# 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 Q3 2020

**October 15, 2020**

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## 1.0 INTRODUCTION

This is the Q3 2020 Quarterly Report for the Maritime Link as directed by the Utility and Review Board (UARB) where the UARB ordered in its Supplemental Decision:

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

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

This Decision also requested that the quarterly reports include an accounting of all transactions related to this project, cash flow analysis, and a reporting of the financial and other benefits realized for ratepayers from the Maritime Link prior to delivery of the Nova Scotia Block and Nalcor market-priced energy. Given that the benefits to ratepayers prior to the Nova Scotia Block and Nalcor market-priced energy are secured by Nova Scotia Power through the Maritime Link, Nova Scotia Power will report on these in its Quarterly Fuel Adjustment Mechanism Report.

## 2.0 UPDATE OF PROJECT SCHEDULE

The Maritime Link was placed in-service on January 15, 2018.

Detail respecting the status of the Nalcor Project and Muskrat Falls is outlined in Section 2.9.

### 2.1 Gates and Milestones

The Maritime Link was placed in-service January 15, 2018.

### 2.2 Safety

NSPML remains committed to operating with safety as a fundamental and integral part of every aspect of NSPML's business.

Throughout the pandemic, NSPML has connected people to practical resources to address workplace psychological health and safety. Office employees continue to work from home; however, following a re-entry plan approved by the senior Executive team, there have been a reduced number of employees onsite at the Converter Stations who are necessary for critical maintenance activities. Most recently, the annual HVDC outage was successfully completed, which incorporated a significant increase in site contractor presence with related COVID re-entry protocols.

There have been no recordable incidents to date in 2020 and operations staff are adhering to evolving safety protocols established in response to COVID-19.

## 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**

| Commercial Activity | Background | Initiative Number | Status in October 2020 |
|---|---|---|---|
| HVDC Submarine Cable Supply and Installation | The Contract was awarded to Nexans in January 2014.<br><br>Substantial Completion occurred in September, 2017.<br><br>Contract Final Completion Certificate signed February 5, 2018. | E11-18 | Closed |
| Converter stations, switchyards and related structures ("converters and structures") | The Contract was awarded to ABB Inc. in June 2014.<br><br>Final System Test Completed January 15, 2018.<br><br>Substantial Completion achieved on January 15, 2018. | E12-74 | System studies requirements are finalized. Contract is ready to be closed out. |
| 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 | Closed |

| **Commercial Activity** | **Background** | **Initiative Number** | **Status in October 2020** |
|---|---|---|---|
| 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 | Closed |
| Site Preparation Services (Includes construction of access road upgrades) | The Contract was awarded to JonelJim Concrete Construction (1994) Ltd. for NS Site Preparation Services in September 2014.<br><br>Contracts awarded to Marine Contractors Inc., MCI Limited Partnership for NL Site Preparation Services in September 2014. | E13-92 | Closed<br><br>Closed |
| Transmission Line Construction | E13-95 contract terminated as of late 2016.<br><br>Contract replaced with E16-284 and E16-269 previously reported. | E13-95 | Contract Closeout is in progress. |
| Transmission Line Construction – NL AC Line | The contract with PowerTel was re-assigned to NSPML for the completion of the two Grounding Lines and the HVAC Line. Final Completion was achieved January 31, 2019. | E16-284 | Contract Closeout is in progress. |
| Transmission Line Construction - NL and NS HVDC Lines | The contract for the construction of the HVDC Transmission Lines was awarded to a joint venture of Emera Utility Services and | E16-269 | Contract Closeout is in progress. |

| **Commercial Activity** | **Background** | **Initiative Number** | **Status in October 2020** |
|---|---|---|---|
| | Rokstad Power Corporation (ERJV). | | |
| Transmission Line Conductors | The Contract for the supply of conductors was awarded to Midal Cables in March 2015.<br><br>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. | E13-87 | Closed<br><br>Closed |
| Horizontal Directional Drill (HDD) Construction Program | Contract awarded to Directional Horizontal Drilling (DHD) in January 2016.<br><br>E13-157 was divided into two contracts.<br><br>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.<br>E13-158 for marine intervention services was awarded in April 2016 to DOF Marine.<br>The supply of the HDD casing (E15-238) was awarded to East | E13-156<br><br>E13-157<br><br>E13-158<br><br>E15-238 | Closed<br><br>Closed<br><br>Closed<br><br>Closed |

| **Commercial Activity** | **Background** | **Initiative Number** | **Status in October 2020** |
|---|---|---|---|
| | Coast Tubulars Limited in October 2015. | | |
| Accommodations Operations | The contract for the accommodations operations services was awarded to East Coast Catering in April 2015. | E13-89 | Closed |

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### 2.3.1 Land Access Agreements

The majority of land rights are now in place, and NSPML is in the final stages of securing any outstanding rights; moving to expropriation as required where agreement could not be reached, or landowners could not be found. These easements do not impact the ability of the project to complete contract closeouts or to operate according to plan.

### 2.3.2 Funding

The IE Certificates allow for Project costs to be paid from the proceeds of the Maritime Link Construction Loan under the payment terms of the Material Project Documents and the Maritime Link Credit Agreement. A draw was requested and approved in February 2020 which was the final draw on the $1.3 billion proceeds.

### 2.3.3 Joint Development Agreements

NSPML continues to work with Nalcor and NS Power to finalize the remaining operational agreements arising from the Formal Agreements with Nalcor. Please refer to Attachment 1 for details on the status of these Agreements, which indicate three Agreements remain to be concluded.

## 2.4 Engineering Activities

Engineering is captured in three main categories across several Work Breakdown Structures ("WBSs"):

- HVDC Submarine Cable Supply and Installation - Completed.

- HVDC Converters and Substations – All HVDC Converters and AC Substations drawings are complete and have been accepted. The second draft of the short circuit performance study (and the associated system models) has been received, reviewed, and accepted.

- Overland Transmission – All project as-builts completed.

