Request IR-22:

With respect to Response to Enerco/AHB 2000 IR-1(b):

(a) Please provide more detail and specifically, elaborate whether an option of shared risk of unforeseen underwater conditions has been considered for the submarine cable contract and if so, how the contract might be structured to achieve risk sharing.

(b) We note that the scheduled contract signoff date for the EPC 1 contract is June 2013, whereas the cable protection and rock berm design criteria will only be finalized by March 2014. How will this be accommodated in the submarine cable contract?

Response IR-22:

(a) The Request for Proposals (RFP) for the Submarine Cable design, supply and install contract was structured as a lump sum Engineer, Procure, Construct (EPC) contract. In this form of contract, NSPML was requesting proposals from Contractors that took into account the scope of work of the Submarine Cable project and all associated risks in providing a firm price for the work. In this format, it was considered that the price would reflect the Contractors confidence to assume all Submarine Cable project risk. In this form of contracting, it is up to the Contractors to evaluate their perceived risk and respond in their proposal how they see this risk being managed with NSPML. With all contracts being performed on a lump sum basis, contractors may desire certainty of all factors that can impact completion of the scope of work to the specified criteria and schedule or potentially seek exemptions in the terms of their contract

From NSPML's perspective, it was recognized that all work has associated execution risk and, as such, NSPML started out early in the project to study the area and gather

appropriate information to increase knowledge of the marine corridor and confidence of successful execution while reducing project risk. The Submarine Cable RFP was issued with a number of reports including one covering a marine survey of a two kilometre swath of the Cabot Strait that covered geophysical and geotechnical features of this corridor for the cable installation. Please refer to SBA IR-285 Attachments 1 through 37. This corridor was chosen based on the industry knowledge of the geological features of the Cabot Strait from years of study and research and with particular consideration by Mr. Gordon Fader, P. Geo. of Atlantic Marine Geological Consulting Ltd. and formerly of the Geological Survey of Canada and the Bedford Institute of Oceanography (retired). The interpretation of the marine survey results by Mr. Fader has led to a better understanding of the anticipated underwater conditions which is reflected in the installation requirements given to the proponents.

In the RFP process, Contractors were requested to outline how they would plan and perform the work which could include suggestions of any other pre-work or surveys that they feel appropriate for a better understanding of the work and route selection within the defined corridor. Pre-work could include such things as a pre-lay grapnel run (PLGR) or additional bathymetric survey in a key area. NSPML will evaluate the proposals and discuss with Contractors any noted exception to arrive at an agreed lump sum price and consideration of any risk sharing for additional cost exposure. This may include provision for minimum trenching rates for cable burial protection (using pre-defined minimum rates and achieved depth) and provision for how these instances are managed and cost is allocated where these rates are exceeded during installation. This may also include provision of lump sum costs for contingency protection measures, such as rock placement, that the Company may choose to use in the event that there are challenges using the primary method in certain areas.

(b) The responses to the Cable RFP will include a proposed conceptual design for the rock berm and associated cost for placement. This will be evaluated by NSPML to consider the proposed conceptual design and number/length of locations along the corridor where

a rock berm may be required in relation to any areas of concern raised by the Contractor or internally by NSPML. NSPML has been undertaking additional assessment of cable routing to reduce the risks associated with installation and protection and is incorporating these enhancements in the evaluation process working with suppliers, with the objective of reducing cost uncertainty.

The contract may include costs for a select number of rock berm designs or provision for how changes to the design may be addressed during detailed design phase of the EPC contract. The design of a rock berm is based on a volume of rock placed. For certainty, the contract may be structured based upon a volume of rock placed and number of transits to the proposed rock quarry in the event that the rock placement vessel has to return for more than one cargo. This will be determined during contract negotiations to arrive at the lowest long term cost and risk option for the project.

Request IR-23:

With respect to Response to Enerco/AHB 2000 IR-2(b):

(a) What is the length of the specified warranty period requested from the supplier in the operating phase?

(b) After the end of the warranty period, is the supplier warranty replaced with a coverage from the overall damage and liability insurance for the operating phase? If yes, is it with exactly the same conditions? If no, what is the difference.

(c) Does the overall damage and liability insurance for the operating period include business interruption coverage? If yes, what are the limits?

(d) If yes please describe the insurance? Would you be seeking costs and loss of revenue?

Response IR-23:

(a) The warranty extends for a period of 60 months after the substantial completion date on which mechanical completion has been achieved, and completion of transmission system tests.

(b) For the operations phase, a conceptual insurance framework will be developed prior to approval for construction. While it is still under development, we anticipate that the insurance coverage during the operating phase of the Maritime Link will include physical damage and liability for all elements of the Maritime Link, including the subsea cable. The complete scope of coverage, including, for example, deductibles, exclusions, limits and the inclusion of business interruption indemnity, will be further developed within the 12-18 month period prior to the Maritime Link commencing operations. The

final design of the program, and the insurance ultimately procured, will be subject to prevailing market conditions, including market capacity and pricing. A detailed strategy for the overall insurance program for the project construction phase is currently under development and will be in place prior to approval for construction.

(c-d) Refer to the answer to (b) above.

Request IR-24:

With respect to Response to Enerco/AHB 2000 IR-3(a):

More details are necessary to have confidence in the practicality of the proposed construction schedule. Please elaborate on how you have evaluated the risk of the project being delayed into a second cable laying construction season in 2017 and what slack is available to manage contingencies and mitigate that risk.

Response IR-24:

This risk was identified in a workshop as a part of the Risk Management Plan and reviewed through the independent risk review sessions with external expertise. In the workshop the logistics of cable supply and install within the weather window were identified; install is limited to Q2/3 of each year. Through this process, it was determined there is a low potential that the installation season would be missed.

The events considered included the inability to complete the manufacture or the install of cables (a market supply constraint), a project problem in the supply chain not related to ML (i.e. such as a factory problem), a vessel not completing prior work which impinges on the ML schedule, or a ML schedule issue of similar nature (one cable delayed in production, slower or problematic install due to vessel issues or non-typical weather delays).

If an event of this nature occurs, it is expected that one of the two cables could be installed in 2016 and the second in 2017. The production time for one cable is about 9 months (18 months for two). If a season is missed for either issue, it is practical to presume the second season would be required and there will be lead time and planning for the second campaign available.

