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# **Nova Scotia Utility and Review Board**

**IN THE MATTER OF**

*The Maritime Link Act, S.N.S 2012 c.9  
and the  
Maritime Link Cost Recovery Process Regulation, N.S. Reg. 189/2012*

## **NSPML Quarterly Report Q4 2017**

**December 15, 2017**

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1 **1.0 INTRODUCTION**

2

3 This is the Q4 2017 Quarterly Report for the Maritime Link as directed by the Utility  
4 and Review Board (UARB) where the UARB ordered in its Supplemental Decision:

5

6 [115]....detailed reports must be filed by NSPML on a semi-  
7 annual basis, on June 15 and December 15 each year. The reports  
8 shall commence December 15, 2013. Updated status reports must  
9 be filed quarterly.

10

11 As per the UARB's order in its Decision regarding the Maritime Link Interim Cost  
12 Assessment (M07718), this Report now includes detail regarding the status of the  
13 construction of Nalcor's assets.

14

15 This Decision also requested that the quarterly reports include an accounting of all  
16 transactions related to this project, cash flow analysis, and a separate section  
17 describing and quantifying the financial and other benefits realized for ratepayers from  
18 the Maritime Link prior to delivery of the Nova Scotia Block and Nalcor market-  
19 priced energy. NSPML will report on these matters when the Maritime Link is in-  
20 service commencing in 2018.

1 **2.0 UPDATE OF PROJECT SCHEDULE**

2  
3 As per Enerco U-31, sections 1.1, 1.2, and 1.3, this section provides an update on the  
4 project schedule, along with a variance explanation and general status updates.

5  
6 Please refer to Attachment 1 for the Level 1 Project Schedule and Attachment 2 for  
7 the detailed Project Schedule.

8  
9 Nalcor's schedule for the transmission assets remains mid-2018 and the completion of  
10 Muskrat Falls is forecast for Q3 2020. The Nova Scotia Block is forecast by Q2 2020.  
11 NSPML will provide future updates as Nalcor advances towards completion of the  
12 Muskrat Falls project.

13  
14 **2.1 Gates and Milestones**

15  
16 As scheduled, key assets were energized in Q3 of this year for subsystem testing and  
17 commissioning is expected by the end of Q4 2017. The Maritime Link is expected to  
18 be in-service by January 1, 2018.

19  
20 **2.2 Safety**

21  
22 The project review of high-risk activities for any remaining field activities by  
23 contractors continues to be followed.

24  
25 Marine safety reviews were completed for all aspects of the marine program, which  
26 was completed at the end of August without any safety incidents.

27  
28 Safety reviews continued during the final stages of the installation of the equipment  
29 for the substations, converter buildings and yards, and other sites. During Q3 and Q4,  
30 specific focus was on the Lock-Out, Tag-Out and Permit-to-Work procedures, which  
31 were followed for the completion of the utility power outages and energization of  
32 HVac equipment at Bottom Brook, Granite Canal, and Woodbine as well as the

1 Newfoundland and Labrador HVac Transmission line. Similar reviews and focus  
2 were followed for the equipment and system tests as well as final testing which are in  
3 progress and scheduled to be completed in late December prior to commercial  
4 operations. Safety planning and preparations for the operations of the Maritime Link  
5 are currently in development.

6  
7 As reported previously, a grouted anchor issue and a fallen tower on June 11, 2017  
8 resulted in a Newfoundland and Labrador Occupational Health & Safety (OH&S)  
9 stop work order being issued for tower erections. The team worked with OH&S to  
10 design and implement a plan to enable work to resume safely. Anchor investigations  
11 began in August and the repair and replacement program was completed in October  
12 without incident.

13  
14 Safety reviews are also carried out prior to demobilization of contractors and assets.  
15 These reviews were implemented for the dismantlement of the Granite Canal camp.  
16 On October 31, during removal of a temporary bridge, an incident occurred when the  
17 structure collapsed with an excavator on it which landed in the river two metres  
18 below. The operator incurred minor injuries. The investigation was completed and  
19 follow-up safety actions were implemented for upcoming bridge removal activities.

20  
21 Public safety notifications were developed and communicated to the communities as  
22 the transmission line and substation assets began energization in Q4.

23  
24 The safety of the public and the workers continues to be the first priority, and  
25 NSPML remains committed to a culture on the work sites that promotes world class  
26 safety behaviours.

## 2.3 Commercial Activities

The key major procurement activities are presented in Table 1 with an update of the status for each initiative.

**Table 1 Key Major Procurement Activities**

<b>Commercial Activity</b>	<b>Status in October 2017</b>	<b>Initiative Number</b>	<b>Status in December 2017</b>
HVdc Submarine Cable Supply and Installation	The Contract was awarded to Nexans in January 2014.  Substantial Completion occurred in September, 2017.	E11-18	Final Completion expected before year end.
Converter stations, switchyards and related structures (“converters and structures”)	The Contract was awarded to ABB Inc. in June 2014.	E12-74	No Change
Right of Way Clearing along Transmission Lines	Contracts were awarded to Majors Logging Limited in NL and to R. MacLean Forestry in NS in February 2014.  E13-88 is closed.	E13-88	Closed
Transmission Structures and Grillages	The Contract was awarded to Kalpataru Power Transmission Ltd. in September 2014 for design and delivery of Structures and Grillages.	E13-85	No Change
Site Preparation Services (Includes construction of access	The Contract was awarded to Joneljim Concrete Construction (1994) Ltd. for NS Site	E13-92	Closed

<b>Commercial Activity</b>	<b>Status in October 2017</b>	<b>Initiative Number</b>	<b>Status in December 2017</b>
road upgrades)	<p>Preparation Services in September 2014.</p> <p>Contracts awarded to Marine Contractors Inc., MCI Limited Partnership for NL Site Preparation Services in September 2014.</p> <p>Contract closeouts in progress.</p>		Closed
Transmission Line Construction	<p>E13-95 contract has been terminated.</p> <p>Contract replaced with E16-284 and E16-269 as reported in the previous report.</p>	E13-95	No Change
Transmission Line Construction – NL AC Line	<p>The contract with PowerTel was re-assigned to NSPML for the completion of the two Grounding Lines and the HVac Line.</p> <p>Substantial Completion achieved.</p>	E16-284	Final completion in progress.
Transmission Line Construction - NL and NS HVdc Lines	<p>The contract for the construction of the HVdc Transmission Lines was awarded to a joint venture of Emera Utility Services and Rokstad Power Corporation (ERJV).</p>	E16-269	Mechanical completion achieved in early December 2017 and final completion in progress.

<b>Commercial Activity</b>	<b>Status in October 2017</b>	<b>Initiative Number</b>	<b>Status in December 2017</b>
Transmission Line Conductors	<p>The Contract for the supply of conductors was awarded to Midal Cables in March 2015. Contract close-out in progress.</p> <p>The contract for the supply of OPGW was awarded to Composite Power Group Inc. in June 2015. This is also within the scope of the E13-87 initiative. Contract close-out in progress.</p>	E13-87	<p>Contract close-out remains in progress</p> <p>Closed</p>
Horizontal Directional Drill (HDD) Construction Program	<p>Contract awarded to Directional Horizontal Drilling (DHD) in January 2016.</p> <p>E13-157 was divided into two contracts.</p> <p>E13-157 A was awarded to Schlumberger in March 2016 for the supply of HDD fluids. E13-157B was awarded to Baker Hughes in April 2016 for the Supply of directional drilling services, drill bits and other materials. Contract closed.</p> <p>E13-158 for marine intervention services was awarded in April 2016 to DOF Marine. Contract closed.</p>	<p>E13-156</p> <p>E13-157</p> <p>E13-158</p>	<p>Closed</p> <p>Closed</p> <p>Closed</p>



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<b>Commercial Activity</b>	<b>Status in October 2017</b>	<b>Initiative Number</b>	<b>Status in December 2017</b>
	<p>The supply of the HDD casing (E15-238) was awarded to East Coast Tubulars Limited in October 2015. Contract closed.</p> <p>The closeout of all HDD construction contracts were in progress. Contract closed.</p>	E15-238	Closed
Accommodations Operations	<p>The contract for the accommodations operations services was awarded to East Coast Catering in April 2015.</p> <p>The Contract was extended to the end of August 2017 with the completion of camp operations.</p> <p>The camp was dismantled and removed, followed by greenfielding of the site.</p>	E13-89	Contract closeout in progress.

1 **2.3.1 Land Access Agreements**

2

3 NSPML is making every effort to ensure title is acquired to the key Project sites by  
4 December 31, 2017, as required under the Federal Loan Guarantee.

5

6 As final land surveys are completed, it is expected that there will be some amendments  
7 required to easements which have been obtained, particularly along the Transmission  
8 and Grounding lines, which will take place in 2018 as anticipated under the Credit  
9 Agreement.

10

11 **2.3.2 Funding**

12

13 As in prior months, Funding and Drawdown Requests containing comprehensive  
14 details of costs for the upcoming month were submitted to the Collateral Agent and  
15 Government of Canada as necessary, and all requested funds were received on  
16 schedule. Please refer to Attachment 3 for the Independent Engineer (IE) Draw  
17 Confirmation Certificates for the period. The IE Certificates allow for Project costs to  
18 be paid from the proceeds of the Maritime Link Construction Loan under the payment  
19 terms of the Material Project Documents and the Maritime Link Credit Agreement.

20

21 **2.3.3 Joint Development Agreements**

22

23 NSPML continues to work with Nalcor and NS Power to finalize the remaining  
24 operational agreements arising from the Formal Agreements with Nalcor. Please refer  
25 to Attachment 4 for details on the status of these Agreements.

1   **2.4   Engineering Activities**

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Commissioning of the Maritime Link continues to align with the completion target date of Q4 2017. Engineering is captured in three main categories across several Work Breakdown Structures (“WBSs”):

- HVdc Submarine Cable Supply and Installation - With all installation work now completed, the remaining engineering work is focused on completion of final documentation as the contract comes to a close in Q4 2017. Engineers from Nexans were available for the repair of land cable tests at the Woodbine transition site. Engineers will also be available for final transmission line tests in December.
  
- HVdc Converters and Substations - Engineering is included in the contract awarded to ABB for the supply and installation of these assets. With construction and installation activities close to completion, engineering is focused on site-related changes and protection and controls during commissioning. Engineering has supported the implementation work during the HVac power outages and energization of the equipment at the three substations. Engineers have been actively engaged in the HVdc equipment testing and documentation reviews. Similarly, they were engaged in witnessing and reviewing the subsystem tests and resulting documentation. Currently they are working with the utilities on the commissioning activities including the energization of the HVdc assets and final testing in December. The remaining engineering priorities include the completion of the main circuit studies, the Plant Circuit Diagrams (PCDs), test results documentation, the “as built” engineering drawings and preparations for the transition to operations.

- 1           • Overland Transmission - Designs for the transmission and grounding lines are  
2 complete and in-field modifications resulting from the contractor related as-found  
3 geotechnical conditions at each structure are complete. Engineering was engaged  
4 with the planning and assessment of the anchors for the NL HVdc transmission  
5 line. Engineers continued to review results of the assessments and were engaged in  
6 the repair and replacement program and the final associated documentation for the  
7 program. Engineers were also engaged in the final energization and testing of the  
8 NL DC transmission line where mechanical completion was achieved in  
9 December.