## 2.5 Submarine Cables

Negotiations are ongoing to secure a contract for the 2020 survey scope. If weather and commercial terms are not satisfactory for proceeding this year, a survey will not be performed until next year. There have been no extreme weather events or other indicators to cause NSPML concern about the reliability of the submarine cable if a survey cannot be completed until 2021.

Planning for the marine survey campaign in 2021 is now underway with the intent of retaining a contract to complete the survey in the spring, thereby maximizing operational flexibility for completing any necessary corrective maintenance work later in the year and to avail of post-ice-season conditions for the near shore inspection. The 2021 survey will proceed regardless of whether NSPML is able to complete the partial survey this year. Alternative marine inspection technologies and methods are being developed which may provide more flexibility and cost effectiveness in future years.

Discussions continue regarding a Contingency Services Agreement to support the broader Cable Inspection, Maintenance and Repair framework.

## 2.6 Converters and Substations

The Construction of the Converters and Substations was completed with the conclusion of system testing and the Maritime Link placed in-service on January 15, 2018 and all punch list items are completed.

## 2.7 Transmission Lines

NSPML finalized multiple procurements respecting the previously identified corrective work related to Optical Ground Wire (OPGW) suspension clamps, OPGW/Overhead Shield Wire (OHSW) jumpers, and faulty vibration dampers. The OPGW and OHSW issues have been addressed in both NL and NS; however, the COVID-19 pandemic resulted in a delay to the delivery of replacement dampers and, as a result, the damper installation work is now planned for 2021. This is not expected to pose an issue from a safety or reliability perspective. NSPML continues to progress both warranty and insurance claims.

Work has been completed on the rerouting of a short section of the NL HVAC line near Southwest Brook, which was required due to soil erosion on the hillside near the base of multiple structures within a short corridor.

The overhead transmission system continues to perform well through the second year of operations with no significant reliability or downtime impacts experienced.

## 2.8 Independent Engineer

NSPML continues to be engaged with the Independent Engineer (IE) related to the Operations phase of the Maritime Link, as per the Federal Loan Guarantee requirements. The IE completed its review of NSPML's 2019 Operations & Maintenance activities; please refer to Attachment 2.

## 2.9 Status of Nalcor Project and Muskrat Falls

On March 17, 2020, Nalcor announced that it had temporarily paused construction activities at the Muskrat Falls site in response to the COVID-19 pandemic. The Muskrat Falls and Soldiers Pond sites remained in care and maintenance mode until June 2020, at which time construction and commissioning activities gradually and safely resumed.

A major milestone was achieved on September 22, 2020, when electricity from Unit 1 of the Muskrat Falls Generating Station flowed to the Labrador grid for the first time. Testing has been satisfactory to date and Unit 1 is expected to be placed in-service shortly, once commissioning tests and inspections are completed and any findings are remedied.

On September 28, 2020, Nalcor provided an update on the Muskrat Falls Project and COVID-19 pandemic impacts to cost and schedule. Nalcor indicated that Unit 2 is expected to begin operating in December, with Units 3 and 4 set to come online in 2021.

Prior to the pause in construction activities, Nalcor's commissioning work on the synchronous condensers had identified material vibration and binding issues; vibration identified during Unit 3 work and binding during Unit 1 and 2 work. The binding issues have been resolved and dynamic commissioning of Unit 2 recommenced on September 28, 2020. Foundation remediation work may be required to address the vibration issue. If deemed necessary, this work could begin on Unit 1 as soon as November 2020, pending a final design and satisfactory plan for the construction schedule and mobilization.

With respect to the HVDC Control System Software development, Nalcor and its Contractor, GE Grid, were able to safely continue development remotely during the COVID-19 suspension. A second pass of the Factory Acceptance Testing (FAT) for the software was completed on July 24, 2020, followed by the release of the software

to site on July 30, 2020, to commence dynamic commissioning. On August 13, 2020, during dynamic commissioning of the LIL, a flashover incident occurred in the Soldier's Pond Pole 2 valve hall. A similar incident occurred on August 22, 2020, in the Muskrat Falls Pole 1 valve hall. Both incidents damaged fiberglass insulating beams and triggered trips of the LIL. A root cause analysis is ongoing. GE Grid's preliminary finding is that the issues were caused by a manufacturing defect present in 90% of the fiberglass beams (approximately 350), requiring their replacement. A schedule and plan for the replacement work is under development and a temporary repair is being advanced that would allow testing to resume once approved. Software development will continue as planned while this issue is being resolved.

NSPML continues to be engaged with Nalcor and is closely monitoring Nalcor's plans to mitigate the effects of COVID-19 and LIL issues to schedule, including consideration of the timing of the Nova Scotia Block and excess energy.

## 2.10 Status of Benefits to NS Power Customers

Customer benefits received to date are being reported by NS Power with its Quarterly Fuel Adjustment Mechanism Report.

## 3.0 UPDATED COST SUMMARY

As per Enerco U-31, section 6, the details below outline the DG3 forecasted costs.

Table 2 provides an updated cost summary for the Maritime Link, which includes actual costs incurred as of June 30, 2020 and forecasted total costs for the remainder of the Project's construction activities.

Costs associated with trenching the submarine cables (and associated with transmission line corrective work noted in section 2.7) are reflected in this report.

NSPML continues to track and report all costs, actual and forecast, consistent with the methodologies used in the cost forecast represented in the Maritime Link Project Application. Capitalized 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 has been tracked and recorded monthly up to December 31, 2017 and totals approximately $209 million as of that date, which is below the $230 million amount estimated at the time of filing of NSPML's Application.