In the mitigation planning, the project schedule has all of the pre work (HDD, land prep, etc.) complete in advance of install and scheduled for 2015. In the event there is one cable complete in

2016 and the other installed in 2017, the scheduled completion would not be impacted and there will be no additional costs to the project as budgeted. If the install is beyond the 2017 schedule, there may be additional costs to the project.

Contracting strategies will include consideration of the risks and quality assurance programs will be focused upon mitigating the risks, with; project controls and progress reporting and inspections, milestone-based payment schedules to ensure the schedule is maintained or to permit timely intervention, on-site inspections during manufacture, load-out, vessel operations, pre-work vessel assessments, continuous coverage on-vessel during installation, testing, protection and commissioning. The assessment of schedule and contract management will be ongoing project activities with dedicated resources, performance based measures of progress and authority based sign-off for progress payments upon validation by project management representatives. External expertise will be employed for marine warranty surveyor works and site quality assurance reporting during various stages of the execution of the works.

Request IR-25:

With respect to Response to Enerco/AHB2000 IR-4 and the Maritime Link Project Organization Plan dated February 2013:

(a) Is the "LCP project Director" the same as the "Project Director" described in Section 4.2 of the Joint Development agreement? If not, please elaborate and clarify.

(b) Is the "Sr. Project Manager" the same as the "Project Manager" as described in Section 4.3 of the Joint Development agreement? If not, please elaborate and clarify.

(c) The organisation chart shows the Sr. Project Manager reporting to the President rather than the Project Director. Please explain.

(d) Please provide the latest ML Project monthly report, as stated in section 4.5(b) (i) of the Joint Development agreement.

(e) What are the roles and authorities of the Quality Management Specialist and of the HSS Specialist? The Organization Plan shows that they report directly to the Sr. Project Manager. They do not seem to be managerial positions as might be expected in a project of such magnitude. Please explain.

(f) The organization chart for the construction function focuses only on the land based facilities. What are the equivalent positions and staffing for construction of the marine and HDD projects reporting to the Marine Engineer Team Leader?

Response IR-25:

(a) Yes.

(b) Yes.

(c) The Organization chart shows the Sr. Project Manager with a direct report to the ENL President as indicated with the solid line. This relationship illustrates day to day accountabilities to the ENL President who also retains responsibility for establishing strategic priorities within the ENL context as well as performance management of the Sr. Project Manager. The chart also shows a reporting line to the Nalcor LCP Project Director as indicated with a dotted line. This recognizes the reporting relationship identified in the ML-JDA where the PM has reporting responsibilities to the PD and that the PM and PD shall consult with each other and work together in good faith to achieve project excellence and execution. As indicated in Section 4.3.c of the MLJDA " The Project Manager, on behalf of Emera (NSPML) and in consultation with the Project Director, shall have responsibility and authority in accordance with the Agreement for managing (i) development activities to be carried out by Emera (NSPML)… and (ii) the Maritime Link Project Team."

(d) Please refer to Attachment 1, January 2013 Monthly Report.

(e) Both roles include direct reports during the construction phase of the project.

- The Health Safety and Security Specialist will have supervisory responsibility for two site specialists located in NL and in NS. The HSS Specialist will primarily have overall loss control accountability for the development, implementation, updating and monitoring of health, safety and security policies, programs, training, reporting, investigations, standards and compliance with regulations and laws in the execution of the project. The HSS Specialist will be accountable for the evaluation of supplier and contractor HSS programs and pre-qualification for participation in procurement processes, working with the project team and for ongoing execution of HSS performance of the project participants.

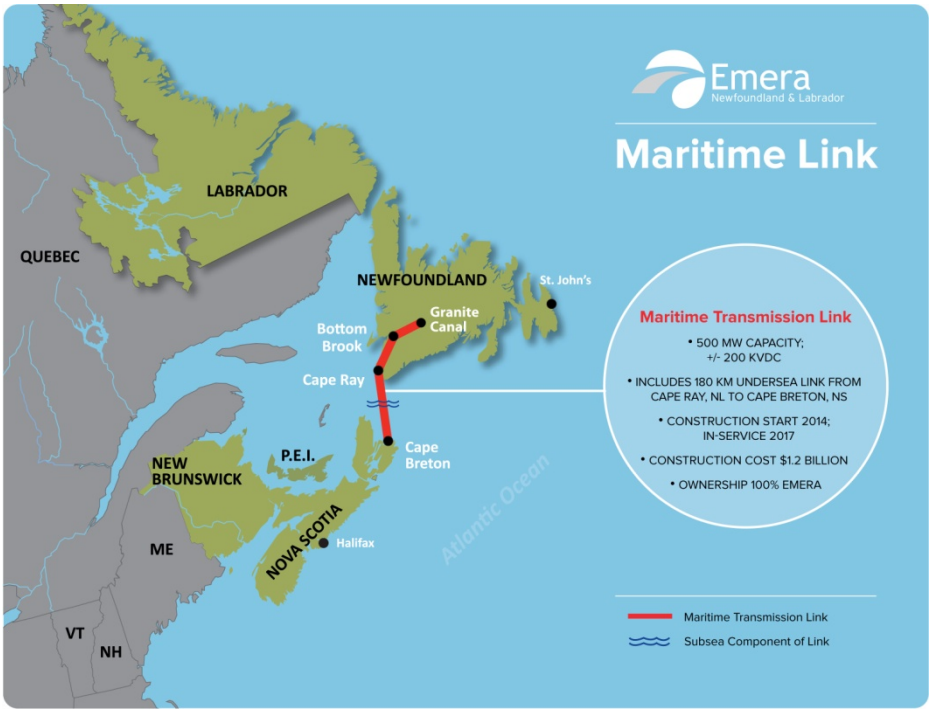
- The Quality Management Specialist will have supervisory responsibility for three specialists focused on Cable Manufacturing, Transmission Line Structures and Grillage, and the Converter Stations and other major electrical equipment. The QM Specialist will have overall accountability for the development, implementation, updating and monitoring of quality control and assurance policies, programs, training, reporting, investigations, standards and compliance with standards and practices which apply for each scope of work in the project. The QM Specialist will be accountable for the evaluation of supplier and contractor QA/QC programs and pre-qualification for participation in procurement processes, working with the project team, suppliers and consultants for ongoing execution of QM performance of the project participants.

(f) The Organization chart includes a Marine Team Lead supported by four engineering specialists:

- Project Engineer Shore Cable & Terminations
- Cable Engineer Design & Manufacturing
- Offshore Installation Engineer
- Project Engineer Landfall & Protection

The contract WBS strategy includes the Cable Contract for the design, manufacture and installation of the marine cable. Separate contracts will address the engineering and construction of the HDD sites in Nova Scotia and Newfoundland. These contracts will be under the direction of the Marine Team Lead.