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Cable HVdc testing at Transition Site



Point Aconi Transition Site

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## **2.5 Submarine Cables**

Installation and testing is complete on the submarine cables.

Technical documentation and survey data is being prepared by Nexans to be submitted for final review and approval. This is the last work activity prior to the achievement of the Final Completion and contract closeout which is scheduled in December.

## **2.6 Converters and Substations**

Overall progress project to date is approximately 99 percent complete in early December. Resources and scheduled activities continue to be optimized and NSPML continues to forecast the achievement of the Commissioning Date, as defined in the Maritime Link Credit Agreement, of December 31, 2017.

At Bottom Brook and Woodbine, work at the HVdc converter buildings and DC Yards was approximately 99 percent complete at the end of November. Recent activity includes the completion of the pulling and terminations of cables to the HVdc control panels in the buildings and the energization of the MACH 2 Controls system. The

1 installation of telecom equipment and related network connections continued. Final  
2 system testing started in late November and both converter stations were energized in  
3 late November. All tests are scheduled to be completed in December, subject to the  
4 utilities' system availability due to weather conditions.

5  
6 A repair process for a damaged section of land cable was completed by removing the  
7 damaged section.

8  
9 At Granite Canal, civil works, substation installation and pre-commissioning are  
10 complete.

11  
12 At Cape Ray and Point Aconi Transition Compounds, civil works, installation and pre-  
13 commissioning were completed in early December.

14  
15 At Big Lorraine and Indian Head Grounding Sites, all installation and pre-  
16 commissioning was completed in early December.

## 17 18 **2.7 Construction Contractors – Transmission Lines**

19  
20 Following the completion of the repair and replacement program, the remaining  
21 anchor and tower installations were completed in November. As shown below, some  
22 of this work involved replacing anchors. The stringing of the conductors and the  
23 energization test of the line were completed in early December. The NL HVdc  
24 transmission line achieved Mechanical Completion in early December.

25  
26 All five transmission lines are now complete. The remaining work includes minor  
27 punch list activities, access trail rehabilitation, and final documentation, each to be  
28 completed in 2018.



Anchor Excavation

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## 2.8 Granite Canal Accommodations Operations

This camp was closed at the end of August. The contracts were awarded for the deconstruction of the camp and the greenfielding of the site. The contractors mobilized in October and all work was completed in November.

## 2.9 Grounding Sites

All installation and pre-commissioning of the grounding sites at Indian Head, Newfoundland and Labrador and Big Lorraine, Nova Scotia were completed in this period.

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**2.10 Independent Engineer**

The Independent Engineer (IE) team has completed several site visits and project inspections, at various stages in each province. As well, IE team members have witnessed the progress at each major manufacturing facility for cables, converters and transformers on multiple occasions at key stages of manufacturing. The IE completes confidential reports for Canada and provides a briefing to NSPML for each inspection.

In June, the IE completed a site visit to Bottom Brook, Cape Ray, Point Aconi and Woodbine. Please see Attachment 5 for the report from this visit. In September, the IE completed site visits to Point Aconi and Woodbine in Nova Scotia and to Bottom Brook and the HVdc Transmission line in Newfoundland and Labrador. In November, the IE visited Bottom Brook, Point Aconi and Woodbine with a representative from Canada, and in December the IE travelled to Woodbine to observe testing activities. Once received, all of the site visit reports from the IE will be provided in a forthcoming Quarterly Report.



1 **2.11 Status of Nalcor Project and Muskrat Falls**

2  
3 The projected in-service date for the Labrador-Island Link (LIL) continues to be Q2  
4 2018. The projected date for first power for Muskrat Falls Generation is Q4 2019, with  
5 full power projected for Q3 2020. This is a shift of approximately three months from  
6 Nalcor's forecast in June 2016. The Nova Scotia Block of energy from Muskrat Falls  
7 is projected for Q2 2020, when the third of four generation units is projected to be  
8 commissioned; this is within the range noted in NSPML's Q3 Report of October 2017.  
9

10 The latest report from Nalcor, published on November 17, 2017 indicates the  
11 following progress as of September 2017:

12  
13 Overall construction progress of all components of the Muskrat Falls Project at the end  
14 of September 2017 was 85 percent. The Muskrat Falls Generating Facility reached 75  
15 percent complete, with the Labrador-Island Transmission Link progress at 93 percent  
16 complete, and the transmission line connecting Churchill Falls to Muskrat Falls at  
17 99 percent complete.

18  
19 For the Muskrat Falls Generating Facility, key recent activities include:

- 20
- 21 • Targets for concrete placement for the powerhouse and intake continue to be
  - 22 exceeded, with 86 percent of concrete placed.
  - 23 • Continuation of installation of steel.
  - 24 • Completion of installation of all precast panels at powerhouse unit 1, installation of
  - 25 26 of 28 precast panels at powerhouse unit 2.
  - 26 • Continuation of concrete surface finishing for draft tubes 2, 3 and 4.
  - 27 • Commencement of assembly of unit 2 draft tube liner.
  - 28 • Commencement of in-water works for the installation of the debris/ice boom.

### 3.0 UPDATED COST SUMMARY

As per Enerco U-31, section 2.1, the detail below outlines the DG3 forecasted costs.

Table 2 below provides an updated cost summary for the Maritime Link, which includes actual costs incurred as of September 30, 2017 and forecasted costs for the remainder of the Project's construction phase.

NSPML continues to track and report all costs, actual and forecast (2011-2018), consistent with the methodologies used in the cost forecast represented in the Maritime Link Project Application. Project costs include fully allocated costs for the entire Project Management Team, including contractors, employees, executives dedicated to the project, and NS Power seconded employees at affiliate mark-up rates according to the Affiliate Code of Conduct. All costs provided are in Canadian dollars.

Actual AFUDC is being tracked and recorded monthly. AFUDC remains within the \$230 million amount estimated at the time of filing of NSPML's Application.

**Table 2 Updated Cost Summary for the Maritime Link**

(000's of Canadian Dollars)	Actual Costs								Forecast		Total Project Estimate at Completion
	2011-2013	2014	2015	2016	Q1 2017	Q2 2017	Q3 2017	Total Project to Date	Q4 2017	2018	
Emera NL Project Management Costs	44,379	42,315	24,599	25,639	8,446	8,222	8,618	162,217	1,607	13,000	176,824
Nalcor Project Support Costs	-	15,232	425	438	15	128	70	16,308	45	-	16,353
Construction and Engineering Initiatives	14,975	167,980	259,750	403,871	128,726	150,318	75,123	1,200,743	68,192	7,190	1,276,125
Environmental Approval	2,651	4,378	1,082	1,623	450	3,335	3,093	16,611	4,618	150	21,379
Submarine and related	3,359	83,797	74,439	54,213	31,643	47,554	16,801	311,807	22,583	-	334,390
Converters, structures, and other ancillary equipment	1,517	48,747	106,195	227,643	49,566	31,725	34,839	500,232	36,620	3,280	540,132
AC and DC Transmission	7,448	31,057	78,035	120,392	47,067	67,704	20,390	372,093	4,371	3,760	380,224
<b>Total</b>	<b>59,354</b>	<b>225,527</b>	<b>284,774</b>	<b>429,948</b>	<b>137,187</b>	<b>158,667</b>	<b>83,811</b>	<b>1,379,268</b>	<b>69,844</b>	<b>20,190</b>	<b>1,469,302</b>
Escalation									32,454	-	32,454
Contingency									75,598	-	75,598
<b>Grand Total</b>	<b>59,354</b>	<b>225,527</b>	<b>284,774</b>	<b>429,948</b>	<b>137,187</b>	<b>158,667</b>	<b>83,811</b>	<b>1,379,268</b>	<b>177,896</b>	<b>20,190</b>	<b>1,577,354</b>

1 **Total Actual Project Costs at end of Q3 2017 Compared to Previous Forecast**

2

3 The total actual project costs for Q3 2017 were \$6.5 million less than the costs for the  
4 same period forecasted in the NSPML Quarterly Report of October 16, 2017. The  
5 explanations of the variances are as follows:

6

7 • ENL Project Management, Nalcor Project Support and Environmental Approval:  
8 \$1.1 million higher cost incurrence due to resourcing, administration and timing of  
9 activities.

10

11 • Submarine and related: \$2.5 million lower cost in the subsea program and timing  
12 of other completion activities.

13

14 • Converters, structures and other ancillary equipment: \$3.1 million lower cost  
15 incurrence due to slower progress achieved for civil construction, installation and  
16 follow-on testing activities for the converter buildings and HVdc yards.

17

18 • AC and DC Transmission: \$11.0 million higher than forecasted. This was  
19 attributed to the NL DC transmission line anchor investigation, repair and  
20 replacement program.

21

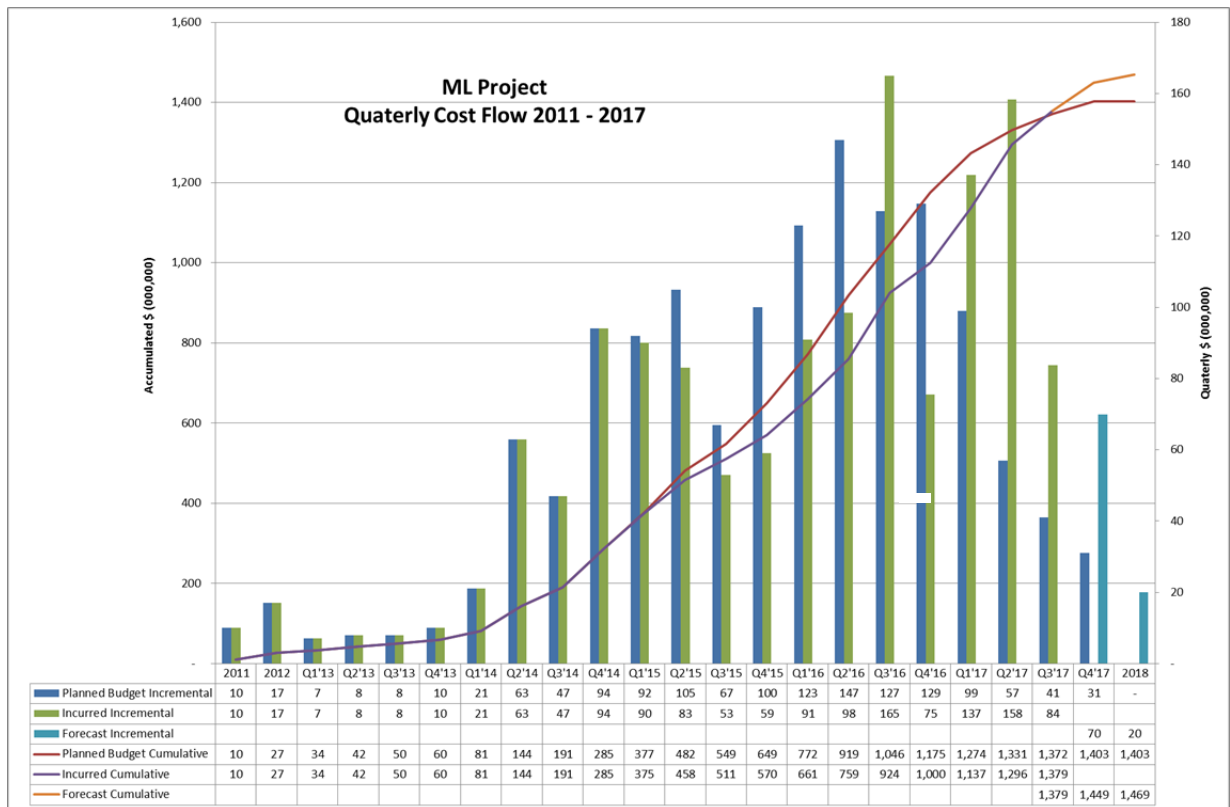
22 The variances do not change the forecasted completion date of Q4 2017, and the  
23 Project remains within budget.