## Table 2 Updated Cost Summary for the Maritime Link Project

| (000's of Canadian Dollars) | Actual Costs | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Description | 2011-2018 | Q1 2019 | Q2 2019 | Q3 2019 | Q4 2019 | Q1 2020 | Q2 2020 | Total Project to Date | Estimate to Completion | Total Project Estimate at Completion (A) |
| **Emera NL Project Management Costs** | **185,442** | **2,741** | **1,140** | **2,390** | **538** | **940** | **794** | **193,985** | **790** | **194,774** |
| **Nalcor Project Support Costs** | **16,216** | **15** | **12** | **(28)** | - | - | - | **16,215** | **(1)** | **16,214** |
| **Construction and Engineering Initiatives** | **1,324,162** | **944** | **1,212** | **14,493** | **4,763** | **(108)** | **1,225** | **1,346,691** | **6,046** | **1,352,737** |
| Environmental Approval | 18,239 | 33 | 54 | 19 | 52 | - | 19 | 18,416 | 20 | 18,436 |
| Submarine and related | 325,422 | - | - | 14,711 | 3,593 | (648) | 363 | 343,441 | 285 | 343,726 |
| Converters, structures, and other ancillary equipment | 547,113 | 275 | 422 | 133 | 317 | 50 | 35 | 548,345 | 2,473 | 550,818 |
| AC and DC Transmission | 433,388 | 636 | 736 | (370) | 801 | 490 | 808 | 436,489 | 3,268 | 439,757 |
| **Total** | **1,525,820** | **3,700** | **2,364** | **16,855** | **5,301** | **832** | **2,019** | **1,556,891** | **6,835** | **1,563,725** |
| Contingency | | | | | | | | - | - | - |
| Escalation | | | | | | | | | **13,629** | **13,629** |
| **Grand Total** | **1,525,820** | **3,700** | **2,364** | **16,855** | **5,301** | **832** | **2,019** | **1,556,891** | **20,464** | **1,577,354** |

Note: Total forecast for Project completion continues to be within $1.577 M. No amount has been estimated in this forecast for the potential recovery of costs from third parties, which continue to be advanced. Any such recovery will be used to reduce the final cost.

**Total Actual Project Costs at end of Q2 2020 Compared to Previous Forecast**

The total actual project capital costs incurred during Q2 2020 of $2,019,000 are detailed below:

- Emera NL Project Management Costs of $794,000: Project management costs continue to be incurred as work advances relating to closing out of contracts, procuring and managing punch list and corrective activities, and ensuring appropriate documentation is in place for project closeout and regulatory purposes. NSPML has segregated these capital costs from costs relating to operating and maintenance activities and have expensed such operating and maintenance costs accordingly.

- Submarine and related of $363,000: This reflects an adjustment for final costs associated with the 2019 subsea cable trenching work.

- Converters, structures, and other ancillary equipment of $35,000: This reflects the cost of NL Hydro and NS Power system upgrades and modifications, as well as the procurement of material spares in both provinces.

- AC and DC Transmission of $808,000: This reflects corrective transmission activities.

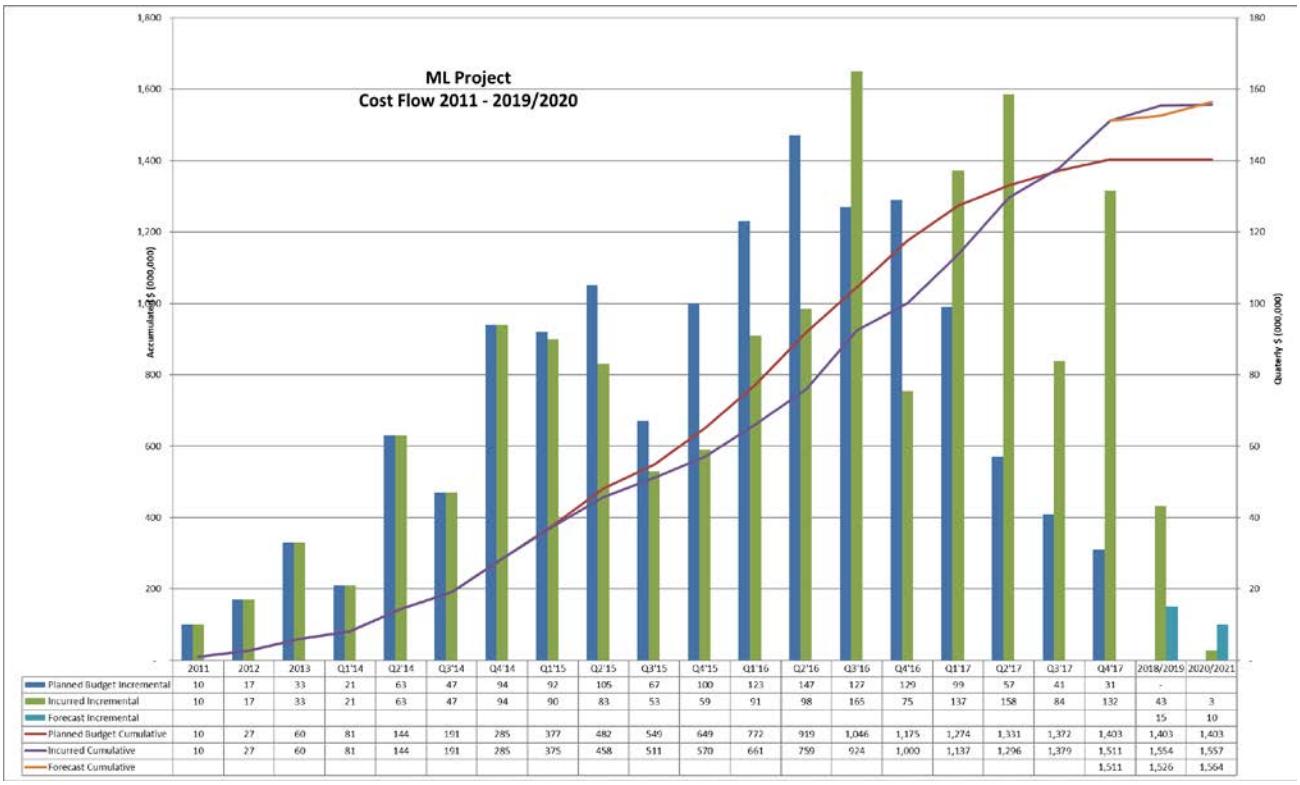
The Project capital cost remains within budget.