Emera
Newfoundland & Labrador



Maritime Link Project

Monthly Status Report
January 2013

ISSUE DATE: February 21, 2013
REVISION: Final
FILE NAME: ML Project Monthly Status Report January 2013

TABLE OF CONTENTS

1 – EXECUTIVE SUMMARY

The project has commenced Phase 3 activities with a focus on concept optimization and transition to detail engineering and major contracting activities.

The key highlights for the month include the following:

- Functional Basis of Design (FBoD) report completed for the concept phase engineering work for terrestrial assets.
- The UARB regulatory application was submitted January 28, 2013. There is an established timetable by the regulators whereby the hearing will be May 27, 2013.
- The Decision Gate Management Meeting was conducted with approval given to proceed with Phase 3 activities.
- Signing of the Project Labour Agreement by the International Brotherhood of Electrical Workers (IBEW) for the Newfoundland-Labrador portion of ML work.
- Incorporation completed in NL for the Maritime Link Transmission Construction Employers' Association Inc.
- The Environmental Assessment report was finalized and filed January 10, 2013.
- Evaluations of Sub Marine Cable and Detailed Engineering proposals advanced.

The actual spend for the month was $1.72M against a budget of $4M and the YTD spend of $1.72M against a budget of $74.5M. (S*ee Finance Section for more details*).

The Approval to Construct decision gate (DG3) is scheduled for Q4, 2013.

2 – KEY PROJECT ACCOMPLISHMENTS

In addition to those comments mentioned in the previous section, the following is a summary of other key project accomplishments for the month of January:

- Detailed Engineering Design RFP proposals received and evaluation commenced.
- Electrical interference and corrosion studies for near shore grounding sites progressing as planned.
- System integration studies and development of technical specification for converters progressing as planned.
- Held protection workshop to optimize the submarine cable burial profile.
- Conducted site visit to manufacturing facility of one cable proponent.
- Completed site geotechnical investigations at Bottom Brook, Woodbine and Point Aconi.
- Completion of access agreements for NL geotechnical ROW sites work.
- Issued draft Technical Interface register covering interfaces between project scopes and contractors.
- Developed package for bridge assessments as part of Material Access Plan in NL.
- Public and Aboriginal review period for the EA Report began on January 18th
- Conducted three public information sessions in NL
- Conducted targeted stakeholder outreach with Louisburg and St. George's fish harvesters
- Continued meetings with targeted landowners in Cape Breton
- Selection of Phase 2 and 3 land agent support services to progress land acquisition activities.
- Conducted Integrated Planning workshop with Nalcor covering LCP projects planning and resource utilization.

3 – HEALTH, SAFETY AND SECURITY

Planning for the NL & Labrador Construction in Safety Conference on February 14, 2013 is well underway, ENL is a platinum sponsor of the event and will have an information booth there and making a presentation to the conference on the Maritime Link Project.

Met with J. Hollohan (Manager of Nalcor Safety) and staff to review our approach to safety management and common safety issues. Also, agreed to set up regular meetings to work together in a team approach to health & safety issues.

Reviewing issues associated with working in wetlands and bog areas, obtaining information and best practices from Nalcor and NL Hydro for development of procedure for ML project.

HSE provided feedback on the following initiatives:

- E12-62 – HDVC Converter Stations
- E12-79 – Transmission Line Route Geotechnical Investigation
- E12-74 – Marine Warranty Services
- E11-18 – Submarine Cable RFP evaluations

Incident Reports System

- There were no injuries in January 2013.
- There were three high potentials reported in January 2013 bringing the total for the project to 12.

As the ramp up with field activities progresses, ENL will be producing detailed safety statistics as part of the monthly reporting format.

4 – OUTLOOK FOR NEXT MONTH

Engineering

- Finalize FBoD engineering design report once Nalcor review comments received.
- Complete evaluation and recommendation for Detailed Engineering Design proposals.
- Completion of the geotechnical investigations at Cape Ray Transition Compound.
- Award and commencement of Transmission Route Geotechnical investigation RFP for transmission line foundations scope.
- Completion of the telecommunications concept design to integrate the ML project with utilities in NS and NL.
- Advancement of the Converter functional performance studies and specification activities. Initiate Converter Station (EPC2) RFP document.

Land Based Assets - Construction

- Populate details for interface register.

- Issue EOI and Contract Strategy for Right of Way Tree Clearing for transmission lines and sites and develop Engineering package for same.
- Issue EOI, and Contract Strategy for project office space on the west coast of NL.
- Develop EOI, and Contract Strategy for accommodation facilities at Granite Canal.
- Review and update of the Project Execution Plan.

Marine

- Optimize cable burial profile and protection requirements based on the outcomes of workshop held in January.
- Finalize recommendation of proposals for design and execution of the near shore and landfall geotechnical program and HDD design.
- Complete technical evaluation of cable supply RFP, seek approval of negotiation strategy and start negotiations with short listed proponents.

Business Services

Procurement

- E11-18 – Continue commercial evaluation of CAST proposals.
- E12-62 –Detail Engineering RFP evaluation of proposals through February.
- E12-74 - Continue preliminary work on Converter Station Contract Strategy and develop RFP document. Pre RFP information session planned with proponents 2nd week of February to discuss schedule, technology and process for an effective RFP execution.
- Advance approximately 20 other contracting initiatives.

Communications/Government Relations

- ML Regulatory communications strategy.
    - Developing advertising concepts to communicate the benefits of the Maritime Link Project and broaden customer understanding of the Maritime Link scope.
    - Continue to engage external stakeholders and government departments' communication leads to ensure appropriate level of knowledge sharing.
    - Ongoing meetings with Nalcor to ensure coordination of timing and release of information.
    - Media outreach conducted in the lead-up to the application filing to pre-empt media questions
    - Application filed on January 28 with modest media interest based on pre-filing activity
- EA Report Filing Communications
    - Report filed on January 10th, followed by a press release and media coverage in outlets through NL and NS
- Outreach to key community stakeholders to ensure continued engagement.
    - EA sessions held in NL and NS, coverage in local news outlets and with CBC TV Halifax
- Ongoing meetings with NS Energy, NL Natural Resources to discuss economic benefits, gender and diversity goals.

Labor and Human Resources

- Continue to fill required staff positions and recruitment planning for phase 3 of project.
- Submitted initial draft of gender equity and diversity plan.
- Review of Benefits Tracking Software.

