution for WAV. Hydro currently has a GIS at the Cat Arm Generating Station which has operated reliably for the past 30 years, and GIS solutions are common in areas when the footprint is limited.

WAV will be executed as an Engineer Procure and Construct (EPC) contract. This contract has been tendered and awarded and the detailed engineering phase has commenced. Engineering for BDE-TS2 is complete and the procurement package for the AIS circuit breakers has been awarded. Engineering for the protection, control, and communications panels is nearing completion as well, with a tender for this equipment expected to be issued in July 2016.

4 ENVIRONMENTAL ASSESSMENT

Given the size and nature of the Project, registration for environmental assessment (EA) under the Environmental Protection Act is required. EA is an evaluation of a project's potential environmental risks and effects before it is carried out. EA also identifies ways to improve project design and implementation to prevent, minimize, mitigate, or compensate for adverse environmental effects and to enhance positive effects. The EA Registration Document for this project is an enhanced registration document, which includes baseline studies for key environmental components such as caribou, avifauna, historic resources, rare plants, and an assessment of the effects of the Project on these components.

Consultation is a cornerstone of the EA process. Hydro consulted with key stakeholders, and held open house sessions in June 2015, in select communities including Bay d'Espoir, Come By Chance and Chapel Arm to inform stakeholders about the new line and to have meaningful discussions and identify concerns.

The Project was submitted for registration as an undertaking under Part 10 of the provincial *Environmental Protection Act* on July 16, 2015. Following a public review period, the Minister of Environment and Conservation normally has 45 days from registration to notify the proponent of release, or that an environmental preview report or environmental impact statement is required. However, the preferred and primary routing through the Bay du Nord Wilderness Reserve (BDNWR) delayed the decision by the Minister until the process described in the following paragraph was completed.

The primary route for TL267 is parallel and adjacent to existing transmission lines along the entire 188 km to minimize the environmental impact. The primary route is located within the BDNWR for 13 km. The reserve was established as a Wilderness Reserve under the Newfoundland and Labrador Wilderness and Ecological Reserve Act in 1990. Although it contains two existing transmission lines constructed in the mid-1960s, the Wilderness Reserve Regulations do not allow for the construction of a new transmission line through the BDNWR.

Provisions in the Act outline the process to allow for the Lieutenant-Governor in Council to reduce the size of the reserve. In order to allow for line construction through the BDNWR, the proposed right of way, 40 m wide and 13 km long, would have to be removed from the reserve. The process required for this removal was initiated in May 2015, and was concluded in early June 2016. The release from further Environmental Assessment was subsequently issued by the Department of Environment and Conservation on June 15, 2016.

With the release from the EA process construction can now proceed. All other required environmental activity is on schedule as planned.

5 PROCUREMENT

Procurement activities are well advanced with most of the packages tendered and awarded (refer to Table 1).

The contract for the supply of the towers and tower foundations, which is on the critical path for the Project, has been awarded and work is well underway. Prototype assembly of each tower type is complete and both full-scale tower testing programs (A-type tower and D-type tower) were successfully completed in June and July, respectively. With the successful full-scale tower test completed, mass fabrication for all towers has now begun. Tower foundation prototyping is also complete and mass fabrication is underway. The first foundation deliveries are expected in August 2016 and the first tower deliveries are expected in September 2016. Photos of tower and tower foundations are included in Section 9.0.

The tender for the transmission line clearing contract was awarded in June and clearing activities started June 27, after the EA release and subsequent clearing permits were acquired.

The tender for the transmission line construction contract was opened on March 29, 2016, closed on June 1, 2016, and bids were evaluated. Six bids were received as part of the tender call and all bidders indicated that the revised October 31, 2017 in-service date was achievable. The contract was awarded in July.

The tender for the EPC contract for the WAV GIS module was awarded in June and engineering for the module was initiated immediately upon award. The tender for the AIS electrical equipment has been awarded and the final package to be tendered is for the protection and control equipment for BDE-TS2. The tender for the BDE-TS2 modifications has closed and is currently being evaluated.

Currently all procurement activities remain on track to support the 2017 in-service date.