## 4.0 COST FLOW

As per Enerco U-31, section 2.2, please refer to Table 3 below for the cost flow of the Maritime Link. This cost flow report for the base capital spending is now forecast at $1.564 billion (prior to the potential recovery of costs from third parties as noted in Section 3.0); no contingency draw has been required since the draw approved by the Company's Board of Directors in Q1 2020.

The remaining budget includes forecasted costs relating to transmission corrective activities, completion of documentation and close out of payments to contractors, as well as regulatory and environmental requirements relating to the construction aspect of the project. Certain of these costs are expected to take place in 2021 and will require further draws on remaining budgeted contingency/escalation balances. The total forecast of base capital spending, escalation, and contingency amounts for the project remains at or below $1.577 billion.

## Table 3 Maritime Link Cost Flow




| | 2011 | 2012 | 2013 | Q1'14 | Q2'14 | Q3'14 | Q4'14 | Q1'15 | Q2'15 | Q3'15 | Q4'15 | Q1'16 | Q2'16 | Q3'16 | Q4'16 | Q1'17 | Q2'17 | Q3'17 | Q4'17 | 2018/2019 | 2020/2021 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Planned Budget Incremental | 10 | 17 | 33 | 21 | 63 | 47 | 94 | 92 | 105 | 67 | 100 | 123 | 147 | 127 | 129 | 99 | 57 | 41 | 31 | - | |
| Incurred Incremental | 10 | 17 | 33 | 21 | 63 | 47 | 94 | 90 | 83 | 53 | 59 | 91 | 98 | 165 | 75 | 137 | 158 | 84 | 132 | 43 | 3 |
| Forecast Incremental | | | | | | | | | | | | | | | | | | | | 15 | 10 |
| Planned Budget Cumulative | 10 | 27 | 60 | 81 | 144 | 191 | 285 | 377 | 482 | 549 | 649 | 772 | 919 | 1,046 | 1,175 | 1,274 | 1,331 | 1,372 | 1,403 | 1,403 | 1,403 |
| Incurred Cumulative | 10 | 27 | 60 | 81 | 144 | 191 | 285 | 375 | 458 | 511 | 570 | 661 | 759 | 924 | 1,000 | 1,137 | 1,296 | 1,379 | 1,511 | 1,554 | 1,557 |
| Forecast Cumulative | | | | | | | | | | | | | | | | | | | 1,511 | 1,526 | 1,564 |

## 5.0 INTERIM ASSESSMENT FINANCIAL UPDATE 2020

With the Maritime Link placed in-service on January 15, 2018, NSPML continues to receive monthly cost recovery revenues from NS Power pursuant to the Board's November 27, 2019 Order. NSPML forecasts its 2020 operating and maintenance, debt and equity financing costs to be within the amounts budgeted for the year.

# Operating Agreement Requirements Arising from the Formal Agreements

| | Agreement | Parties | Description | Formal Agreement Source | Status |
|---|---|---|---|---|---|
| 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 | NS Power<br><br>NLH | Nalcor's provision of the Regulation Service with respect to the Nova Scotia Block for the Initial Term | ECA, Schedule 5 | Expect completion prior to delivery of the NS Block |
| 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) | No longer required given sale of Bayside to NB Power. |
| 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) | Completed |
| 21. | Assignment of Energy Access Agreement | Emera, Nalcor, NSPI and Nalcor Energy Marketing (NEM) | Assignment/assumption of Nalcor's rights and obligations to/by NEM | EAA s. 15.1 (a) | Expect completion in 2020. |
| 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 2020. |
| 23. | JOA-Joint Operating Committee ("JOC") | Nalcor and NSPML | Establish/Operationalize JOC | JOA 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 |

# MARITIME LINK: 2019 ANNUAL O&M REPORT

Prepared for: Natural Resources Canada and EMERA

IE Team Lead: Nik Argirov

Date: July 03, 2020

### *Quality Assurance Statement*

| | |
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# 1. GENERAL

**Contractor:** Argirov Engineering Inc.
**Company:** NSP Maritime Link (EMERA)

**Annual Report Purpose:**
Contractor is tasked to confirm that the budgeting and maintenance of the Maritime Link Project is being conducted in accordance with good utility practice.

**Limitations and Exclusions:**
For purposes of this Report the Contractor relied on the verbal and written information provided by the Company as well as on the observations and the information gathered during the two Contractor's site visits (in May and October'19).
Equipment inspections and the maintenance activities were not witnessed in person. Individual Work Orders and records of work done were not reviewed by the Contractor.

# 2. SCOPE OF THE REPORT

(a) A summary of any material routine and unscheduled maintenance which has been carried out since the last report as well as an updated review of expected major maintenance requirements, timing, and milestones.

(b) A breakdown of costs incurred during the year covered by the applicable annual report with respect to operations and maintenance (O&M) including any variance from annual O&M budgets and a summary of any updates of O&M budgets.

(c) A summary of any staffing, training or labor management issues.

(d) A list of changes to key personnel and the qualifications of new key personnel, if any.

(e) Commentary on parts inventory and redundancy.

(f) A review of construction contractors' support and the ongoing management of post-completion technical risks.

(g) Ongoing compliance with major permits.

(h) A review of the state of repair of key equipment and facilities.