- NL Labour Strategy in development. Meeting with Nalcor & IBEW February 8, 2013.
- Overall Benefits Strategy in development. Meeting with Natural Resources February 7, 2013.
- Develop team building workshop and year end performance review schedule.

Land Access

- Start date for Phase 2 and 3 Land Agency support services in mid February 2013.
- Progress remaining Phase 2 letters of consent for land access and initiation of permanent easement discussions.
- Ongoing meetings with land owners in Nova Scotia.
- Continue property searches for private lands in NL.
- Agreement of terms to secure land for NL grounding site.

Legal Services

- Ongoing legal support of various active procurement and corporate initiatives and land access activities to continue.
- Continue work with NL, NS and Federal government stakeholders to support land acquisition strategy and Public Utility Act changes needed for ML.

Insurance

- Insurance framework development workshop held January 24th with brokers.

Regulatory

- Regulatory application Order issued by UARB on January 29, 2013 outlining all required components and dates.
- First round of Information Requests runs from Feb. 25 – March 11; second round runs from March 18 – April 2. Hearing begins May 27, 2013.
- Preparations for technical workshop with interveners and UARB consultants Feb 14.

Environment

- Conduct public information and Aboriginal community information sessions in NS.
- Public and Aboriginal review period for the EA Report concludes on February 21st. Information Requests will be received on February 28th.
- Engaging DFO, Environment Canada, Transport Canada, and NR Canada prior to release of the Information Requests.
- Completion of an avifauna VEC (valued environmental components review) as a precaution from remarks to EA Report questioning missing VEC on migratory birds from the report.
- Progressing negotiations with KMKNO for draft benefits MOU.
- Planning community meetings in NL with the Qalipu and participating in a Qalipu business forum in Corner Brook.
- Completion of permitting applications to support transmission lines corridor geotechnical investigations.

Project Management

- Evaluate and select cost control software for project spend going forward.
- Standardize incurred cost reporting with vendors through project controls.
- Continue to align Nalcor and ENL OPEX budgets.
- Progress migration and development of the detailed project schedule from MS Project to Primavera P6 V8.2. Target completion is February 8.
- Develop integrated level 2 project schedule with Nalcor to ensure alignment with ML and LIL/MF projects as appropriate.
- Advance system completions and commissioning plan and strategy.
- Finalize contract and start implementation of the new document management software Coreworx.

5 – KEY RISKS / ISSUES

The following key risks (R) and Mitigation (M) Strategies are tracked by the project team:

1. (R) Unavailability of subsea cable to meet the project schedule
    - (M) RFP proposal reviews continue with a full technical and commercial evaluation plan in place and proceeding on schedule. Meetings planned with proponents to discuss the proposed cable execution plans. Site visits for the next phase of evaluation started in November and will be continued in January. Schedule to be maintained to mitigate any delay on award of the contract. External expertise has been retained for legal and engineering advisory roles during evaluation and negotiations. Risk and mitigations remain active until award is complete. Develop contingency plans during Phase 3 work plan and assess options including Nalcor provided market insight.
2. (R) Rock trenching technical viability for cable protection
    - (M) Updated ice risk studies to optimize protection requirements. Plans include avoidance by re-routing in these areas as appropriate.
    - (M) Meetings held with proponents to advance their proposals relative to execution risks and provide contingency plan for protecting the cable in the area of bed rock. Possible methods will have to mitigate any possible environmental and socioeconomic impacts. Also preparing contingency plans for executing potentially difficult trenching/pre-leveling work one season early to minimize installation conflicts.
    - (M) Protection optimization workshop conducted in January along with optimized burial profile resulting in less area where full burial depth cannot be achieved. Secondary protection being assesses for these areas (rock dumping and mattresses). Project cost estimates will be re-assessed.
    - Regular coordination technical meetings/lessons learned between Emera Marine Team and Nalcor SOBI Team are being held.
3. (R) Cable installation (trenching & cable laying) interactions with commercial fisheries
    - (M) Proactive and ongoing engagement with commercial fisheries groups to exchange information and identify opportunities to avoid or mitigate potential interactions.
    - (M) Reviewing cable proponent schedules against commercial fisheries seasons to determine mitigations for schedule avoidance.

- (M) Investigating methods to proactively collect data on fishing patterns (temporal and spatial) in the study area to avoid or mitigate potential interactions.

4. (R) Availability of qualified resources for project team activities

- (M) Significant progress has been made in filling key project roles. Focus has now shifted to start early recruitment for Phase 3 activities to avoid delays in filling positions.

5. (R) Expenditures before DG3 (Approval to Construct).

- (M) Reviewing contract strategies for major project scopes and land acquisition to determine early commitments before DG3, mitigating cost and schedule exposure where possible.

6. (R) Access to private and Crown land

- (M) A land strategy has been developed which outlines a number of concurrent activities to advance access to/acquisition of both private and crown lands required for the Project. A Lands Coordinator position is in place that will manage all NS and NL land strategy activities and land team resources.
- Utilizing the integrated team with Nalcor to advance securing crowns land and plan for crossings in NL.
- Identification of private land owners in NL and NS has been completed. Land Agency services have been contracted for Phase 2/3 activities to secure options for private lands in with activities starting in Feb. There are no issues currently identified that pose a risk to the project which cannot be addressed through coordination with land owners, which initial contact has already been made.

7. (R) Approval by NL Government to use third party dark fiber by ML Project

- (M) Commitment given through Nalcor that dark fiber is available for use. Activity to start in February lead by Nalcor to progress formal agreement with Government of NL to secure access.

8. (R) Unexpected geotechnical results impacting foundation designs

- (M) Geotechnical program sampling completed for Converter, Substation and Landfall Sites to align with the project schedule for detailed design inputs.
- (M) Received proposals and finalizing negotiations for transmission line right of way geotechnical investigations for execution targeted to start in February 2013.
- (M) Permitting activities well advanced to support the commencement of borehole activities.

9. (R) General labor productivity – execution efficiencies

- (M) Project execution plan, work-sequencing and labor resource histograms to be revisited for efficiencies.
- (M) Development and negotiation of contract strategies for construction activities to identify productivity targets. IBEW –NL agreement ratified and Cape Breton strategy planned for Q1 2013.
- (M) Committee in place with Nalcor to review and resolve construction resourcing concerns.