Table 1: Procurement Status Update

Item	Contract Name	Status
1	Supply of Steel Towers and Foundations	Awarded
2	Supply of Line Conductor	Awarded
3	Supply of 220 kN Insulator	Awarded
4	Supply of Steel Towers (2 – NDD, 3 – AA)	Awarded
5	Supply of Line Hardware	Closed – Under Evaluation
6	Supply of Steel Wire	Awarded
7	Supply of Anchor Materials	Awarded
8	Supply of Optical Ground Wire	Awarded
9	Supply of Dampers	Awarded
10	TL267 – Line Clearing Contract	Awarded
11	TL267 – Line Construction Contract	Awarded
12	Four – 245 kV AIS Circuit Breakers for Bay d’Espoir	Awarded
13	Western Avalon – TS GIS Turnkey Solution	Awarded
14	Protection, Control, Comms Equipment Supply	Under preparation – Tender in July
15	Bay d’Espoir Installation Contract	Closed – Under Evaluation

6 CONSTRUCTION

Construction has started with the commencement of the line clearing. With the EA release received on June 15, 2016 and subsequent clearing permits received the following week, the first tree cut was on June 27, 2016.

The transmission line construction contract was awarded in July. Mobilization will begin in July with an initial ground truthing exercise, establishment of construction offices and camps, and start of construction of access roads/trails. Tower foundation work is planned to start in September after arrival of the foundation materials.

7 COST

A significant portion of the expenditure for this Project will occur in 2016 and 2017. The 12 months covered by this annual report primarily includes EA, engineering, and planning expenditures. The rate of spend across the project duration will increase significantly going forward, now that the majority of the contracts have been awarded, construction has commenced, and materials are arriving on site.

As part of the project execution, a re-baseline of the cash flow was completed based on the revised in-service date of the project, and based on the execution model detailed previously. This re-baseline will include expenditures of \$2.1M (2015), \$85.4M (2016), \$149.9M (2017) and \$54.3M (2018). Approximately \$6M has been expended to date on transmission and station engineering, environmental work, material procurement, and project management. Significant material and construction expenditure will be realized prior to the next update, when most of the line materials arrive, clearing is well advanced, and line construction has begun. A more detailed report will be presented at that time.

Tender results recently received for the major equipment and construction contracts support the advancement of the in-service date, and demonstrate that the budget expectation is accurate and that the acceleration of the schedule has no negative impact to overall project cost. The project remains forecasted to be on budget at \$291,658,000.

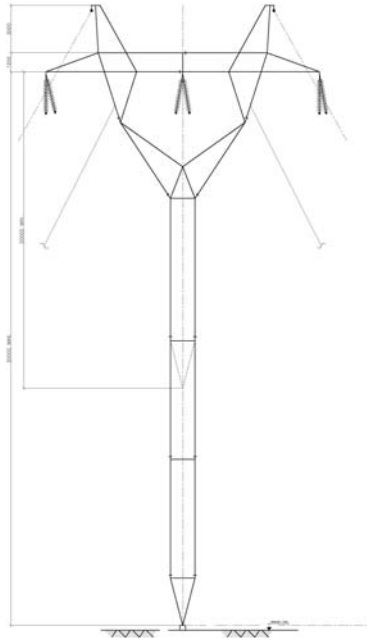
8 SCHEDULE

The updated milestone schedule is included in Appendix A.

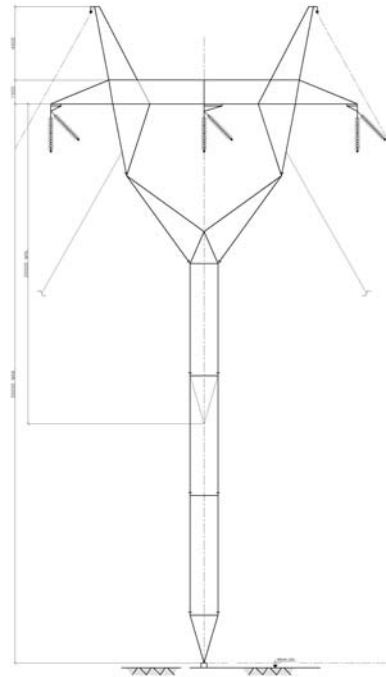
This schedule is currently being used to track progress, and is based on the EA release by the Minister in June 2016, which allowed clearing activities to start in June 27, 2016. Overall, at this early point of field execution, the project is tracking on schedule to meet the in-service date of October 31, 2017. Given the late release from the EA process, the schedule is considered challenging; however, Hydro has taken steps to mitigate the delays caused by the late EA release by:

1. Advancing the procurement of transmission tower structures, terminal station equipment, and other transmission line materials to support the advanced construction schedule.
2. Issuing the transmission line construction contract tender call and evaluating the bids in parallel with the Environmental Assessment review period so that schedule savings could be achieved. EA Release was granted on June 15, 2016.
3. Including the advanced in-service date as a part of the transmission line construction contract tender. Six bids were received as part of the tender call and all bidders indicated that the 2017 in-service date was achievable.