# 3. DATA SOURCES

[1] Maritime Link 2019 Annual Operations and Maintenance Report, EMERA Doc. No. D-000ED-0-950-05-046 dated 03/30/2020

[2] Maritime Link Operations Annual Maintenance Plan – 2019, EMERA Doc. No. D-000ED-0-950-03-025 dated 11/9/2018

[3] Maritime Link Operations HVDC Maintenance Plan, Doc. No.: D-000OP-0-950-03-020 dated 25-Mar-19, revised 7-Nov-19

[4] ABB Maritime Annual Maintenance 2019 Summary, doc. No. 1JNL676650 dated 30/9/2019

[5] Maritime Link Operations Subsea and Land Cable Fault Finding Procedure, Doc. No. D000OP-0-950-04-01 dated 20.11.2019

[6] Maritime Link Operations Overhead Transmission and Grounding Line Contingency Plan, Doc. No. D000OP-0-950-03-93 dated 13.12.2019

[7] Maritime Link Operations Transmission Line Maintenance & Repair Plan, Doc. No. D000OP-0-950-03-022 dated 12.12.2019

[8] Annual O&M Budget for Operating Year 2019

[9] Maritime Link Operations "June 19, 2019 Bi-pole Forced Outage", Doc. No. D000OP-0-950-05-217 dated 21.04.2020

[10] Maritime Link IE Update 2019 Year End Review and 2020 Outlook, dated April 24, 2020

# 4. O&M DOCUMENTS AND INITIATIVES

## 4.1 ML 2019 ANNUAL O&M REPORT (REF. [1])

### 4.1.1 Introduction

The Maritime Link is owned and operated by NSP Maritime Link Inc. (NSPML), a wholly owned subsidiary of EMERA Newfoundland & Labrador Holdings Incorporated (ENL).

Commercial operation of the Maritime Link commenced on January 15, 2018. Project closeout activities, resource development and competency training for Operations staff also took place in 2018. Safety and Environmental Management, reliability performance and maintenance planning and execution are progressing as expected for early operations.

### 4.1.2 Safety

There were no reportable injuries during 2019.

Safety Management System Highlights:

- The Permit to Work subcommittee reissued NSPML's Permit to Work Procedure. The Permit to Work Procedure is expected to evolve throughout 2020 to allow for greater integration of work occurring between demarcation points of control identified in the permit.
- Audits for the Confined Space Entry as well as Permit to Work procedures for pole de-energization were completed in 2019.
- Throughout 2019 eight (8) high potential / near miss incidents and 3 first aids were reported.
- NSPML has continued to focus on diligent risk assessment through a monthly Field Level Risk Assessment (FLRA) review at the team safety meeting.

### 4.1.3 Environment

All environmental objectives were achieved in 2019 with no critical aspects at risk. NSPML also closed all audit action items associated with the 2018 Emera Corporate Environmental Audit.

No moderate or significant environmental incidents were recorded in 2019. A total of 52 environmental incident reports were created in 2019, with 10 minor incidents recorded.

NSPML regularly meets with the Department of Fisheries and Oceans (DFO);the regulator was satisfied that recent study outcomes presented fulfilled the conditions of the Environmental Assessment process and Canadian Fisheries Act s.35 permit for the construction of the Big Lorraine grounding facility.

### 4.1.4 Performance

Availability and Reliability

HVDC System: Overall, 2019 was a strong year for Maritime Link Availability with only four recordable forced outage events recorded throughout the year. Less than 1.5% of total unavailability was caused by forced outages, with the balance primarily attributable to HVDC System maintenance, Transmission Line conductor repairs and Subsea trenching operations. These planned outages do not reflect on ABB's Initial Availability Warranty Period; therefore, these availability results have been tabulated in separate columns below. ABB achieved the Initial Availability Warranty for 2019 with an Energy Availability of 99.06%.

There was one Bi-pole Forced Outage in 2019 which occurred in Q2. NSPML is in discussions with ABB with respect to resolution of this matter under the warranty provisions of the ABB supply contract (ref. [9]).
Woodbine STATCOM: Either Pole 1 or Pole 2 STATCOMs were available 100% of the time.
Bottom Brook STATCOM: Either Pole 1 or Pole 2 STATCOMs were available 99.932% of the time.

CIGRE TB590 Dashboard:

| | Q1 | Q2 | Q3 | Q4 | Q4 (ABB) | Initial Period Guarantee |
|---|---|---|---|---|---|---|
| %FEU | 0.01% | 0.05% | 0.06% | 0.07% | 0.10% | N/A |
| %SEU | 0.0% | 0.0% | 5.18% | 5.80% | 0.84% | ≥1.25% |
| %EA | 99.99% | 99.95% | 94.76% | 94.13% | 99.06% | ≥98% |
| BFO | 0 | 1 | 1 | 1 | 1 | =0 |

Legend:
FEU Forced Energy Unavailability
SEU Scheduled Energy Unavailability
EA Energy Availability
BFO Bi-pole Forced Outage

Outage Events Details

- The Maritime Link experienced one (1) recordable event causing P1 trip during Q1, 2019. Safety interlock micro switch false indication resulted in P1 trip at Bottom Brook.
- The Maritime Link experienced one (1) recordable event causing bi-pole unavailability during Q2, 2019. External trip caused loss of both station service supplies and subsequent failure to transfer the essential power to emergency diesel generator caused bi-pole trip at Bottom Brook. Temporary measures are in place, full

remediation is being discussed with ABB. At the time of report writing the parties have not yet arrived at the appropriate solution.

- The Maritime Link experienced one (1) recordable event causing Pole 2 trip during Q3, 2019. The event was caused by overloading of Bottom Brook control computers. The issue has since been addressed.
- The Maritime Link experienced one (1) recordable event causing Pole 2 trip during Q4, 2019. Valve hall door vertical dead bolt failed at Bottom Brook preventing the door to be fully closed that resulted in the pole trip. Permanent solution was executed on Bottom Brook P2 with temporary measures implemented elsewhere. The remaining doors will be permanently corrected during 2020 annual shutdown maintenance window.

Utilization

Utilization of the Maritime Link has been higher through 2019 compared to 2018, with the majority of transactions scheduled for a NS to NL direction and variable in magnitudes in range from 2.59GWh to 66.82GWh.

Losses

For 2019 the average posted Maritime Link Loss Factor is 5.00%. The losses during the period were slightly higher than in 2018; it is recognized that the ML was operated with lower magnitudes over longer hours than in 2018.