10. (R) Habitat compensation (Harmful Alteration, Disruption or Destruction (HADD) of fish habitat) requires authorization and compensation under federal Fisheries Act which may have project cost variability. Potential HADD requirement is a function of grounding site design and chosen cable installation methodology.

- (M) Finalize cable protection and grounding pond/breakwater designs with minimum impacts.

- (M) Early input from regulators during EA process to provide indication of HADD compensation. Continue engagement to finalize commitment expectations.

11. (R) Unknown potential project interactions with Aboriginal land and resource use

- (M) Progressive engagement with groups in both NL and NS (and formal Consultation with NS) underway. Continue discussions to capture concerns and reach appropriate agreements that consider rights and benefits.
- (M) Development of MOU with NS Mi'kmaq underway with focus on economic opportunities but with provisions for addressing potential interactions.

12. (R) Delay / Conditions of Environmental Approvals

- (M) The 6-week regulatory review of the draft report has concluded and key regulatory concerns received relate to: 1) potential environmental effects of the installation and operation of subsea cables and grounding facilities; 2) potential environmental effects of the project on migratory birds, and 3) documenting current use of land and resources by the Mi'kmaq & Qalipu First Nation in Newfoundland. Work is underway to address these items and mitigate the risk of delay in the approval of the final report.
- (M) Engaging key regulatory departments/agencies proactively and directly to facilitate their reviews.

13. (R) Negotiate a Benefits Agreement with the Mi'kmaq Rights Initiative in a timely manner.

- (M) A draft MOU has been prepared and is near completion, the MOU will provide a framework for the development of the Benefits Agreement.
- (M) Develop a strategy for effectively and efficiently negotiating a Benefits Agreement.
- (M) Continue engagement at senior levels with the Mi'kmaq Rights Initiative.

14. (R) Increased Benefits agreement compliance costs

- (M) Engagement underway with both NS and NL to progress an appropriate agreement.
- (M) Contract strategies drafted in alignment with NS-NL MOU. Cost impacts to be reviewed against approved agreement before awards made.

15. (R) Public concern due to limited information on EMFs and other Project interactions in the marine environment during operation of the grounding facilities and subsea cables.

- (M) Complete study of potential grounding effects in Q2 2013 to confirm understanding of possible impacts and mitigation options.
- (M) Discussion of potential interactions in the EA Report and ongoing stakeholder engagements.
- (M) Commitment to additional baseline studies and effects-monitoring programs in EA Report.

16. (R) Commodity pricing fluctuations impacting project materials costs

- (M) Investigate commodity market forecasts both in-house as well as consult with Nalcor on their findings for common materials.
- (M) Engage external subject matter experts for market surveillance as required. Update potential cost impacts/uncertainties for DG3 estimate.

17. (R) Foreign Currency exposure impacting project costs

- (M) Investigate market forecasts for potential currency requirements. Engage subject matter experts for market surveillance as required.

- (M) Specify and negotiate contracts in $Cdn to limit exposure, but evaluate the risks or opportunities based on each major contract exposed to exchange rates.

18. (R) HDD landfall construction risks
    - (M) Released the RFP associated with Geotechnical program in December to align with the project schedule to ensure the Geotechnical reports to be issued as per plan.
    - (M) Interface meeting to be arranged between Cable manufacturer and HDD design contractor.
19. (R) Regulatory approval and cost allowances
    - (M) ENL has a regulatory core team in place and the regulatory application has been filed. Planning for Technical Workshop underway.
    - The prerequisite Commercial Agreements are complete. Continue the focus on Federal Loan Guarantee discussions.
    - (M) Alternative analysis has been assessed to ensure a robust analysis is completed and ML is the lowest long term cost alternative.
20. (R) Understanding of XPLE submarine cable (Service Life) – Opportunity
    - (M) Continue to evaluate cable types for suitable service life requirements (50 years).
    - (M) MI cable included in present estimate and Basis of Design but XLPE remains an option under review. Conduct review of Basis of Design with Nalcor for objective assessment when cable recommendation is completed if XLPE shows opportunity.
21. (R) Scope changes / additions driven by utilities (NSP, NLH) and Nalcor
    - (M) Continue design reviews and address any remaining concerns. FBOD report issued to Nalcor for review.
    - (M) Complete system studies and highlight any operational issues or additional equipment requirements. If none are identified this removes a strategic project risk and cost exposure.
    - Technical and Operating Committee being established to successfully plan, design and integrate ML Project scope with the other LIL, NSP and NLH Projects.

6 – FINANCIAL

Effective to January 31, 2013 ($000)

Maritime Link Project
2013 Cost Summary
Period Ending: 31-Jan-13
$CDN 000s

Description	2013 Original Budget	Planned Expenditures		Expended		2013 Spend Forecast			FC Variance VS Bgt
		This Period	To Date	This Period	To Date	Current	Previous	Variance	
Emera Internal	**21,918**	**2,183**	**2,183**	**1,458**	**1,458**	**21,918**	**21,918**	**0**	**0**
Nalcor Internal	**1,565**	**130**	**130**	0	0	**1,565**	**1,565**	**0**	**0**
Third Party	**51,018**	**1,698**	**1,698**	**266**	**266**	**51,018**	**51,018**	**0**	**0**
Environmental Approval	4,075	195	195	33	33	4,075	4,075	0	0
Cable	19,650	183	183	20	20	19,650	19,650	0	0
Other Technical & Engineering	27,293	1,320	1,320	212	212	27,293	27,293	0	0
Total	**74,501**	**4,012**	**4,012**	**1,723**	**1,723**	**74,501**	**74,501**	**0**	**0**