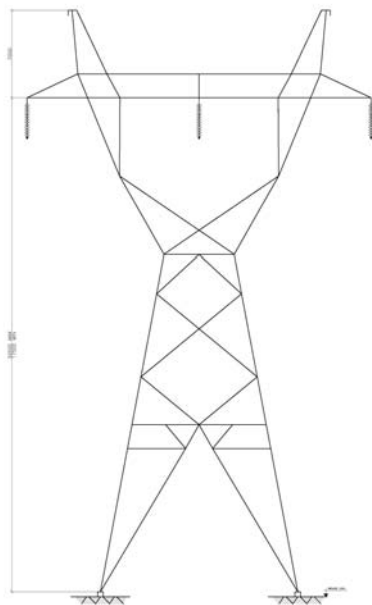
9 DRAWINGS AND PHOTOS



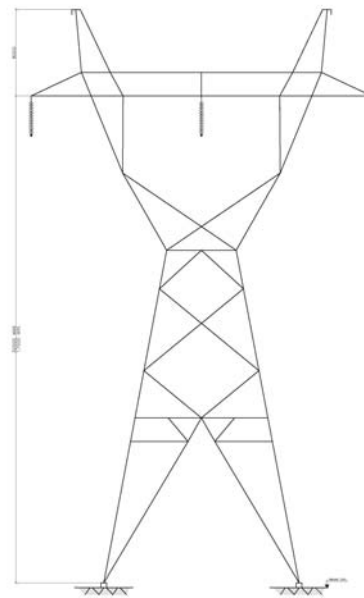
Tower Type A



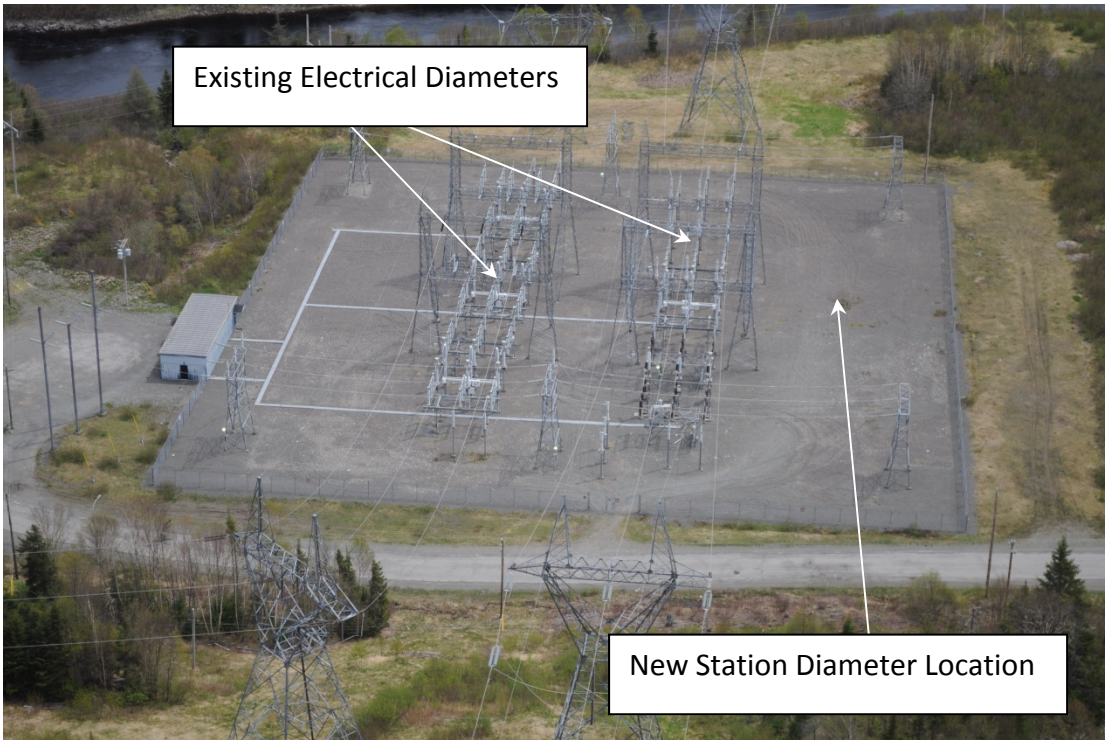
Tower Type B



Tower Type C



Tower Type D



Bay d'Espoir Terminal Station 2



Western Avalon Terminal Station



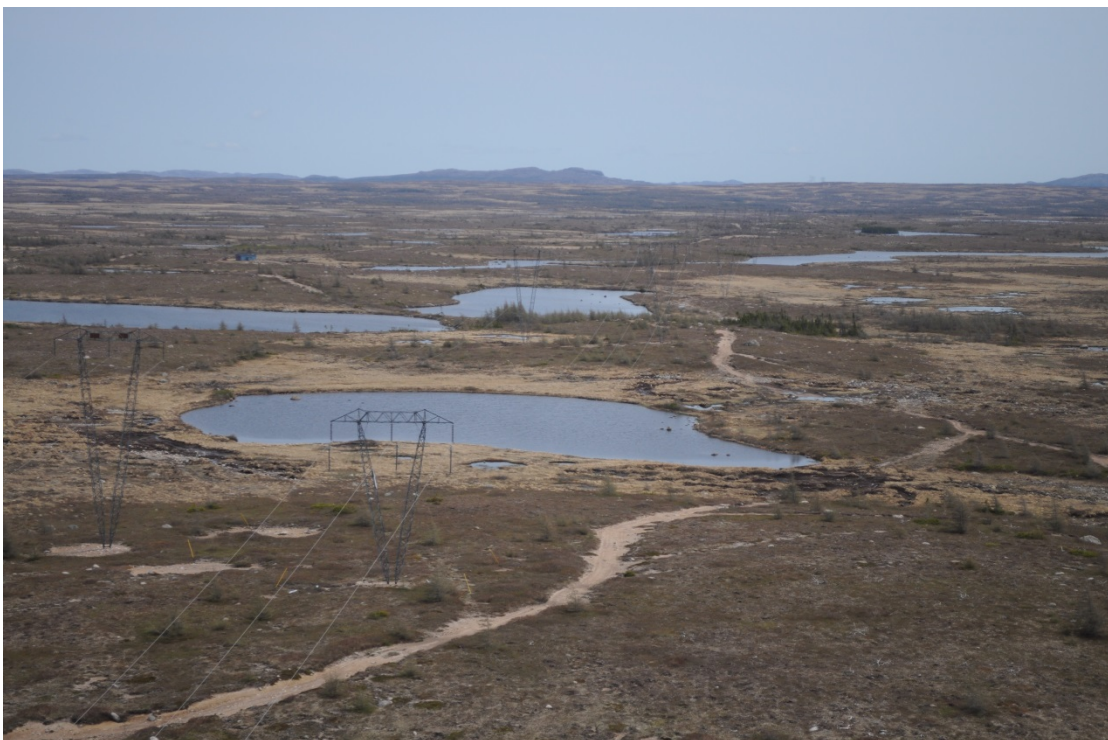
Typical TL202/TL206 right of way near BDE; TL267 will be on the right



Typical TL202/TL206 right of way near BDE; TL267 will be on the right



TL202/TL206 right of way with existing Hydro access bridge within the Bay Du Nord Wilderness Reserve



Typical TL202/TL206 right of way in limited available access zone west of Pipers Hole Park



Typical TL203/TL237 right of way on the Avalon Peninsula; TL267 will be on the right