4.0 COST FLOW

As per Enerco U-31, section 2.2, please refer to Table 3 below for the cost flow until the Maritime Link is commissioned. This cost flow for the base capital spending remains forecasted at \$1.469 billion as reported in the previous quarter with no draw down on contingency or escalation. The total of the base capital spending, escalation, and contingency amounts remains at \$1.577 billion.

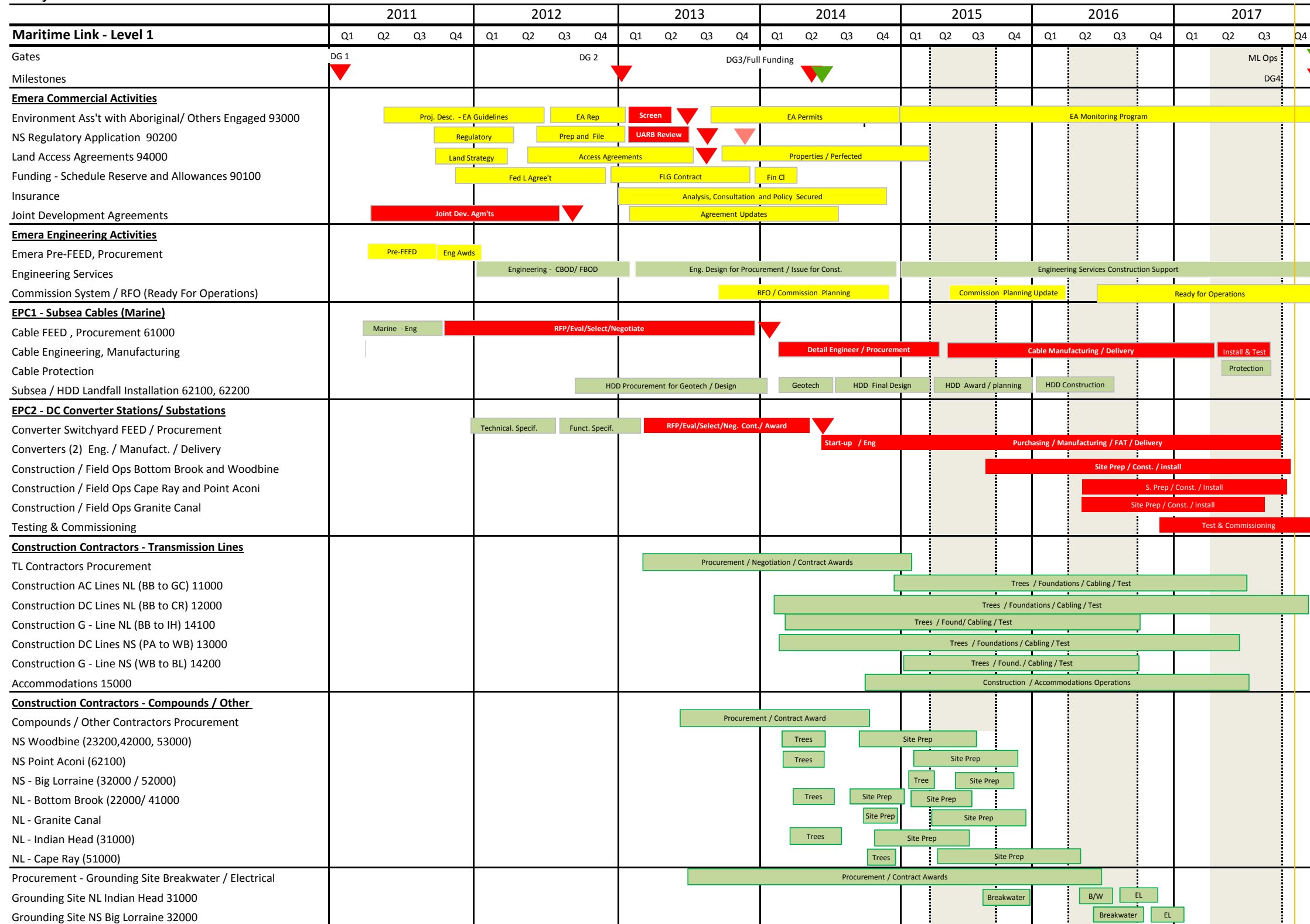
Certain costs such as final major contract payments, release of statutory withholdings, and payment of punch list items are expected to occur in 2018. This does not change the forecast of the project being in-service by January 1, 2018 and AFUDC ending upon the in-service date. NSPML is currently forecasting these 2018 payments and will report on these amounts in the next quarterly report.

**Table 3 Cost Flow until the Maritime Link is Commissioned**



# Maritime Link Project Level 1 Project Schedule

## Project Level 1 Schedule



ENL Lead Activities  
 Other Lead Activities  
 Critical Path Activities  
▼ Milestones

Marine Weather Installation Window 1  
 Marine Weather Installation Window 2  
 Marine Weather Installation Window 3

Activity Name	Start	Finish	2014		2015				2016				2017				2018				2019				2020					
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2		
<b>MLP - Schedule ( DD-DEC-01-17 )</b>	01-Mar-11 A	29-Dec-17	[Gantt bar from 01-Mar-11 to 29-Dec-17]																											
<b>GATES AND MILESTONES</b>	01-Mar-11 A	29-Dec-17	[Gantt bar from 01-Mar-11 to 29-Dec-17]																											
<b>Gates &amp; Milestones.</b>	24-Dec-12 A	29-Dec-17	[Gantt bar from 24-Dec-12 to 29-Dec-17]																											
DG2 Concept Selection		24-Dec-12 A	[Milestone diamond at 24-Dec-12]																											
DG3 Approval to Construct		12-May-14 A	[Milestone diamond at 12-May-14]																											
Project Completion (Handover)		28-Dec-17	[Milestone diamond at 28-Dec-17]																											
DG4 Approval to Operate	29-Dec-17		[Milestone diamond at 29-Dec-17]																											
<b>Milestones</b>	01-Mar-11 A	29-Dec-17	[Gantt bar from 01-Mar-11 to 29-Dec-17]																											
Start MLP	01-Mar-11 A		[Milestone diamond at 01-Mar-11]																											
Submit EA Report		10-Jan-13 A	[Milestone diamond at 10-Jan-13]																											
Submit UARB Application		28-Jan-13 A	[Milestone diamond at 28-Jan-13]																											
Environmental Assessment Approval		21-Jun-13 A	[Milestone diamond at 21-Jun-13]																											
UARB Approval		29-Nov-13 A	[Milestone diamond at 29-Nov-13]																											
Marine Cable Contract Award (EPC1)		30-Jan-14 A	[Milestone diamond at 30-Jan-14]																											
Transmission Line Tree Clearing Start 12000 BB to CR	17-Feb-14 A		[Milestone diamond at 17-Feb-14]																											
Converter Station Contract Signoff (EPC2) ( E12-74 )		30-Jun-14 A	[Milestone diamond at 30-Jun-14]																											
Marine Cable Install Substantial Complete		30-Aug-17 A	[Milestone diamond at 30-Aug-17]																											
Commission Complete		29-Dec-17	[Milestone diamond at 29-Dec-17]																											
First Commercial Power		29-Dec-17	[Milestone diamond at 29-Dec-17]																											
<b>Milestones For E12-74</b>	26-Jan-14 A	29-Dec-17	[Gantt bar from 26-Jan-14 to 29-Dec-17]																											
<b>OVERHEAD TRANSMISSION LINE</b>	02-Oct-12 A	05-Dec-17	[Gantt bar from 02-Oct-12 to 05-Dec-17]																											
<b>11000 (T23001) Overhead AC Transmission Line from Granite Canal to Bottom Brook ( NL )</b>	05-Nov-12 A	08-Aug-17 A	[Gantt bar from 05-Nov-12 to 08-Aug-17]																											
ENGINEERING	05-Nov-12 A	30-Mar-17 A	[Gantt bar from 05-Nov-12 to 30-Mar-17]																											
PROCUREMENT ( MATERIALS & FABRICATION ).	02-Feb-15 A	30-Nov-16 A	[Gantt bar from 02-Feb-15 to 30-Nov-16]																											
CONSTRUCTION	02-Jul-14 A	09-Jun-17 A	[Gantt bar from 02-Jul-14 to 09-Jun-17]																											
COMMISSIONING	09-Jun-17 A	08-Aug-17 A	[Gantt bar from 09-Jun-17 to 08-Aug-17]																											
<b>12000 (X20005/6) Overhead HVDC Transmission Line from Bottom Brook to Cape Ray ( NL )</b>	05-Nov-12 A	05-Dec-17	[Gantt bar from 05-Nov-12 to 05-Dec-17]																											
ENGINEERING	05-Nov-12 A	30-Mar-17 A	[Gantt bar from 05-Nov-12 to 30-Mar-17]																											
PROCUREMENT ( MATERIALS & FABRICATION )	01-Oct-14 A	30-Nov-16 A	[Gantt bar from 01-Oct-14 to 30-Nov-16]																											
CONSTRUCTION	24-Feb-14 A	04-Dec-17	[Gantt bar from 24-Feb-14 to 04-Dec-17]																											
COMMISSIONING	01-Dec-17	05-Dec-17	[Gantt bar from 01-Dec-17 to 05-Dec-17]																											

Primary Baseline  
  Remaining Work  
 ◆ Milestone  
  Summary  
 Actual Work  
 ◆ Baseline Milestone