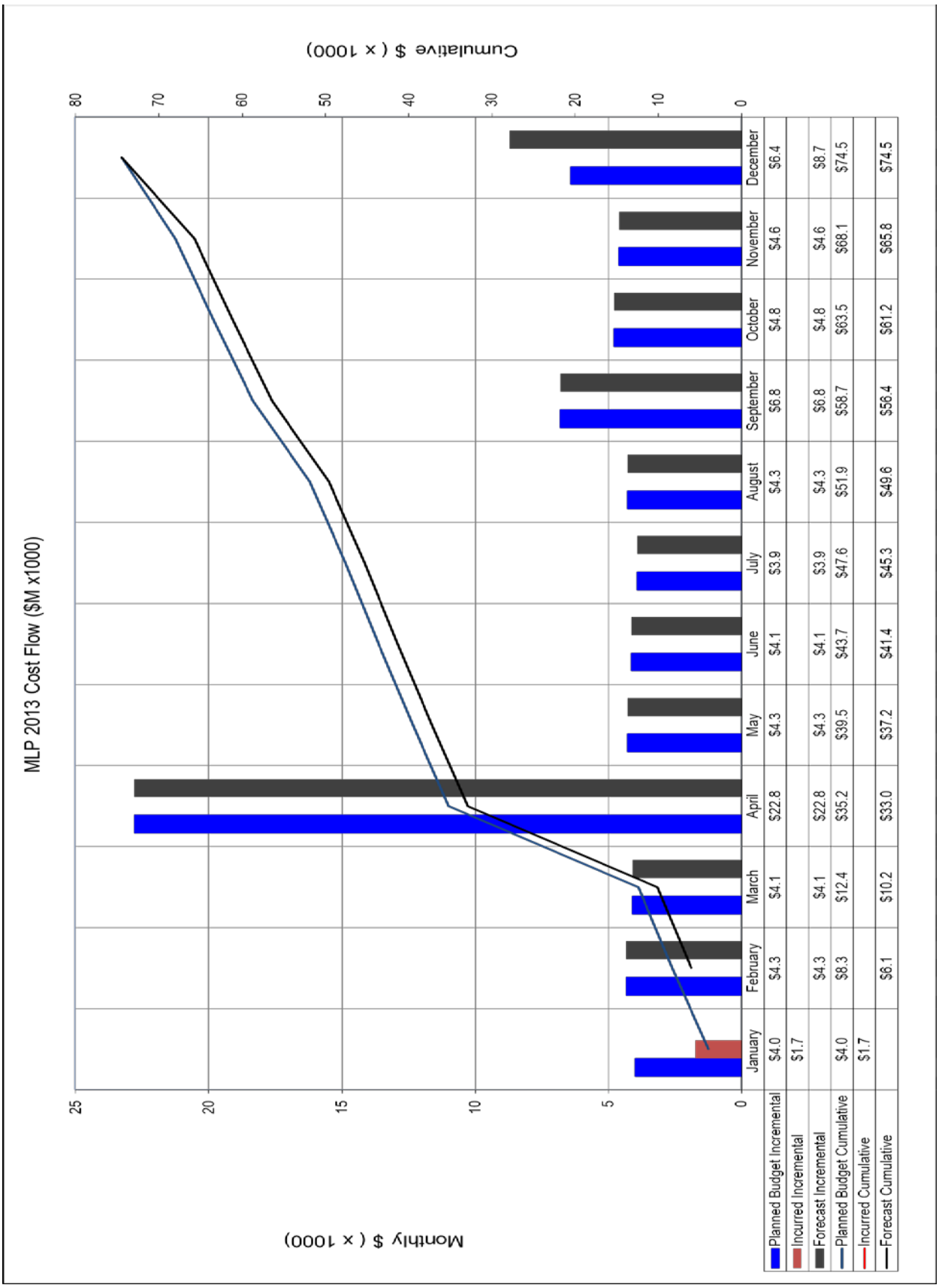
Notes:

- Actual spend for January was $1.72M against a budget of $4M.
- The actual to date spend (or year end for 2012) is $1.72M against a budget of $74.5M.
- Contracts expected to be awarded in February-March that will result in increased spend:
    - Information Management Software
    - Detailed Engineering services (Terrestrial Assets)
    - Horizontal Directional Drill Final Design and Geotechnical Program
    - Transmission Right of Ways Geotechnical Program
    - Phase 2 and 3 Land Agency Services

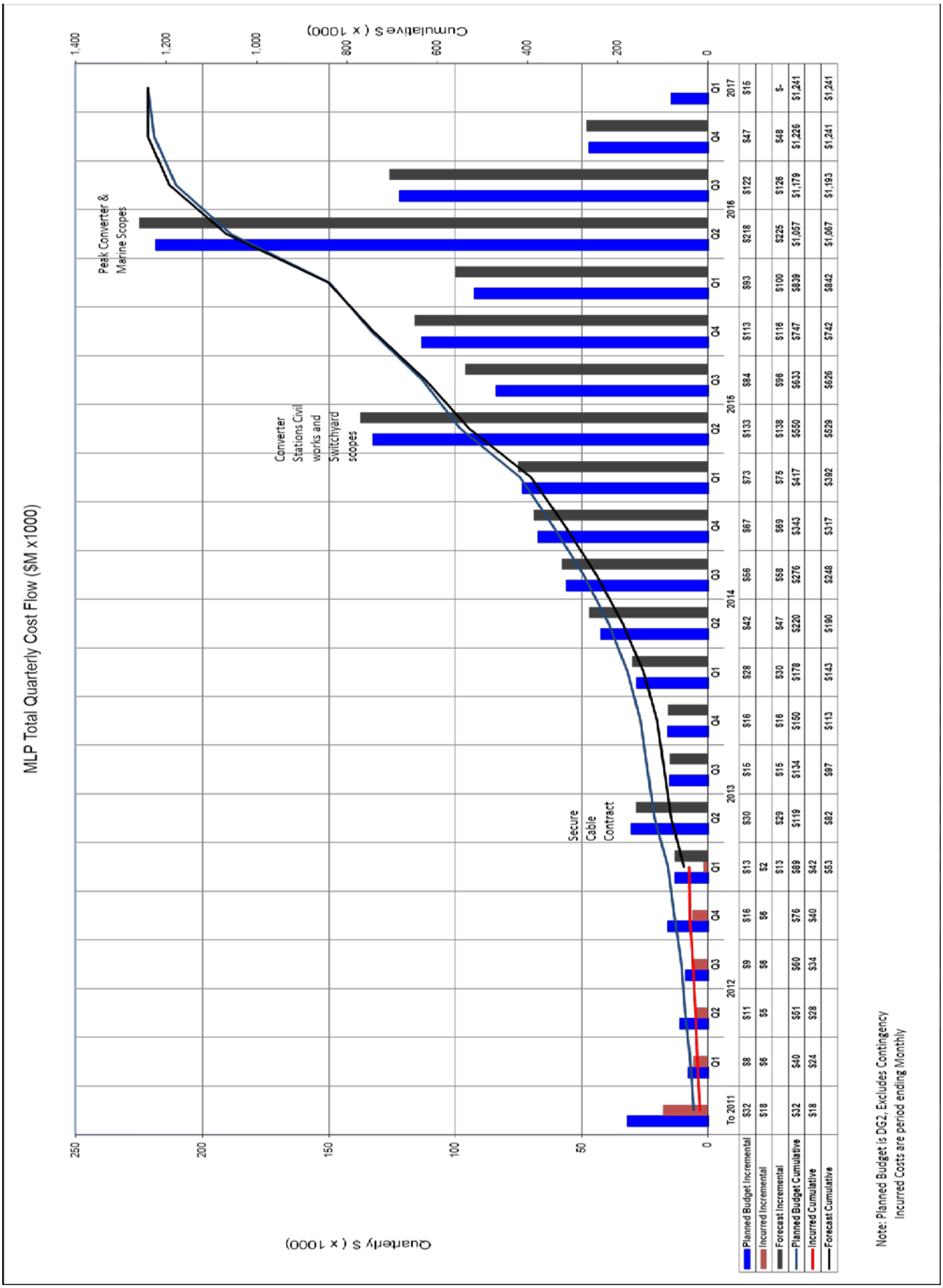
Detailed reviews of 2013 budget forecast are ongoing through February.