Start of Clearing Near Chapel Arm – June 27, 2016



Foundation Steel Preparation for Shipping – Ankara, Turkey



A-Tower Full Scale Load Test - Romania



A-Tower Full Scale Load Test - Romania

APPENDIX A

Activity ID	Activity Name	Physical % Complete	Start	Finish	2016				2017												
					2	Qtr 3		Qtr 4		Qtr 1		Qtr 2		Qtr 3		Qtr 4					
					J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O
System Upgrades TL267					01-Jun-16 A	19-Dec-17															
Key Project Milestones					01-Jun-16 A	19-Dec-17															
TL267 Milestones					01-Jun-16 A	19-Dec-17															
267.MS.200	TL267 Construction Contract Tender Close	100%		01-Jun-16 A																	
267.MS.100	EA Release TL267	100%		15-Jun-16 A																	
267.MS.280	Award LNTP for TL267 Construction Contract # 65473	100%		24-Jun-16 A																	
267.MS.140	Award TL267 Right of Way (ROW) Clearing Contract # 64095	100%		24-Jun-16 A																	
267.MS.150	TL267 ROW Clearing Start	100%	27-Jun-16 A																		
267.MS.120	Award TL267 Construction Contract # 65473	0%		18-Jul-16																	
267.MS.160	TL267 Foundations Steel (Lot 1A 25% of all) Received at Marshalling Yard	0%		16-Aug-16*																	
267.MS.260	TL267 Foundations Steel (Lot 1B 25% of all) Received at Marshalling Yard	0%		29-Aug-16*																	
267.MS.130	TL267 Construction Start	0%	15-Sep-16																		
267.MS.170	TL267 Tower Steel (Lot 2A & B Tower) Received at Marshalling Yard	0%		20-Sep-16*																	
267.MS.230	TL267 Foundations Steel (Lot 3 Remaining 50% of all) Received at Marshalling Yard	0%		04-Oct-16*																	
267.MS.220	TL267 Tower Steel (Lot 2C & D Tower) Received at Marshalling Yard	0%		24-Oct-16*																	
267.MS.270	TL267 Towers & Foundations AA & NDD Received at Marshalling Yard	0%		02-Nov-16*																	
267.MS.240	TL267 Tower Steel (Lot 4 Towers 75% of all) Received at Marshalling Yard	0%		08-Nov-16*																	
267.MS.250	TL267 Tower Steel (Lot 5 Towers 100% of all) Received at Marshalling Yard	0%		16-Feb-17*																	
267.MS.180	TL267 Substantial Completion	0%		02-Oct-17*																	
267.MS.190	TL267 In-service	0%		31-Oct-17*																	
267.MS.210	TL267 Reclamation Complete - Package # XXX	0%		19-Dec-17*																	

Activity ID	Activity Name	Physical % Complete	Start	Finish	2016				2017												
					Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4										
					J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O
TL267 Terminal Station Milestones					24-Jun-16 A	30-Oct-17															
TS.MS.210	Award PCC Equipment Supply Contract # XXXX	0%		06-Sep-16*																	
WAV					24-Jun-16 A	30-Oct-17															
TS.MS.280	Award LNTP for WAV TS GIS Turnkey Solution Contract # 66452	100%		24-Jun-16A																	
TS.MS.110	Award WAV TS GIS Turnkey Solution Contract # 66452	0%		05-Jul-16																	
TS.MS.120	WAV TS GIS Design Complete	0%		08-Aug-16																	
TS.MS.150	WAV TS GIS Construction Start	0%	05-Oct-16																		
TS.MS.130	WAV TS GIS Equipment Manufacturing Complete	0%		04-Apr-17																	
TS.MS.230	WAV PCC Equipment Received	0%	01-Jun-17*																		
TS.MS.140	WAV TS GIS Equipment Received	0%		22-Jun-17																	
TS.MS.240	WAV TS GIS Substantial Completion	0%		02-Oct-17*																	
TS.MS.160	WAV TS GIS Commissioning Start	0%	27-Oct-17																		
TS.MS.250	WAV TS GIS In-service	0%		30-Oct-17*																	
BDE					03-Aug-16	30-Oct-17															
TS.MS.170	Award BDE TS Installation Contract # 66780	0%	03-Aug-16																		
TS.MS.190	BDE TS Construction Start	0%	26-Aug-16																		
TS.MS.220	BDE PCC Equipment Received	0%	01-May-17*																		
TS.MS.180	BDE TSAIS Equipment Received	0%	18-May-17																		
TS.MS.260	BDE TSAIS Substantial Completion	0%		02-Oct-17*																	
TS.MS.200	BDE TS Commissioning Start	0%	19-Oct-17																		
TS.MS.270	BDE TSAIS In-service	0%		30-Oct-17*																	