Activity Name	Start	Finish	2014		2015				2016				2017				2018				2019				2020					
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2		
			Gantt Chart Data																											
<b>13000 (X20001/2) Overhead HVDC Transmission Line from Point Aconi to Woodbine ( NS )</b>	02-Oct-12 A	31-May-17 A	[Gantt bar: 02-Oct-12 A to 31-May-17 A]																											
ENGINEERING	02-Oct-12 A	30-Mar-17 A	[Gantt bar: 02-Oct-12 A to 30-Mar-17 A]																											
PROCUREMENT ( MATERIALS & FABRICATION )	02-Feb-15 A	30-Nov-16 A	[Gantt bar: 02-Feb-15 A to 30-Nov-16 A]																											
CONSTRUCTION	17-Feb-14 A	25-May-17 A	[Gantt bar: 17-Feb-14 A to 25-May-17 A]																											
COMMISSIONING	25-May-17 A	31-May-17 A	[Gantt bar: 25-May-17 A to 31-May-17 A]																											
<b>14100 (E00502) Grounding line from Bottom Brook to Indian Head ( NL )</b>	05-Nov-12 A	30-Sep-16 A	[Gantt bar: 05-Nov-12 A to 30-Sep-16 A]																											
ENGINEERING	05-Nov-12 A	30-Sep-16 A	[Gantt bar: 05-Nov-12 A to 30-Sep-16 A]																											
PROCUREMENT ( MATERIALS & FABRICATION )	02-Mar-15 A	25-Nov-15 A	[Gantt bar: 02-Mar-15 A to 25-Nov-15 A]																											
CONSTRUCTION	17-Mar-14 A	30-Sep-16 A	[Gantt bar: 17-Mar-14 A to 30-Sep-16 A]																											
COMMISSIONING	19-Sep-16 A	30-Sep-16 A	[Gantt bar: 19-Sep-16 A to 30-Sep-16 A]																											
<b>14200 (E00501) Grounding line - Woodbine to Big Lorraine ( NS )</b>	02-Oct-12 A	30-Sep-16 A	[Gantt bar: 02-Oct-12 A to 30-Sep-16 A]																											
ENGINEERING	02-Oct-12 A	30-Sep-16 A	[Gantt bar: 02-Oct-12 A to 30-Sep-16 A]																											
PROCUREMENT ( MATERIALS & FABRICATION )	18-Mar-15 A	22-May-15 A	[Gantt bar: 18-Mar-15 A to 22-May-15 A]																											
CONSTRUCTION	23-Feb-15 A	29-Sep-16 A	[Gantt bar: 23-Feb-15 A to 29-Sep-16 A]																											
COMMISSIONING	06-Sep-16 A	30-Sep-16 A	[Gantt bar: 06-Sep-16 A to 30-Sep-16 A]																											
<b>15000 Accommodations</b>	23-Aug-13 A	30-Aug-17 A	[Gantt bar: 23-Aug-13 A to 30-Aug-17 A]																											
ENGINEERING	23-Aug-13 A	31-Oct-14 A	[Gantt bar: 23-Aug-13 A to 31-Oct-14 A]																											
PROCUREMENT ( MATERIALS & FABRICATION )	15-Sep-14 A	10-Nov-14 A	[Gantt bar: 15-Sep-14 A to 10-Nov-14 A]																											
CONSTRUCTION	01-Sep-14 A	06-Jul-15 A	[Gantt bar: 01-Sep-14 A to 06-Jul-15 A]																											
OPERATIONS	30-Jul-15 A	30-Aug-17 A	[Gantt bar: 30-Jul-15 A to 30-Aug-17 A]																											
<b>AC INTERCONNECTION STATIONS.</b>	03-Dec-12 A	13-Nov-17 A	[Gantt bar: 03-Dec-12 A to 13-Nov-17 A]																											
<b>21100 (103NL) Switchyard at Granite Canal ( NL )</b>	03-Dec-12 A	21-Oct-17 A	[Gantt bar: 03-Dec-12 A to 21-Oct-17 A]																											
ENGINEERING	03-Dec-12 A	31-Mar-17 A	[Gantt bar: 03-Dec-12 A to 31-Mar-17 A]																											
PROCUREMENT ( MATERIALS & FABRICATION )	29-Sep-14 A	05-Jun-17 A	[Gantt bar: 29-Sep-14 A to 05-Jun-17 A]																											
CONSTRUCTION	01-Oct-15 A	04-Aug-17 A	[Gantt bar: 01-Oct-15 A to 04-Aug-17 A]																											
COMMISSIONING	11-May-17 A	21-Oct-17 A	[Gantt bar: 11-May-17 A to 21-Oct-17 A]																											
<b>21200 (102NL) Modifications for P&amp;C Communications, Ductbanks to Existing 230 kV Subst</b>	12-May-14 A	30-Aug-17 A	[Gantt bar: 12-May-14 A to 30-Aug-17 A]																											
ENGINEERING	12-May-14 A	30-Sep-15 A	[Gantt bar: 12-May-14 A to 30-Sep-15 A]																											
PROCUREMENT ( MATERIALS & FABRICATION )	28-Apr-15 A	31-Jan-17 A	[Gantt bar: 28-Apr-15 A to 31-Jan-17 A]																											
EPC2 CONSTRUCTION	16-Aug-16 A	30-Aug-17 A	[Gantt bar: 16-Aug-16 A to 30-Aug-17 A]																											
COMMISSIONING	01-Aug-17 A	21-Aug-17 A	[Gantt bar: 01-Aug-17 A to 21-Aug-17 A]																											
<b>22000 (101NL) Switchyard at Bottom Brook</b>	03-Dec-12 A	13-Nov-17 A	[Gantt bar: 03-Dec-12 A to 13-Nov-17 A]																											

▬ Primary Baseline   
  Remaining Work   
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Activity Name	Start	Finish	2014		2015				2016				2017				2018				2019		2020			
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2		
ENGINEERING	03-Dec-12 A	31-Mar-17 A	▶ 31-Mar-17 A																							
PROCUREMENT ( MATERIALS & FABRICATION )	29-Sep-14 A	24-Jul-17 A	▶ 24-Jul-17 A																							
CONSTRUCTION	29-Sep-14 A	03-Nov-17 A	▶ 03-Nov-17 A																							
COMMISSIONING	01-Feb-17 A	13-Nov-17 A	▶ 13-Nov-17 A																							
<b>22100 Generator Fuel Supply</b>																										
<b>23100 (301NS) Connect 345 kV Substation at Woodbine to Converter Station, ( NS )</b>	06-May-13 A	29-Aug-14 A	▶ 29-Aug-14 A																							
<b>23200 (301NS) Extension of Substation at Woodbine ( NS )</b>	17-Feb-14 A	16-Oct-17 A	▶ 16-Oct-17 A																							
ENGINEERING	01-Aug-14 A	31-Mar-17 A	▶ 31-Mar-17 A																							
PROCUREMENT ( MATERIALS & FABRICATION )	02-Sep-14 A	15-Jun-17 A	▶ 15-Jun-17 A																							
CONSTRUCTION	17-Feb-14 A	12-Oct-17 A	▶ 12-Oct-17 A																							
COMMISSIONING	25-Nov-16 A	16-Oct-17 A	▶ 16-Oct-17 A																							
<b>23300 (301NS) NSPI Control Centre Modifications ( NS )</b>	04-Jul-17 A	30-Aug-17 A	▶ 30-Aug-17 A																							
CONSTRUCTION	04-Jul-17 A	26-Jul-17 A	▶ 26-Jul-17 A																							
COMMISSIONING	01-Aug-17 A	30-Aug-17 A	▶ 30-Aug-17 A																							
<b>23400 (301NL) NLH Control Centre Modifications ( NL )</b>	03-Jul-17 A	30-Aug-17 A	▶ 30-Aug-17 A																							
CONSTRUCTION	03-Jul-17 A	11-Aug-17 A	▶ 11-Aug-17 A																							
COMMISSIONING	14-Aug-17 A	30-Aug-17 A	▶ 30-Aug-17 A																							
<b>GROUNDING SITES ASSOCIATED WITH CONVERTER STATIONS.</b>	06-May-13 A	13-Feb-17 A	▶ 13-Feb-17 A																							
<b>31000 (901NL) Grounding Site NL - Indian Head ( NL )</b>	06-May-13 A	30-Jan-17 A	▶ 30-Jan-17 A																							
ENGINEERING	06-May-13 A	11-Feb-15 A	▶ 11-Feb-15 A																							
PROCUREMENT ( MATERIALS & FABRICATION )	17-Aug-16 A	04-Nov-16 A	▶ 04-Nov-16 A																							
CONSTRUCTION	06-Oct-14 A	25-Nov-16 A	▶ 25-Nov-16 A																							
COMMISSIONING	10-Jan-17 A	30-Jan-17 A	▶ 30-Jan-17 A																							
<b>32000 Grounding Site NS - Big Lorraine ( NS )</b>	06-May-13 A	13-Feb-17 A	▶ 13-Feb-17 A																							
ENGINEERING	06-May-13 A	31-Mar-16 A	▶ 31-Mar-16 A																							
PROCUREMENT ( MATERIALS & FABRICATION )	17-Aug-16 A	08-Dec-16 A	▶ 08-Dec-16 A																							
CONSTRUCTION	01-Dec-14 A	29-Nov-16 A	▶ 29-Nov-16 A																							
COMMISSIONING	13-Feb-17 A	13-Feb-17 A	▶ 13-Feb-17 A																							
<b>CONVERTER STATIONS.</b>	01-Oct-12 A	05-Dec-17	▶ 05-Dec-17																							
<b>41000 (301NL) Bottom Brook Converter Station ( NL )</b>	01-Oct-12 A	05-Dec-17	▶ 05-Dec-17																							
ENGINEERING	01-Oct-12 A	12-May-17 A	▶ 12-May-17 A																							
PROCUREMENT ( MATERIALS & FABRICATION )	03-Nov-14 A	28-Sep-17 A	▶ 28-Sep-17 A																							

Primary Baseline  
  Remaining Work  
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  Summary



Activity Name	Start	Finish	2014		2015				2016				2017				2018				2019		2020								
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2							
<b>CONSTRUCTION</b>	29-Sep-14 A	01-Dec-17	▼																			01-Dec-17									
<b>COMMISSIONING</b>	09-Oct-17 A	05-Dec-17																				▼	05-Dec-17								
<b>42000 (301NS) Woodbine Converter Station ( NS )</b>	01-Oct-12 A	04-Dec-17	▼																			04-Dec-17									
<b>ENGINEERING</b>	01-Oct-12 A	12-May-17 A																				▼	12-May-17 A								
<b>PROCUREMENT ( MATERIALS &amp; FABRICATION )</b>	08-Jul-15 A	06-Oct-17 A																				▼	06-Oct-17 A								
<b>CONSTRUCTION</b>	11-Sep-14 A	04-Dec-17	▼																			04-Dec-17									
<b>COMMISSIONING</b>	02-Oct-17 A	28-Nov-17 A																				▼	28-Nov-17 A								
<b>OVERHEAD TO UNDERGROUND TRANSITION SITES.</b>	08-Oct-12 A	21-Dec-17	▼																			21-Dec-17									
<b>51000 (701NL) Overhead to Underground Transition Compound at Cape Ray ( NL )</b>	28-Jan-13 A	07-Dec-17	▼																			07-Dec-17									
<b>ENGINEERING</b>	28-Jan-13 A	03-Apr-17 A																				▼	03-Apr-17 A								
<b>PROCUREMENT ( MATERIALS &amp; FABRICATION )</b>	08-Feb-16 A	05-Nov-17 A																				▼	05-Nov-17 A								
<b>CONSTRUCTION</b>	10-Nov-15 A	18-Nov-17 A	▼																			18-Nov-17 A									
<b>COMMISSIONING</b>	17-Nov-17 A	07-Dec-17																				▼	07-Dec-17								
<b>52000 (701NS) Overhead to Underground Transition Compound at Point Aconi ( NS )</b>	08-Oct-12 A	29-Nov-17 A	▼																			29-Nov-17 A									
<b>ENGINEERING</b>	08-Oct-12 A	30-Mar-17 A																				▼	30-Mar-17 A								
<b>PROCUREMENT ( MATERIALS &amp; FABRICATION )</b>	08-Feb-16 A	05-Nov-17 A																				▼	05-Nov-17 A								
<b>CONSTRUCTION</b>	04-Feb-14 A	29-Nov-17 A	▼																			29-Nov-17 A									
<b>COMMISSIONING.</b>	01-Nov-17 A	17-Nov-17 A																				▼	17-Nov-17 A								
<b>53000 (702NS) Woodbine Transition Compound ( NS )</b>	10-Mar-14 A	20-Dec-17	▼																			20-Dec-17									
<b>ENGINEERING</b>	10-Mar-14 A	31-Mar-17 A																				▼	31-Mar-17 A								
<b>PROCUREMENT ( MATERIALS &amp; FABRICATION )</b>	01-Nov-16 A	22-Aug-17 A																				▼	22-Aug-17 A								
<b>CONSTRUCTION</b>	09-Sep-14 A	01-Dec-17	▼																			01-Dec-17									
<b>COMMISSIONING</b>	01-Dec-17	20-Dec-17																				▼	20-Dec-17								
<b>55000 Telecommunication Links</b>	01-Jan-13 A	21-Dec-17	▼																			21-Dec-17									
<b>ENGINEERING</b>	01-Jan-13 A	31-Oct-14 A	▼																			31-Oct-14 A									
<b>PROCUREMENT ( MATERIALS &amp; FABRICATION )</b>	01-Apr-16 A	30-Oct-17 A																				▼	30-Oct-17 A								
<b>CONSTRUCTION</b>	05-Jun-17 A	12-Dec-17	▼																			12-Dec-17									
<b>COMMISSIONING</b>	21-Dec-17	21-Dec-17																				▼	21-Dec-17								
<b>56000 Control Center Data Link</b>	29-Nov-13 A	01-Dec-17	▼																			01-Dec-17									
<b>ENGINEERING</b>	29-Nov-13 A	31-May-16 A																				▼	31-May-16 A								
<b>PROCUREMENT ( MATERIALS &amp; FABRICATION )</b>	19-Jan-16 A	31-May-16 A																				▼	31-May-16 A								
<b>CONSTRUCTION</b>	19-Jan-16 A	01-Dec-17	▼																			01-Dec-17									