There will be an ongoing effort through phase 3 to incorporate estimate revisions based on current pricing into the project cost estimate.

Refer to the following pages for Total MLP Cost Flow and 2013 Cost Flow.



	January	February	March	April	May	June	July	August	September	October	November	December
Planned Budget Incremental	$4.0	$4.3	$4.1	$22.8	$4.3	$4.1	$3.9	$4.3	$6.8	$4.8	$4.6	$6.4
Incurred Incremental	$1.7											
Forecast Incremental		$4.3	$4.1	$22.8	$4.3	$4.1	$3.9	$4.3	$6.8	$4.8	$4.6	$8.7
Planned Budget Cumulative	$4.0	$8.3	$12.4	$35.2	$39.5	$43.7	$47.6	$51.9	$58.7	$63.5	$68.1	$74.5
Incurred Cumulative	$1.7											
Forecast Cumulative		$6.1	$10.2	$33.0	$37.2	$41.4	$45.3	$49.6	$56.4	$61.2	$65.8	$74.5



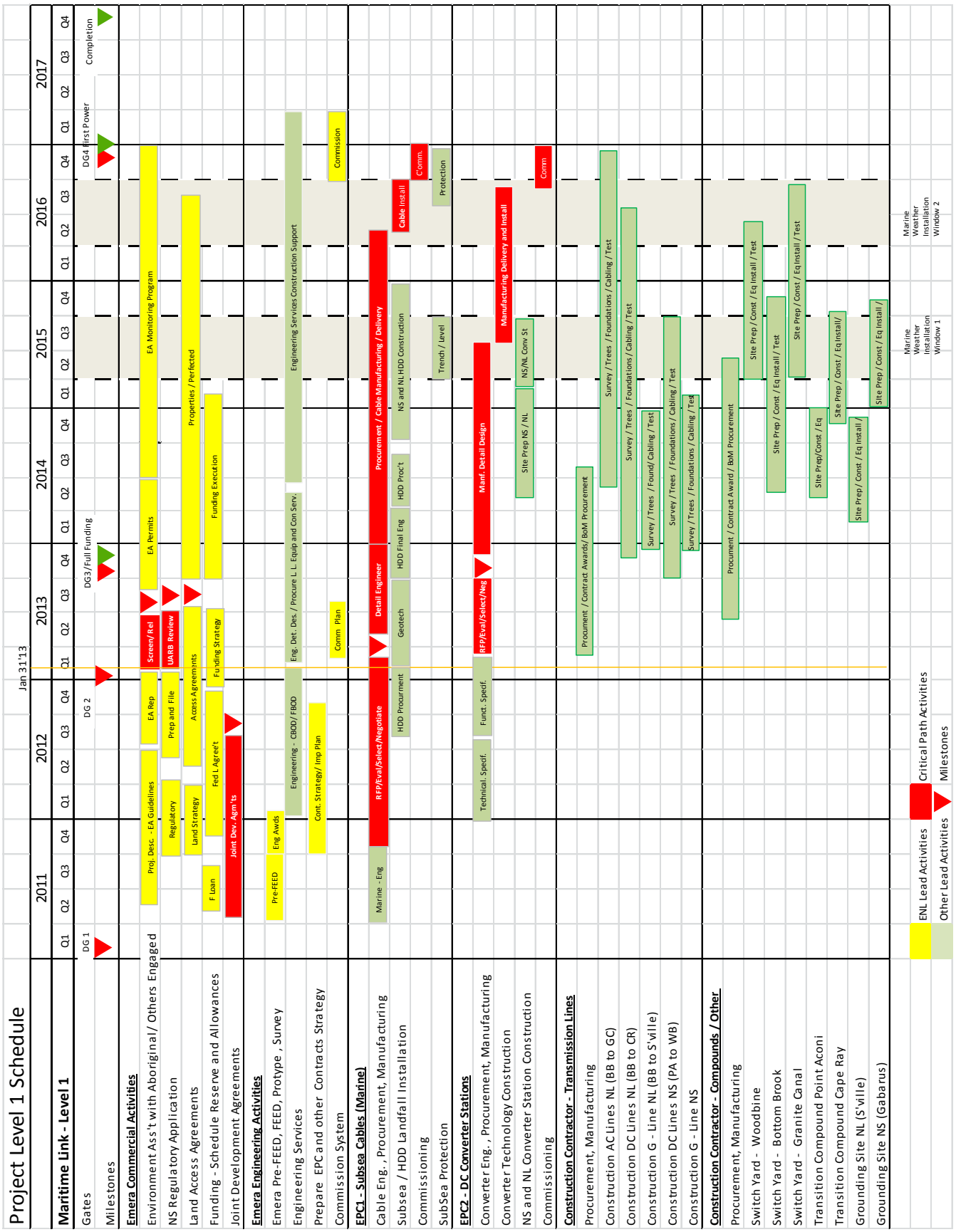
	To 2011	Q1 2012	Q2 2012	Q3 2012	Q4 2012	Q1 2013	Q2 2013	Q3 2013	Q4 2013	Q1 2014	Q2 2014	Q3 2014	Q4 2014	Q1 2015	Q2 2015	Q3 2015	Q4 2015	Q1 2016	Q2 2016	Q3 2016	Q4 2016	Q1 2017
Planned Budget Incremental	$32	$8	$11	$9	$16	$13	$30	$15	$16	$28	$42	$56	$67	$73	$133	$84	$113	$93	$218	$122	$47	$16
Incurred Incremental	$18	$6	$5	$6	$6	$2																
Forecast Incremental						$13	$29	$15	$16	$30	$47	$58	$69	$75	$138	$96	$116	$100	$225	$126	$48	$-
Planned Budget Cumulative	$32	$40	$51	$60	$76	$89	$119	$134	$150	$178	$220	$276	$343	$417	$550	$633	$747	$839	$1,057	$1,179	$1,226	$1,241
Incurred Cumulative	$18	$24	$28	$34	$40	$42																
Forecast Cumulative						$53	$82	$97	$113	$143	$190	$248	$317	$392	$529	$626	$742	$842	$1,067	$1,193	$1,241	$1,241

7 – PROJECT SCHEDULE

The Level 1 Schedule (refer to next page) depicts the main areas of project activity with the critical path indicated in red. The critical path leading to the Project Approval to Construct (DG3) at end of Q3, 2013 continues to be achievable pending award of detailed engineering services contract.