Operational Exceedances (deviations from designed max-min values for major equipment)

No operational exceedances have occurred during the reporting period.

### 4.1.5 Maintenance Highlights

In order to ensure that warranty protections are maintained, the maintenance activities in the current period were completed in accordance with the Original Equipment Manufacturer (OEM) recommendations.

HVDC Converter Stations

During the year, 1361 Preventive Maintenance work orders were issued for the HVDC System. The work is reported to have been completed within the prescribed time window, with only one (1) item, the converter building roof inspection at Woodbine, not completed due to adverse weather. Between August 19 and 25, 2019 both Pole 1 and Pole 2 planned HVDC System shutdown maintenance items were completed as planned and in addition, several outstanding warranty items were completed.

Compliance activities relating to NERC CIP cyber security requirements have been completed as necessary during 2019.

HVAC Substations

All scheduled preventative maintenance work orders were completed prior to the end of January 2020 and confirmed by both Nova Scotia Power Inc. and Newfoundland and Labrador Hydro.

Overhead Transmission and Grounding Lines

The planned vegetation management along the HVDC Transmission and Grounding lines was completed in Q3, 2019 with the total of 290 hectares cleared. Identification of and progress on stabilization of remediated areas has been completed in Q3.

A significant climbing inspection and bolt re-torqueing campaign was completed in 2019; all 481 HVDC Transmission Line towers were climbed and bolts re-torqued on the tower structures in Newfoundland. The inspections in Nova Scotia showed no apparent bolt torque issues. At a minimum, line inspections were completed per the Transmission and Grounding Line Maintenance Plan, with augmented inspections where required related to remedial work scoping. Four (4) sections of damaged conductor along the HVDC transmission line in Newfoundland were cut out with new sections spliced in (there are 4 more cut outs outstanding to be completed in 2020).

HVAC transmission line services to perform inspection and corrective works as required were externally contracted; the work was completed by January 2020.

Submarine and Land Cables

Marine trenching work and full submarine cable survey of both cables were completed in Q3/Q4.
DFO advised that the largest distribution of redfish is now found between 350m and 500m water depth and, starting in 2019, the fishing industry is shifting from mid-water trawling to bottom trawling and they will harvest at this depth. Bottom trawling represents a direct and current risk to the submarine cables. As a result of the emerging redfish fishery, a capital trenching / burial campaign for the 59km deep water section of cable was undertaken with the OEM, Nexans. Full submarine survey of both cables was conducted in accordance with the planned maintenance. The development of contingency planning associated with submarine and land cable assets continued in 2019 with the advancement of cable repair scenarios as well as the development of a fault-finding procedure (ref. [6]).

Spare Parts
Materials have been stored in the new Spares Buildings. The reconciliation of ABB spares with contractual and operational requirements has thus been completed.

Forward Planning
Complete remediation of the HVDC transmission line vibration damper and OHSW/OPGW bonding jumper issues has been scheduled for 2020.

Other planned maintenance activities including outages for 2020 can be found in the 2020 Annual Maintenance Plan: D-000OP-0-950-03-056.

## 4.2 ML OPERATIONS ANNUAL MAINTENANCE PLAN (REF. [2])

The plan provided an overview of all the necessary elements required to carry out 2019 annual equipment maintenance in accordance with Good Utility Practice.

The Plan anticipated that Maintenance activities will be completed by NSPML technical staff with the support of contractors as appropriate to the activity and task. For 2019 that included NSPML's primary contractors; ABB (HVDC systems), Nexans (Subsea & Land Cables), DOF subsea (subsea cable inspection), the two provincial utilities NLH & NSPI (AC substations and related infrastructure), as well as other local suppliers to support transmission and other activities across the asset footprint.

## 4.3 ML OPERATIONS HVDC MAINTENANCE PLAN (REF. [3])

The Plan details asset management strategy. For purpose of defining preventive maintenance scope the HVDC assets are comprised of the converter stations and transition compounds including converter transformers, switchgear, IGBT valves, converter reactors, and the associated control and protection systems. Also included are the auxiliary systems and building maintenance. The maintenance programs for the facilities in both provinces are virtually the same. The Plan describes the HVDC equipment and facilities in detail as well as the maintenance activities applicable to the equipment listed. The assets are installed at:

- 301NL – Bottom Brook HVDC Converter Station.
- 301NS – Woodbine HVDC Converter Station.
- 701NL – Cape Ray Transition Station.
- 701NS – Point Aconi Transition Station.

Responsibility for maintenance outlined in the Plan rests with The Maritime Link Asset Management Team and HVDC Technicians:

Preventive Maintenance: During the initial service period scheduling of preventive maintenance will be 'time or interval based'.

Inspections: These are intended to identify potential or emerging issues with the HVDC equipment and its auxiliary systems.

ABB / EMERA SLA - 5-year Service Level Agreement has been executed. It includes a minimum of 3 year on-site technical support.

HVDC Maintenance – Shutdown work is subcontracted to ABB; work is to be done according to OEM recommendations during warranty period.

Grounding Stations - Inspections only.

AC Substations - NLH and NSPI Utilities maintain and ML will keep the records.

Submarine and Land Cable - Maintenance is defined in NEXANS document (M-20000-1-100-09-001) and the

Subsea & Land Cable Maintenance and Repair Plan – D-000OP-0-950-03-23.

OH Transmission and Grounding Lines - Preventive maintenance consists of line inspections, vegetation control and ROW vegetation management.

## 4.4 ABB MARITIME ANNUAL MAINTENANCE 2019 SUMMARY (REF. [4])

This detailed report focuses on converter stations preventive maintenance items, outstanding issues, and recommendations. Areas covered are:

- Inspections, tests, and maintenance completed in 2019.
- Number of IGBT changes.
- Abnormalities addressed at BBR and WB.
- Outstanding issues at BBR and WB sorted by work requiring (and not requiring) equipment outages.
- Recommendations on work to be completed and issues resolved in 2020.