Primary Baseline  
  Remaining Work  
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 Actual Work  
 ◆ Baseline Milestone  
 Summary

Activity Name	Start	Finish	2014		2015				2016				2017				2018				2019				2020					
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2		
<b>COMMISSIONING</b>	01-Dec-17	01-Dec-17	▼ 01-Dec-17																											
<b>58000 Improvement of Access Road Infrastructure.</b>	02-May-13 A	30-Aug-17 A	▶ 30-Aug-17 A																											
<b>ENGINEERING</b>	02-May-13 A	15-Oct-13 A	▶ 15-Oct-13 A																											
<b>CONSTRUCTION</b>	14-Oct-14 A	26-Jan-16 A	▶ 26-Jan-16 A																											
<b>COMMISSIONING</b>	27-Jan-16 A	02-Feb-16 A	▶ 02-Feb-16 A																											
<b>OPERATIONS</b>	08-Feb-16 A	30-Aug-17 A	▶ 30-Aug-17 A																											
<b>SUBMARINE CABLE AND TERMINATIONS.</b>	03-Sep-12 A	05-Dec-17	▶ 05-Dec-17																											
<b>61000 Submarine Cable, Land Cable, and Terminations</b>	30-Jan-14 A	05-Dec-17	▶ 05-Dec-17																											
<b>MILESTONES</b>	30-Jan-14 A	30-Oct-17 A	▶ 30-Oct-17 A																											
<b>ADMINISTRATION &amp; QHSER</b>	30-Jan-14 A	05-Dec-17	▶ 05-Dec-17																											
<b>ENGINEERING</b>	30-Jan-14 A	09-Oct-17 A	▶ 09-Oct-17 A																											
<b>PROCUREMENT</b>	11-Aug-14 A	30-Jun-17 A	▶ 30-Jun-17 A																											
<b>MANUFACTURING</b>	17-Jun-15 A	02-Mar-17 A	▶ 02-Mar-17 A																											
<b>TRANSPORT</b>	27-Sep-15 A	13-May-17 A	▶ 13-May-17 A																											
<b>CONSTRUCTION INSTALLATION &amp; PROTECTION</b>	29-Jun-15 A	30-Sep-17 A	▶ 30-Sep-17 A																											
<b>PRECOMMISSIONING</b>	28-May-17 A	30-Aug-17 A	▶ 30-Aug-17 A																											
<b>62000 Landfall HDD</b>	03-Sep-12 A	27-Aug-16 A	▶ 27-Aug-16 A																											
<b>HDD ENGINEERING</b>	03-Sep-12 A	10-Sep-15 A	▶ 10-Sep-15 A																											
<b>62200 Landfall HDD Cape Ray, NL</b>	15-Apr-14 A	06-Jun-16 A	▶ 06-Jun-16 A																											
<b>62100 Landfall HDD Point Aconi, NS</b>	04-Feb-14 A	27-Aug-16 A	▶ 27-Aug-16 A																											
<b>63000 Marine Consultancy Services</b>	22-Mar-13 A	01-Dec-17	▶ 01-Dec-17																											
<b>Storage Table Reel Foundation</b>	05-Dec-16 A	30-Mar-17 A	▶ 30-Mar-17 A																											
<b>63100 Marine Warranty Survey Services</b>	30-Dec-16 A	30-Dec-16 A	▶ 30-Dec-16 A																											
<b>63200 Marine 3rd Party Engineering Verification Services</b>	01-Jun-17 A	01-Dec-17	▶ 01-Dec-17																											
<b>63300 Engineering Studies (finalize cable protection studies, design rock berm, etc.)</b>	22-Mar-13 A	04-Apr-14 A	▶ 04-Apr-14 A																											
<b>20000 NSPI</b>	07-Feb-14 A	31-Aug-17 A	▶ 31-Aug-17 A																											
<b>20100 NSPI - L6513 - Onslow to Springhill Rebuild</b>	07-Feb-14 A	23-Jun-17 A	▶ 23-Jun-17 A																											
<b>ENGINEERING</b>	07-Feb-14 A	31-Aug-16 A	▶ 31-Aug-16 A																											
<b>PROCUREMENT ( MATERIALS &amp; FABRICATIONS )</b>	01-May-16 A	01-May-16 A	▶ 01-May-16 A																											
<b>CONSTRUCTION</b>	10-Jun-14 A	30-Mar-17 A	▶ 30-Mar-17 A																											
<b>COMMISSIONING</b>	01-Apr-17 A	23-Jun-17 A	▶ 23-Jun-17 A																											
<b>20200 NSPI - Strait of Canso Crossing/Separate L-8004/L-7005</b>	17-Mar-14 A	31-Aug-17 A	▶ 31-Aug-17 A																											

Primary Baseline  
  Remaining Work  
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  Summary  
  Actual Work  
 ◆ Baseline Milestone  
  Summary



Activity Name	Start	Finish	2014		2015				2016				2017				2018				2019				2020					
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2		
Risk Assessments	09-Sep-13 A	30-Jun-17 A	▼ 30-Jun-17 A																											
Purchasing (Contracts)	15-Mar-11 A	26-Sep-16 A	▼ 26-Sep-16 A																											
<b>90200 External Services</b>	<b>04-Jan-12 A</b>	<b>31-Dec-15 A</b>	▼ 31-Dec-15 A																											
Legal Services	25-Jun-12 A	31-Dec-15 A	▼ 31-Dec-15 A																											
Insurance Services	03-Jul-12 A	10-Dec-14 A	▼ 10-Dec-14 A																											
Regulatory (UARB) Affairs	02-Jan-13 A	24-Jun-14 A	▼ 24-Jun-14 A																											
Independent Project Reviews	08-Jul-13 A	31-Dec-15 A	▼ 31-Dec-15 A																											
Human Resources, Diversity and Gender Equity and Benefits Strategy	01-Aug-12 A	30-Sep-14 A	▼ 30-Sep-14 A																											
CBoD/FBoD Hatch	04-Jan-12 A	22-Jan-13 A																												
<b>93000 Environmental</b>	<b>02-Apr-12 A</b>	<b>29-Sep-16 A</b>	▼ 29-Sep-16 A																											
EA Approval	11-Jan-13 A	09-Sep-13 A	Sep-13 A																											
Environmental Studies	02-Apr-12 A	30-Jun-16 A	▼ 30-Jun-16 A																											
Permits	01-Apr-13 A	29-Sep-16 A	▼ 29-Sep-16 A																											
Environmental Protocol Documents	01-Aug-13 A	31-Dec-15 A	▼ 31-Dec-15 A																											
Aboriginal Relations	11-Jun-12 A	31-Dec-15 A	▼ 31-Dec-15 A																											
Other Stakeholder Relations	28-Jan-13 A	31-Dec-15 A	▼ 31-Dec-15 A																											
Post EA Environmental Monitoring Program	01-Jun-13 A	31-Dec-15 A	▼ 31-Dec-15 A																											
Environmental Program 14001	31-Jan-13 A	31-Dec-15 A	▼ 31-Dec-15 A																											
<b>94000 Land Acquisition</b>	<b>15-Jul-12 A</b>	<b>31-Dec-15 A</b>	▼ 31-Dec-15 A																											
<b>90500 Other NLH System Upgrades</b>	<b>31-Aug-12 A</b>	<b>15-Dec-17</b>	▼ 15-Dec-17																											
Engineering (TL201, Bay D'Espoir, Upper Salmon)	31-Aug-12 A	14-Aug-13 A	Aug-13 A																											
Procurement (Materials & Fabrication)	03-Apr-17 A	29-Jun-17 A	▼ 29-Jun-17 A																											
Construction	28-Dec-16 A	01-Dec-17	▼ 01-Dec-17																											
Commissioning	30-Dec-16 A	15-Dec-17	▼ 15-Dec-17																											
<b>Dynamic Commissioning (90100)</b>	<b>24-Nov-17 A</b>	<b>29-Dec-17</b>	▼ 29-Dec-17																											
<b>System Test Preparation Activities</b>	<b>01-Dec-17</b>	<b>06-Dec-17</b>	▼ 06-Dec-17																											
<b>HV Energization.</b>	<b>24-Nov-17 A</b>	<b>06-Dec-17</b>	▼ 06-Dec-17																											
Pole - 2	24-Nov-17 A	26-Nov-17 A	▼ 26-Nov-17 A																											
Pole - 1	29-Nov-17 A	06-Dec-17	▼ 06-Dec-17																											
<b>Terminal Operation</b>	<b>28-Nov-17 A</b>	<b>07-Dec-17</b>	▼ 07-Dec-17																											
Pole - 2	28-Nov-17 A	28-Nov-17 A	▼ 28-Nov-17 A																											
Pole - 1	06-Dec-17	07-Dec-17	▼ 07-Dec-17																											

Primary Baseline  
  Remaining Work  
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  Summary  
 Actual Work  
 ◆ Baseline Milestone



## SCHEDULE "Q"

## DRAW CONFIRMATION CERTIFICATE BY INDEPENDENT ENGINEER

## ML PROJECT FINANCING

This Draw Confirmation Certificate is provided by Argirov Engineering Inc. (the "Independent Engineer") to The Toronto-Dominion Bank (the "Collateral Agent") in connection with the credit agreement dated February 24, 2014, between NSP Maritime Link Incorporated (the "Borrower"), Maritime Link Financing Trust (the "Lender") and the Collateral Agent (said agreement, as same may be amended, supplemented or restated from time to time, is hereinafter referred to as the "ML Credit Agreement"). Capitalized terms used in this Draw Confirmation Certificate not defined herein shall have the meanings assigned to them in Exhibit A of the ML Credit Agreement.