## 4.5 ML OPERATIONS SUBSEA AND LAND CABLE FAULT FINDING PROCEDURE (REF. [5])

There are three major sources of risk over the cable route: anchors, ice and fishing gear contacts. NSPML has made significant investment to protect these subsea cables, but in the unlikely event of a subsea cable fault, the fault must be located by fault finding procedures known as "pre-location". The operating procedure, test instructions and interpretation of the results developed by NSPL have been aligned with CIGRE TB 773: Fault Location on Land and Submarine Links (AC & DC) published by CIGRE Working Group B1.52 in 2019. Cable faults typically fall into three main categories:

- Open circuit faults (interruption of conductor or sheath by external mechanical impact).
- Shunt faults (insulation failure resulting in short circuit to ground).
- Sheath faults (sheath to ground fault resulting in eventual water ingress).

Main risks to submarine cable are external, from marine vessels. For purpose of monitoring ships traffic, AIS system has been installed and is being monitored for the Maritime Link.

**Note**: AIS (Automatic Identification System) is an automatic tracking system that uses transponders on the ships and is used by Vessel Traffic Services (VTS).

## 4.6 ML OPERATIONS OVERHEAD TRANSMISSION AND GROUNDING LINE CONTINGENCY PLAN (REF. [6])

The Maritime Link transmission line system includes two (2) ±200kV HVDC transmission lines, one (1) 230kV HVAC transmission line, and two (2) 25kV grounding lines:

| Line | Number of Structures | Length of Line [km] |
|---|---|---|
| HVAC line | 870 | 160 |
| HVDC line | 481 | 142 |
| Ground'g line | 163 | 46 |
| Ground'g line | 389 | 23 |

The purpose of this Plan is to detail the contingency models for repairing and/or replacing structures of each transmission line as may be required over their service lives:

- HVDC line failures constitute the largest risk to the Maritime Link. It the event of structure failure, best course of action is replacement in kind. Or, in case of cascading failures, series of by-pass structures will need to be constructed.
- HVAC uses wood pole design. The most cost-effective alternative for replacing these structures in the event of a structure failure is to replace in kind with the original design for the particular structure.
- Grounding lines consist of wood poles with steel crossbeams. In the event of a structure failure the most pragmatic option for this line is to replace it with structure in kind. Therefore, it is prudent to keep a satisfactory inventory of the spare parts.

## 4.7 ML OPERATIONS TRANSMISSION LINE MAINTENANCE AND REPAIR PLAN (REF. [7])

The Plan details maintenance strategy and associated plans specific to the Maritime Link Overhead Line structures. It is a part of ML Asset Integrity Management Plan (ref. D-000OP-0-950-02-001) which provides a full breadth overview of the maintenance and repair programs employed across the Maritime Link assets.

**Note**: Other programs are in place for HVDC and Grounding Stations, AC Substations, Grounding Site repair, submarine cable repair, telecommunication system maintenance and transmission line contingency repair.

This Plan describes the preventative maintenance program and vegetation management for the Maritime Link overhead transmission and grounding line assets. It describes their main components and highlights key specifications. The plan is applicable to the assets in both Newfoundland and Nova Scotia including:

- 230kV HVAC line (TL269) between Granite Canal AC Substation (103NL) and Bottom Brook AC Substation (101NL).
- +/-200kV HVDC transmission line including associated rights of way (X205/6 in NL and X201/2 in NS).
- Grounding line in Nova Scotia from Woodbine to Big Lorraine grounding station (E501).
- Grounding line in Newfoundland from Bottom Brook to Indian Head grounding station (E502).

Preventive and Predictive Maintenance:

Preventive maintenance activities planned for Maritime Link assets are based on established utility experience that meets the good utility practice. ML Operations will perform all recommended maintenance in accordance with recommended frequencies until expiration of equipment warranties. At that time the maintenance may shift to risk-based maintenance strategy.

ML's fleet of overhead lines will be inspected on a routine basis as part of the preventative maintenance process. If damage is identified and repair is deemed necessary, repairs will be done by qualified contractors. Aerial, climbing and ground inspections will be carried out at different intervals. It has been reported that 100% of the HVDC NL structures were inspected in 2019.

HVAC and HVDC line protection relays have fault locating capability that pinpoints the location of line faults. This feature potentially shortens the line outage times by allowing the crew dispatch to the exact fault location for inspection and corrective maintenance actions. Electrode Line Impedance Supervision (ELIS) and Electrode Line Open Circuit (ELOS) monitoring serve the similar purpose for the electrode lines.

In NL, vegetation management by a spray and selective cutting program has commenced in 2019, five (5) years after the initial clearing of the right of way in 2014. The entire RoW (right of way) should be re-inspected and/or retreated/cut within a ten (10) year cycle. Application of spray and cutting will be guided by the effectiveness of the method selected and the re-vegetation rate. The program for NS is under development.

# 5. 2019 YEAR END REVIEW (REF. [10])

IE visited NL site and published formal site visit report. In addition, teleconferences took place to discuss equipment reliability, availability and resolution of any deficiencies.

Transmission Lines

- All HVDC line vibration dampers will be replaced. Proposals are being evaluated with Stockbridge being the likely choice.
- Some dampers were replaced in 2019, rest are scheduled for 2020. However, due to supply chain issues with COVID 19, the delivery of dampers is still in question to allow work to be completed in 2020. Most of the repairs will be planned to coincide with station annual outage.
- OPGW clamps will be retrofitted with longer suspension bracket to increase the clearance from the tower. 65 clamps with longer suspension brackets were replaced in 2019. Inspection and repairs for the remaining clamps will be managed as part of the annual inspection program.
- OPGW / OHSW bond wires are to be replaced with braided wires. 30% on the NL HVDC line were replaced in 2019, the rest are scheduled to be changed out in 2020.
- NS HVDC line 10% ground inspections, 10% climbing inspection and 10% re-torqueing were completed with 100% climbing inspection and re-torqueing on NL HVDC. Remedial work was carried out to address deficiencies.
- HVAC line 10% ground inspections and 10% climbing inspection were completed. Remedial work was carried out to address deficiencies.
- 2019 vegetation management plan work was completed and continues into 2020. The NL vegetation management program is currently expected to restart in 2024.
- HVAC line relocation between structure 842 and 846 due to slope stability concerns is in progress. Approximately 50% of the work is completed with target to have the remaining work done in 2020.