The Independent Engineer has (i) discussed matters believed pertinent to this Draw Confirmation Certificate with the Borrower and any relevant Material Project Participants, (ii) made such other inquiries as we have determined appropriate and (iii) reviewed:

- (a) the Construction Report dated October 20, 2017 (the "Construction Report"); and
- (b) the Borrower's funding request dated October 25, 2017 (the "Funding Request").

On the basis of the foregoing limited review procedures and on the understanding and assumption that the factual information contained in the Construction Report and Funding Request is true, correct and complete in all material respects, the Independent Engineer makes the following statements in favour of the Collateral Agent and to the best of its knowledge, information and belief, as of the date hereof that:

1. Construction of the Project is progressing in a satisfactory manner and in accordance with the terms of the applicable Material Project Documents with the following exceptions:

NO EXCEPTIONS NOTED

2. All payments to the Material Project Participants to be paid with the proceeds of the ML Construction Loan (including any payments using advances from the Working Capital Reserve Account during the period from the last Draw Confirmation Certificate to this Draw Confirmation Certificate) requested to be made pursuant to the Funding Request are allowed under the payment terms of the applicable Material Project Documents and the ML Credit Agreement as to the advance requirements of Section 7.3, with the following exceptions:

NO EXCEPTIONS NOTED

3. Assuming the Borrower exercises proper engineering and construction management throughout the remainder of the Project, we have no reason to believe that the


Commissioning Date will not occur prior to the Date Certain, or that the total Project Costs will exceed [\$1,577,354,028] with the following exceptions:

NO EXCEPTIONS NOTED

This Draw Confirmation Certificate is solely for the information and assistance of the Collateral Agent, the Lender and Canada in connection with the Funding Request and shall not be used, circulated or relied upon for any other purpose or by any other party.

Dated: October 27, 2017

**Argirov Engineering Inc.**

By:  \_\_\_\_\_

Title: IE Team Leader

## SCHEDULE "Q"

## DRAW CONFIRMATION CERTIFICATE BY INDEPENDENT ENGINEER

## ML PROJECT FINANCING

This Draw Confirmation Certificate is provided by Argirov Engineering Inc. (the "Independent Engineer") to The Toronto-Dominion Bank (the "Collateral Agent") in connection with the credit agreement dated February 24, 2014, between NSP Maritime Link Incorporated (the "Borrower"), Maritime Link Financing Trust (the "Lender") and the Collateral Agent (said agreement, as same may be amended, supplemented or restated from time to time, is hereinafter referred to as the "ML Credit Agreement"). Capitalized terms used in this Draw Confirmation Certificate not defined herein shall have the meanings assigned to them in Exhibit A of the ML Credit Agreement.

The Independent Engineer has (i) discussed matters believed pertinent to this Draw Confirmation Certificate with the Borrower and any relevant Material Project Participants, (ii) made such other inquiries as we have determined appropriate and (iii) reviewed:

- (a) the Construction Report dated November 20, 2017 (the "Construction Report"); and
- (b) the Borrower's funding request dated November 22, 2017 (the "Funding Request").

On the basis of the foregoing limited review procedures and on the understanding and assumption that the factual information contained in the Construction Report and Funding Request is true, correct and complete in all material respects, the Independent Engineer makes the following statements in favour of the Collateral Agent and to the best of its knowledge, information and belief, as of the date hereof that:

1. Construction of the Project is progressing in a satisfactory manner and in accordance with the terms of the applicable Material Project Documents with the following exceptions:

NO EXCEPTIONS NOTED

2. All payments to the Material Project Participants to be paid with the proceeds of the ML Construction Loan (including any payments using advances from the Working Capital Reserve Account during the period from the last Draw Confirmation Certificate to this Draw Confirmation Certificate) requested to be made pursuant to the Funding Request are allowed under the payment terms of the applicable Material Project Documents and the ML Credit Agreement as to the advance requirements of Section 7.3, with the following exceptions:

NO EXCEPTIONS NOTED

3. Assuming the Borrower exercises proper engineering and construction management throughout the remainder of the Project, we have no reason to believe that the



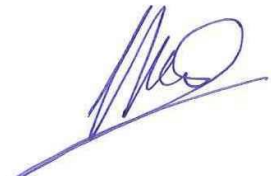
Commissioning Date will not occur prior to the Date Certain, or that the total Project Costs will exceed [\$1,577,354,028] with the following exceptions:

NO EXCEPTIONS NOTED

This Draw Confirmation Certificate is solely for the information and assistance of the Collateral Agent, the Lender and Canada in connection with the Funding Request and shall not be used, circulated or relied upon for any other purpose or by any other party.

Dated: November 24, 2017

**Argirov Engineering Inc.**

By:  \_\_\_\_\_

Title: IE Team Leader

### **Operating Agreement Requirements Arising from the Formal Agreements**

	<b>Agreement</b>	<b>Parties</b>	<b>Description</b>	<b>Formal Agreement Source</b>	<b>Status</b>
1.	Asset Interconnection Agreement (NL)	Emera, NLH	Interconnection of ML with the Island Interconnected System	ML-JDA, s. 2.1 (c )	Completed
2.	Multi-Party Pooling Agreement	Emera, NLH	NLH (SO) to have operational control of ML NLH AC Upgrades	ML-JDA, s. 2.1 (d )	Completed
3.	Transmission Operating Agreement (NL)	Emera, NLH	NLH (SO) to have operational control of ML NL HVdc Facilities	ML-JDA, s. 2.1 (e )	Completed
4.	Asset Interconnection Agreement (NS)	Emera, NSPI	Interconnection of ML with NS bulk electric transmission system	ML-JDA, s. 2.1 (f )(i)	Completed
5.	Transmission Operating Agreement (NS)	Emera, NSPI	NS SO to have general operational control of the ML	ML-JDA, s. 2.1 (f )(ii)	Completed
6.	ECA – Metering and Measuring Standards – Transmission Losses	NSPML, Nalcor	Metering and measuring standards used in the calculation of Transmission Losses	ECA, Schedule 3, s. 5	Completed
7.	Regulation Service Agreement	NSPML, Nalcor	Nalcor’s provision of the Regulation Service with respect to the Nova Scotia Block for the Initial Term	ECA, Schedule 5	Expect completion in 2018
8.	Metering and Measuring Standards – NS NTQ transmission losses	NSPML, Nalcor	Metering and measuring standards used in calculation of NS –NTQ Path Peak and Off-Peak Hour transmission losses	NSTUA, Schedule 3, s. 6	Completed
9.	NB Back-up Capacity Agreement	Bayside Power L.P, Nalcor	Emera’s provision of backup Capacity to NB to Nalcor until March 31, 2021	NBTUA, s. 2.1(d)	Expect completion in 2018
10.	IOA – ML Transmission Procedures	NSPI, NLH	Rules and practices applicable to administration of transmission service over the ML	IOA, Schedule D	Completed
11.	IOA – Reserve Sharing	NSPI, NLH	Sharing of energy and reserves between the Parties to improve Reliability	IOA, Schedule A	Completed
12.	IOA – Description of Interconnection Facilities	NSPI, NLH	Description of Interconnection Facilities for which each Party is responsible	IOA, Schedule B	Completed
13.	IOA – Functional Operating Relationship	NSPI, NLH	Various matters relating to operating relationship	IOA, Schedule C	Completed

14.	IOA – Operating Procedures	NSPI, NLH	IOC to develop “operating procedures”	IOA s.7.2 and s. 7.4(a)	Completed
15.	IOA – Schedule A1.0	NSPI, NLH	Parties to prepare a plan for NLH participation in Reliability Assessment Program (“RAP”)	IOA Schedule A1.0	Completed
16.	ML TSA – ML Scheduling Process	Emera and Nalcor	Scheduling process applicable to the provision of Firm Point-to-Point Transmission Service	MLTSAs, Schedule 2	Completed
17.	Amendments to Formal Agreements	Emera, Nalcor	Amendments to Formal Agreements required by Sanction Agreement	Sanction Agreement	Completed
18.	Energy Access Agreement	Emera, Nalcor	Commitments regarding access to market priced energy	Compliance Filing, Appendix A	Completed
19.	Balancing Service Agreement	Emera, Nalcor	Nalcor commitment to provide balancing services from generation sources in NL for 25 years.	Energy Access Agreement Term Sheet, s. 7(g) and Appendix 1	Completed
20.	Assignment of Transmission Rights under ML(E)TSA	Emera, Nalcor	Assignment of Transmission Rights	ML(E)TSA, s. 3.3 (h)	Expect completion in Q1, 2018
21.	Assignment of Energy Access Agreement	Emera, Nalcor, NSPI and NEM	Assignment/assumption of Nalcor’s rights and obligations to/by NEM	EAA s. 15.1 (a)	Expect completion in 2019
22.	Assignment of Nalcor Master Agreement (EAA Schedule 2)	Nalcor, NSPI and NEM	Assignment/assumption of Nalcor’s rights and obligations to/by NEM	Nalcor Master Agreement s. 10.5 (a)	Expect completion in 2019
23.	JOA-Joint Operating Committee (“JOC”)	Nalcor and NSPML	Establish/Operationalize JOC	JOA s.s. 3.1, 3.5	Completed
24.	NS Transmission Utilization Agreement	Nalcor and Emera	Status of Emera firm Point to Point Transmission Service	NSTUA s.s.2.2 (a)-(c)	Completed

# LCP - ML PROJECT

## SITE VISIT REPORT JUNE 5 TO 8, 2017

Prepared for: Natural Resources Canada and Emera

IE Team Lead: Nik Argirov

Date: September 13, 2017

### *Quality Assurance Statement*

<b>Office Address</b>	740-1185 W Georgia Street, Vancouver BC, V6E 4E6
<b>Prepared by</b>	Nik Argirov, Vlad Kahle and Hamdy Khalil
<b>Reviewed by</b>	Nik Argirov
<b>Approved for Issue by</b>	Nik Argirov

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### *Disclaimer*

*This document contains information which may be confidential or proprietary. Any unauthorized use of the information contained herein is strictly prohibited and the writers shall not be liable for any use outside the intended and approved purpose.*

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## 1. GENERAL

Independent Engineer (IE) team, together with a representative from Natural Resources Canada participated in the site visit for the Maritime Link (ML) project. The site visit took place in the provinces of Newfoundland and Nova Scotia during the period extending from June 5 to 8, 2017. Emera senior management representatives Gerry Brennan, Senior Project Manager, Phil Zinck, Converter and Stations Contract Manager, Norm Dimmel, Corporate Services, Anne- Marie Curtis, Completions and Integration Director and Ken Meade, Assistant Project Manager, accompanied the IE team listed below.

IE team:

- Nik Argirov (IE Team Lead)
- Vlad Kahle (IE Electrical SME)
- Hamdy Khalil (IE Transmission Lines SME)

The trip itinerary was as follows:

June 4:

- Arrive and overnight in Deer Lake NL

June 5:

- Start from Deer Lake
- Fly HVac line to Bottom Brook, fly portion of HVdc line
- Granite Canal substation inspection
- Overnight in Deer Lake

June 6:

- Cape Ray Cable pull- in site, Land Cable, Transition site visit
- HVac, HVdc transmission line ground inspection
- Bottom Brook Converter Station site visit
- Travel from Deer Lake NL to Stephenville NS
- Overnight in Stephenville NS

June 7:

- Bottom Brook Converter Station Completion Plan meeting
- Travel from Deer Lake NL to Sidney NS

June 8:

- Safety Orientation in NSPML office
- Travel to Point Aconi
- Point Aconi Cable pull- in site, Land Cable, Transition site visit
- Cape Breton HVdc transmission line site visit
- Woodbine Converter Station site visit
- Depart Sydney for home bases



## 2. NEWFOUNDLAND PROJECT SITES – JUNE 5 TO 7, 2017

The Newfoundland portion of the project includes: (a) approximately 142 km of steel tower 200 kV HVDC transmission line from the existing Bottom Brook substation to Cape Ray, (b) approximately 20 kilometers of grounding line from Bottom Brook to Indian Head and (c) approximately 160 km of wood H-Pole 230 kV HVAC transmission line from Bottom Brook to Nalcor's existing Granite Canal Hydroelectric Generating Station. The associated infrastructure includes: (i) a new converter station and substation expansion at Bottom Brook, (ii) a switchyard at Granite Canal, (iii) a transition compound, (iv) 2 km of underground cable and an onshore cable anchor at Cape Ray and (v) a marine ground at Indian Head.

Transportation to all sites, with the exception of the Granite Canal, was by road. The travel by helicopter along the HVAC transmission line from Bottom Brook station to Granite Canal station and the portion of the HVdc served the dual purpose of the transmission line construction progress inspection and transportation to and from the Granite Canal site.

### HVAC and HVDC Transmission Lines

The AC line is largely complete with final stringing considered the main activity which would be followed by walk-down and punchlisting for the last remaining activities. On the DC line installation of foundations and tower erection was underway. A small portion of stringing had been completed. During the site visit, the IE witnessed stringing activities on both AC and DC lines. The IE also observed several wood pole structures on the AC side and guyed and self-supporting lattice towers on the DC side. (In NS only some grounding wires were stolen from number of the lattice structures).



**Photo 1.** Indian Head grounding site and grounding line.



**Photos 2/3/4.** Stringing site / AC line – Structure ready for Stringing - Stringing using helicopter.



**Photo 5.** Corner dead end structure / AC line.



**Photo 6.** Stringing site / DC line.



**Photo 7.** Guyed DC structure / use of access mats due to soil condition.



**Photos 8/9.** Tower assembly outside Bottom Brook.



**Photos 10/11.** Lightning Towers and the first DC corner structure outside Bottom Brook.



**Photos 12/13.** Double Circuit dead end tower / Single circuit self-supporting tower.



**Photos 14/15.** Leg Grounding / Damaged (stolen) ground wire.



**Photos 16/17.** Anchor detail.

The HVDC line is equipped with both the conventional shielding wire and OPGW (optical ground wire). DC line protection between the converter station and the transition compound will communicate via the optical fibres within the OPGW. The OPGW has to be periodically grounded to dissipate unwanted electric charge. Transmission tower termination/ grounding box is shown below.



**Photos 21/22:** HVDC line fibreoptic box.

### **Granite Canal Substation**

The work is largely complete. The construction is still in progress in the switchyard and cabling installation is taking place in the control room. The IE inspected the control room and battery room installations and discussed the applied wiring methodology and hardware with the test technicians and EMERA managers. Protection and Control (P&C) installation has been completed and relay testing is in progress.



**Photo 23.** Details of Alstom test blocks and test lead connections.

Relay hardware from different manufacturers is being used (Photo 24).



**Photo 24:** Diverse relay hardware from ABB and Schweitzer Engineering Ltd is employed in HVAC protection system.

Construction site appears to be well kept and properly managed.



### Cape Ray Landfall and Transition Compound Sites

Two individual subsea HVDC cables (each one approximately 168 km long) comprise the submarine link between Cape Ray(NL) and Point Acconi(NS) sites. The cables are first pulled up through the HDD landfall conduits through the utilization of a winch onshore and subsequently laid on the seafloor along the selected route. At the time of the IE visit Cable 2 (west) was already in place (Photo 25) laid out across the crossing and the Cable Lay Vessel (CLV), Skagerrak, was in process of installing the Cable 1 (east) (Photo 26). The cables are subsequently jointed to the land cables at the respective pull-in site (Photo 27). The protection of the subsea cables will commence with the burial of sections of the cables to predetermined burial depths.



**Photo 25:** Subsea Cable 2 (west) already pulled through the HDD casing, anchored and in process of jointing to the land cable.



**Photo 26:** Subsea Cable 1 (east) already pulled through the HDD casing and ready for jointing.



**Photo 27:** Jointing under controlled conditions of land and subsea Cable 2 (west).

The land cables have been laid in the trench between the shoreline landfall and the transition compound. The encasement of the cables in insulating thermal concrete was close to completion (Photo 28).



**Photo 28:** Land cables laid in trench and encased in protective thermal concrete.

At the transition compound site scaffolding has been erected for the termination installation at the head of each cable (Photo 29). The main gantry, several post insulators and the transition compound control building were erected as well (Photo 30).



**Photo 29:** Scaffolding erected for land cables termination installation at the transition compound.



**Photo 30:** Transition compound control building, main gantry and post insulators.

### **Bottom Brook AC Substation and Converter Station**

The AC Substation installation was essentially complete with equipment installation at 95 percent and cable pulling and termination at 98 percent respective completion (Photos 31,32 and 33). The pre-commissioning of the Substation was ongoing with over 80 percent completion. The first outage period commenced at the time of the visit and it will result in the energization of all equipment associated with the NLH Transmission Line (TL)233. The next outage period will begin on June 22nd and is planned to end in mid-July with the energization of all equipment associated with the TL209.

The IE inspected the control room and battery room installations and discussed the applied wiring methodology and hardware with the test technicians and EMERA managers. Protection and Control (P&C) installation has been completed and relay testing was in progress. Review of the P&C drawings and test sheet samples demonstrated quality of recording and tracking of the Protection testing work appropriate for commissioning of electric utility protection systems.



**Photo 31:** AC Substation nearing completion.



**Photo 32:** AC Substation - main 230 kV lines' circuit breakers.

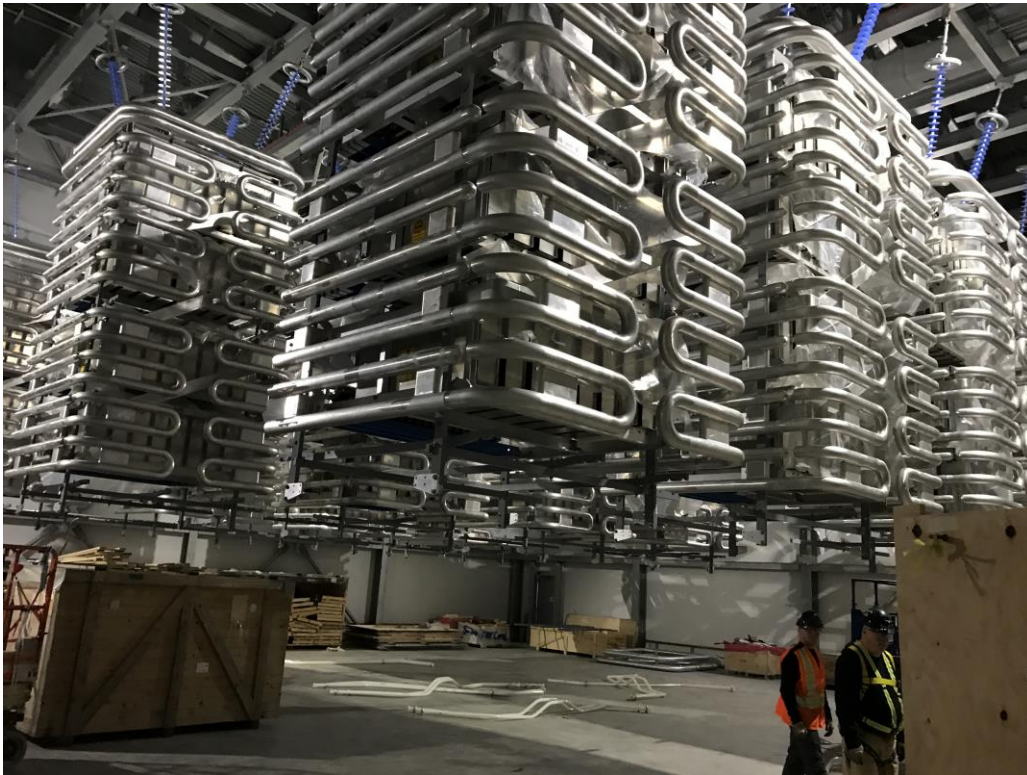


**Photo 33:** AC Substation Control building – ongoing cable termination.

The civil work for the Converter building has been completed. The interior and exterior panels of the building were fully installed (Photo 34). The HVDC electro-mechanical installation in the DC yard was approximately at 65 percent completion. The valve equipment installation in the Valve Rooms was ongoing (Photo 35). The main HVAC equipment installation on the mezzanine floor was close to completion (Photo 36).



**Photo 34:** Converter Station building (fully erected) and part of the AC yard.



**Photo 35:** Converter Station – HVDC valves installed in Valve Room # 201.



**Photo 36:** Converter Station – HVAC equipment installed on mezzanine level.



The electro-mechanical installation was not yet ready for control and protection equipment installation. The IE viewed only the areas dedicated for this equipment.

The Converter transformers have been oiled and installed on their pads. Besides the standard non-electrical protections (Buchholz relay, oil level, temperature monitoring) these transformers are equipped with transformer gas analyzer (Photo 37) that will monitor presence of gases and moisture in the transformer insulating oil.



**Photo 37:** Converter transformer gas analyzer.

### **Systems Completion Plan Meeting in Bottom Brook Construction Office**

Systems Completion Plan meeting and teleconference was conducted with the commissioning team managers and specialists. The Systems Completion Plan is to be formally accepted by the IE and incorporated into the Federal Loan Guarantee Agreement and the purpose of this meeting was to cover a number of related matters. Discussions are ongoing and based on current versions of the documentation that will be fine-tuned as required. The following preliminary comments are based on IE understanding of the current version of the Completion Plan.

1. IE was advised that the schedules are effectively maintained and project challenges, if any occur, are being dealt with. There appears to be no significant obstacles at this time.
2. Managers with their specialist staff have been given responsibilities for the commissioning of the HVAC and HVDC power apparatus, HVAC/ SCADA/ P&C/ Telecom and the DC converters with their controls. The commissioning team structure is appropriate for the Project with such diverse equipment groups. Overall responsibility for the integrated systems tests and performance testing has been assigned to Integrated System Commissioning specialist.
3. IE reviewed examples of the test result reports. The reporting appears to be comprehensive and it is properly filed for future reference and NERC (North American Reliability Corporation) certification, if required.