Marine Program

- 2 x 59km of trenching and 'as-trenched' survey at water depth greater than 400m completed by Nexans.
- Visual inspection survey completed by DOF Subsea Canada.
- Nexans will be reviewing the 2019 survey results to provide a recommendation on any necessary cable remedial rock protection for the areas of scour and settling first identified during the 2018 inspection campaign.
- Cable Repair Contingency Plan was developed in 2019 and includes the Team Structure, Repair Response Flowchart, Fault Finding Procedures, and Cable Repair Scenarios.
- Technical discussions with Nexans are ongoing and focus on the scope of a Contingency Services Agreement under which Nexans will provide services and lead any cable intervention activities under the Inspection, Maintenance and Repair (IMR) Framework. Commercial and contract discussions will follow.

Documents Uploaded Q3/ Q4

- 2018 Submarine Inspection Survey Report.
- 2019 Submarine Inspection Survey Report.
- Bipole Forced Outage Report.
- Q2 O&M Report.
- Q3 O&M Report.
- Q4 O&M Report.
- Q1 Schedule J Report.

- Q2 Schedule J Report.
- Q3 Schedule J Report.
- Q4 Schedule J Report.
- AC Substation Maintenance Plan.
- Submarine and Land Cable Maintenance and Repair Plan.
- Addendum to 2019 Annual Maintenance Plan.
- Annual Maintenance Plan 2020.

# 6. CONCLUDING REMARKS

## 6.1 MAINTENANCE PLANS

Suitable maintenance plans are in place or under development (ref. [11]). When completed, those plans will consist of an umbrella long term asset management plan as well as the equipment inventory, maintenance procedure documentation and work order systems. Such an approach is consistent with good utility practice.

## 6.2 ROUTINE MAINTENANCE ACTIVITIES

For the time being the scheduled maintenance is carried out according to Original Equipment Manufacturer (O&M) manuals. Service Level Agreements are in place or are being finalized. This approach is deemed to be the most appropriate during the warranty period and it is consistent with good utility practice.

## 6.3 UNSCHEDULED MAINTENANCE AND RESPONSE TO FORCED OUTAGES

Response to deficiencies and equipment failures has been timely and appropriate. Engineering solutions have been / are being explored to find optimal solutions to transmission line hardware problems. Solution to emergency diesel generator protection is pending.

## 6.4 SUMMARY OF STAFFING, TRAINING OR LABOUR MANAGEMENT ISSUES

There are 20 full time employees plus two co-op student positions that change throughout the year. No management or labor issues were reported in 2019.

Training has been completed.

## 6.5 PARTS INVENTORY

Spare parts have now been stored in permanent facilities. All spare components have been listed and categorized and are in the process of being loaded into an enterprise inventory management system. Contractual reconciliation with ABB has been completed. Subsea and land cable spares are in place and are being maintained as per O&M requirements. Major spare parts for transmission lines are in place however, additional materials will be required for bypass and to facilitate quick restoration.

## 6.6 ANNUAL O&M BUDGET FOR 2019 (ref. [8]):

Costs are shown in $1,000s. Timing of expenditures will be per Annual Maintenance Plan (ref. [2])

| Breakdown | Operating Budget 2019 | Cost incurred to Dec.31, 2019 | Commentary |
|---|---|---|---|
| Labour | 2,600 | 3,000 | |
| General Administration | 2,200 | 1,800 | Includes shared corp. svc's, rent, office, travel |
| HVDC and transition sites | 3.200 | 3,400 | |
| AC substation | 500 | 200 | |
| Marine | 2,000 | 2,300 | |
| Overhead transmission lines | 1,200 | 2,000 | |
| Other maintenance | 700 | 500 | |
| Other | 400 | 500 | Environmental and IE |
| Insurance | 2,000 | 2,000 | |
| Legal, regulatory & compli-ance | 1,700 | 1,500 | |
| Contingencies | 1,800 | | Includes storm response |
| Total O&M Budget | 18,300 | 17,200 | |

Budget and maintenance activities objectives appear to have been achieved in 2019.

## 6.7 CONSTRUCTION CONTRACTORS' SUPPORT AND MANAGEMENT OF POST-COMPLETION TECHNICAL RISKS

- AC Substations - NLH and NSPI Utilities jointly maintain the power apparatus and Protections and Control equipment. The physical work will be carried out by NSPI staff.
- HVDC - Maintenance is subcontracted to ABB and will be carried out within the framework of 5-year SLA. ABB staff will provide on-site technical assistance for at least the initial 3 year period.
- Submarine Cables - EMERA prepared cable repair plans. NEXANS is expected to be contracted to carry out the sub-marine cable repairs, should any arise. In case NEXANS is unable to carry out the repairs within 2 months, the splicing instructions are held in escrow and will be available to 3rd party contractor. The trenching of 59km of deep-water cable was also completed by NEXANS. The annual survey of cables was completed by DOF.
- Communications Channels - Since those were provided by different vendors there are mixed responsibilities for the maintenance and technical support.
- Transmission Inspections and Repairs - See Section 5 for details.

## 6.8 ML PERFORMANCE

The Maritime Link's 2019 Availability as of the end of Q4 2018 was 94.13%including planned and unplanned outages that occurred throughout the year.

For 2019 the average posted Maritime Link Loss Factor is 5.0%. This is consistent with the losses guaranteed recognizing that power flows in 2019 were lower than the Maritime Link's 500MW rating.