4. Inspection and Test Plan (ITP) register listing ABB's Factory Acceptance and Site Inspection and Test Plans was provided to the IE as part of EMERA's System Completion Plan. This method of tracking the equipment tests is acceptable.
5. Equipment outages are being coordinated between the Construction agency, EMERA and the utilities. Formal energization process is/ will be followed from the construction phase to the commissioning and integrated systems testing. Final tests will include the power flow tests between the NS and NL utilities.
6. Bulk of the commissioning scope rests with the ABB. EMERA already accepted and signed off on the factory acceptance tests (FAT's). ABB's "E12-74 Converter Station Engineer, Procure, Construct Transmission System Tests/ System Completion Plan" Exhibit 15 (ref: 1292977.03B-WASSR01A-MSW)" is a part of the original Project documentation. ABB Inspection and Test Plan has been accepted by EMERA.
7. IE were given EMERA's System Completion Plan handout that contains organizational charts with assigned responsibilities, testing plan and sequential equipment certification process. Three distinct phases, static commissioning, dynamic commissioning and integrated tests (and certification) are standard practice. It is our opinion that this global commissioning framework is in line with good utility practice.
8. ABB's "Maritime Integrated Commissioning Plan 1JNL526076" Revision 3 dated 2017- 01- 24 was approved by Mr. Jeffrey Buckner, Sr. Construction Manager. This Commissioning Plan is intended to cover the entirety of the Maritime Link Project. It contains three individual plans, HVAC, HVDC and Telecommunications. Of special interest to the IE is the final phase, the System Tests. Those tests also refer to NSPML initiated testing such staged DC faults, AC system disturbances and faults, runbacks and disturbance in LIL (refer to page 3, Definitions). Staged System Tests details have not yet been made available to the IE. The Stage and Disturbance testing is also included in the Exhibit 15 (see Item 6. above).

Post Meeting Note 1: 'Additional Operational Tests' ITR 1JNL549453 that covers the DC faults tests has now been provided to IE.

Post Meeting Note 2: AC staged faults and currently being discussed with NSPI.

9. HVDC link controls testing has been discussed at length. Comprehensive testing of control features, operating sequences, interlocks and heat run are planned. Two ABB documents outline this testing:
  - a. Terminal Operation Testing (ref: 1JNL481094. A) proposes terminal operational test of the control modes in AC Voltage Control, Reactive Power Control and during loss of auxiliary power.
  - b. Power Transmission Operation (ref: 1JNL207409. A) outlines Pole 1 and Pole 2 tests in Active and Reactive Power Control, in AC voltage control, operation under reduced DC voltage condition, steady state operation at high power and in metallic return. Bipole will be tested in Active and Reactive Power Control and in steady state at high power. Black start and the heat run have been sketched in this document, the writers are unable to comment without additional explanation.

The IE noted that Exhibit 15- Transmission System Test/ Completion Plan prescribes additional tests that are not yet included in the above ABB's 'Maritime Integrated Commissioning Plan 1JNL526076'. Specifically, absent are Switching Operations Related to Runbacks, Emergency Power Control, Frequency Control, Damping Control, Disturbance Testing and Staged Faults.

Post Meeting Note 1: ITR's provided to IE subsequent to the June 2017 meeting cover the converter systems testing in comprehensive detail. Those documents are well structured and are appropriate for communicating the test instructions and recording the test results.

Post Meeting Note 2: EMERA advised that when the electric grid conditions are not suitable for carrying out the on-line testing, Real Time Digital Simulator (RTDS) and factory test results (FAT) will be accepted in lieu of carrying out live testing of some of the HVDC control features.

10. IE's were advised that PSCAD (power systems computer aided design) modeling, NERC studies and Utilities operational studies for various operating scenarios have been completed. Results of the studies led to development of operational guidelines. IE's did not review any operational studies or the operating protocols.

Post Meeting Note: Subsequent to this meeting an agreement was made to provide list of the operating instructions to IE for review of documents relevant to testing and operation of the ML.

### 3. NOVA SCOTIA PROJECT SITES – JUNE 8, 2017

In Nova Scotia the subsea cables will come ashore just west of the existing Point Aconi thermal generating station. The Nova Scotia portion of the project includes approximately 46 km of 200 kV HVDC transmission line from Point Aconi to the Woodbine converter station site, and 41.4 km of grounding line from Woodbine to the Big Lorraine grounding site. Associated infrastructure includes an onshore cable anchor and cable transition compound at Point Aconi, a transition compound, converter station and substation expansion at Woodbine, a marine ground at Big Lorraine, and two sections of underground (land) cable each of about 1 km length at Point Aconi and Woodbine. Most of the Nova Scotia rights of way (ROW) for the new lines either parallel or are close to existing access roads or existing transmission rights of way.

The team started from Sydney in the morning, stopped at the local Maritime Link project office for a safety briefing and to pick up safety vests and hard hats. The team then proceeded in sequence to the following sites:

#### **Point Aconi Landfall and Transition Compound Sites**

At this site Cable 2 (West) was already pulled in and placed in position for jointing with the land cable (Photo 38). It was expected that CLV Skagerrak will reach Point Aconi with Cable 1 (East) in the following week and will initiate the pull in operation (Photos 39 & 40).

The IE was informed that following the survey of Cable 2 (West), an issue was discovered that will require a repair. During the cable pull in operation the minimum bend radius (MBR) criteria was exceeded which also resulted in damaging the cable fiber optic strands designed for temperature sensing. This required a section of the cable to be replaced near Point Aconi site. The Contractor and NSPML team were working on the development of appropriate set of cable replacement procedures and establishment of proper safety parameters for monitoring the upcoming pull up of Cable 1 (East).

The land cables have been laid in the trench between the shoreline landfall and the transition compound (Photos 41 & 42). The encasement of the cables in insulating thermal concrete was ongoing (Photo 43).



**Photo 38:** Cable 2 (West) already pulled in and in position for jointing with the land cable.



**Photo 39:** Site prepared for Cable 1 (East) pull - in. Land cable in position for jointing.



**Photo 40:** Winch used for pull-in subsea cables through HDD casing.



**Photo 41:** Land cables in trenches entering landfall site for jointing to subsea cables.



**Photo 42:** Land cables in position for placement of protective concrete.



**Photo 43:** Land cables already encased in protective thermal concrete.

At the transition compound site scaffolding has been erected for the termination installation at the head of each cable (Photo 44). The main gantry, several post insulators and the transition compound control building were erected as well (Photo 45).



**Photo 44:** Scaffolding erected for land cables termination installation at the transition compound.



**Photo 45:** Transition compound control building, main gantry and post insulators.

### **Woodbine converter station / AC Substation**

The civil work for the Converter building has been completed. The interior and exterior panels of the building were fully installed (Photo 46). The valve equipment installation in the Valve Rooms was ongoing (Photos 48 & 49). The main HVAC equipment installation on the mezzanine floor was close to completion (Photo 49). The electrical & mechanical installation in the DC yard was close to 50 percent completion, with installation of towers, gantries and equipment approximately 60 percent complete (Photo 47).

The mechanical equipment installation stage does not yet permit control or protection panels installation. The IE viewed the areas dedicated for this equipment. Converter transformers have been oiled and installed on their pads (Photo 51).





**Photo 46:** Converter Station building with the AC yard and part of the DC yard to the left.



**Photo 47:** Close-up of surge arresters bank at the AC yard as part of the neutral bus.



**Photos 48 & 49:** Converter Station - Valve Rooms at different stages of valves installation.



**Photo 50:** Converter Station – HVAC equipment installed on mezzanine level.



**Photo 51:** Woodbine converter transformer.

AC Substation work was nearing completion with 97% completion of equipment installation and cable pulling and terminations (Photos 51, 52 & 53). Pre-commissioning of the AC Substation was ongoing. The first outage period has started on June 3<sup>rd</sup> and energization of all equipment associated with TL 7014 was scheduled for July 4<sup>th</sup>. The IE inspected the control room (Photos 54 & 55) and battery room installations and discussed the applied wiring methodology and hardware with the test technicians and EMERA managers. Protection and Control (P&C) installation was in progress. In order to comply with NERC Critical Infrastructure Protection requirements, redundant and independent protections systems are being installed in ML substations. The IE was advised that at Woodbine, there will be two separate substation buildings, one for Protection A systems and another one for Protection B systems. This approach was deemed to be the most efficient given the complexity of separating existing A and B protection in the existing control building. It also assisted in maintaining the Protections reliability when phasing in the equipment and it is in compliance with NSPI standards for new protection and control installations.



**Photos 52:** Woodbine - AC Substation work nearing completion.



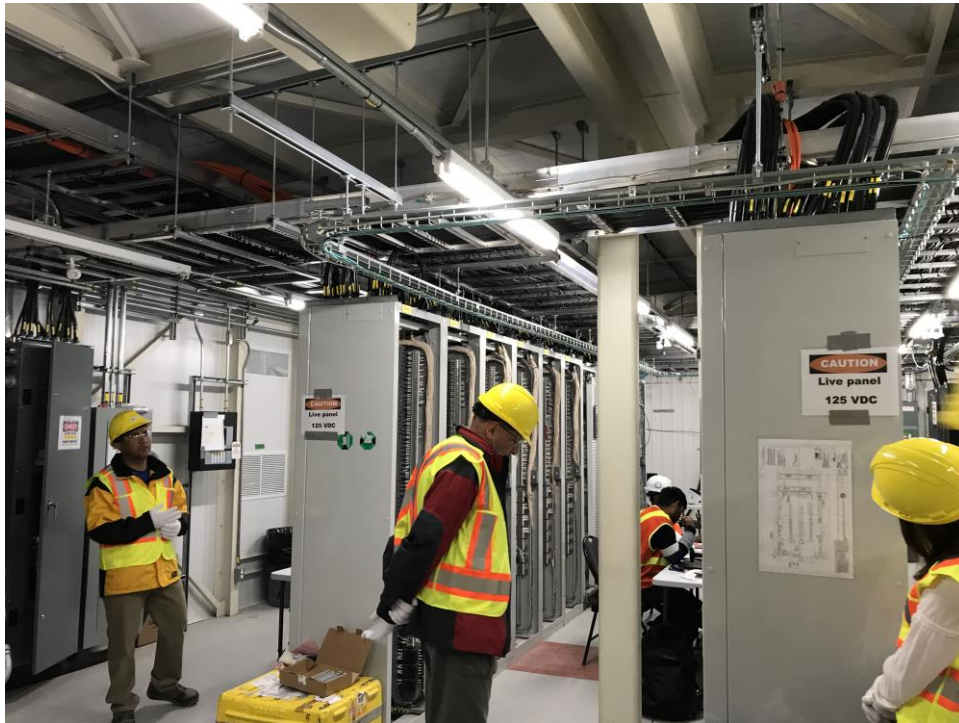
**Photos 53:** AC Substation yard.



**Photos 54:** AC Substation autotransformer.



**Photos 55:** AC Substation control building.



**Photos 56:** Interior view of AC Substation Control building - ongoing installation and testing of protection and control panels (some of them already energized).

## 4. COMMENTS

- It was evident that the work on site is proceeding with good quality and safety awareness, and with the exception of the NL portion of the HVDC transmission line, it is within the baseline schedule.
- Consequent to the site visit NSPML reported that the subsea Cable 2 (West) repair was successfully completed along with the pull in of Cable 1 (East) at the HDD site at Point Aconi and after confirmation of cable integrity the CLV Skagerrak was demobilized from site. There was no impact to the critical path of the schedule. An insurance file has been opened to address the costs relating to this repair.