Comments and changes to this critical path since the last report are as follows:

- The Environment Assessment schedule remains unchanged with submission of the EA report January 10th and a release by June, 2013.
- UARB application was filed January 28th with a decision in July 2013.
- Land access activities for Right of Way agreements continue to progress on schedule.
- The Engineering Functional Basis of Design for transmission lines and substations is complete excluding the Grounding sites. These sites will be finalized following legal and environmental discussions that are ongoing.
- The schedule for start of detail engineering and procurement of long lead equipment remains the same from last month. It assumes the Engineering Services firm will start work in early Q1, 2013 following the current evaluation cycle of proposals. The procurement preparation activities will begin in Q2. To support detail design activities, geotechnical activities for all switchyard and substation locations are in progress and the RFP for the soils investigation activities for the transmission lines has closed and is under evaluation.
- The Submarine Cable RFP technical evaluation continues as scheduled with a contract recommendation planned to be presented at end Q1, 2013. A contract in Q2 may be necessary to achieve the manufacturing and installation schedule.
- The RFP for the Horizontal Directional Drill (HDD) Final Design and Geotechnical program closed December 10th and the evaluation process is on schedule.
- The Converter Station RFP release remains planned for late Q1 2013 subject to the development of the performance specifications, which are in progress, as previously reported. The Converter Stations are critical path for MLP.
- DG3 deliverables for phase 3 have been launched and are in progress by responsible lead.


Project Level 1 Schedule
Jan 31'13
2011
2012
2013
2014
2015
2016
2017
Q1 Q2 Q3 Q4
Maritime Link - Level 1
Gates
DG 1
DG 2
DG3/Full Funding
DG4 first Power
Completion
Milestones
Emera Commercial Activities
Environment Ass't with Aboriginal/ Others Engaged
NS Regulatory Application
Land Access Agreements
Funding - Schedule Reserve and Allowances
Joint Development Agreements
Emera Engineering Activities
Emera Pre-FEED, FEED, Protype , Survey
Engineering Services
Prepare EPC and other Contracts Strategy
Commission System
EPC1 - Subsea Cables (Marine)
Cable Eng. , Procurement, Manufacturing
Subsea / HDD Landfall Installation
Commissioning
SubSea Protection
EPC2 - DC Converter Stations
Converter Eng. , Procurement, Manufacturing
Converter Technology Construction
NS and NL Converter Station Construction
Commissioning
Construction Contractor - Transmission Lines
Procurement, Manufacturing
Construction AC Lines NL (BB to GC)
Construction DC Lines NL (BB to CR)
Construction G - Line NL (BB to S'ville)
Construction DC Lines NS (PA to WB)
Construction G - Line NS
Construction Contractor - Compounds / Other
Procurement, Manufacturing
Switch Yard - Woodbine
Switch Yard - Bottom Brook
Switch Yard - Granite Canal
Transition Compound Point Aconi
Transition Compound Cape Ray
Grounding Site NL (S'ville)
Grounding Site NS (Gabarus)
Proj. Desc. - EA Guidelines
EA Rep
Screen/Rel
EA Permits
EA Monitoring Program
Regulatory
Prep and File
UARB Review
Land Strategy
Access Agreements
Properties / Perfected
F Loan
Fed L Agree't
Funding Strategy
Funding Execution
Joint Dev. Agm'ts
Pre-FEED
Eng Awds
Engineering - CBOD/ FBOD
Eng. Det. Des. / Procure L L. Equip and Con Serv.
Engineering Services Construction Support
Cont. Strategy/ Imp Plan
Comm Plan
Commission
Marine - Eng
RFP/Eval/Select/Negotiate
Detail Engineer
Procurement / Cable Manufacturing / Delivery
Cable Install
C'omm.
HDD Procurment
Geotech
HDD Final Eng
HDD Proc't
NS and NL HDD Construction
Trench / Level
Protection
Technical. Specif.
Funct. Specif.
RFP/Eval/Select/Neg
Manf. Detail Design
Manufacturing Delivery and Install
Site Prep NS / NL
NS/NL Conv St
Comm
Procurment / Contract Awards/ BoM Procurement
Survey / Trees / Foundations / Cabling / Test
Survey / Trees / Found/ Cabling / Test
Survey / Trees / Foundations / Cabling / Test
Survey / Trees / Foundations / Cabling / Tes
Procurment / Contract Award / BoM Procurement
Site Prep / Const / Eq Install / Test
Site Prep/Const / Eq
Site Prep / Const / Eq Install/
Site Prep / Const / Eq Install /
Site Prep / Const / Eq Install / Test
Site Prep / Const / Eq Install / Test
Marine Weather Installation Window 1
Marine Weather Installation Window 2
ENL Lead Activities
Other Lead Activities
Critical Path Activities
Milestones

8 – DECISION GATE AND PROJECT DELIVERABLES

Work has begun to start developing deliverables and prepare for the various project reviews that will be performed prior to DG3.

DG3 Deliverables Summary:

Num	DG Catagory	Accountable	Responsible	Author	Title	Colour1	Status1	% Complete	Due Date	ID
MLP-PM-STR-0001	Business	R Janega	G Brennan	B Stapleton	Project Charter		Modifying DG2 Doc		2/28/2013	1
MLP-CA-PLN-0001	Business	G Brennan	B Rendell	Norma Weir	Energy and Capacity Economics Plan		Not Started		5/30/2013	2
MLP-CA-PLN-0002	Business	R Janega	B Rendell	Ken McOnie	Financing Plan		Modifying DG2 Doc		5/30/2013	3
MLP-PM-ORG-0001	Business	G Brennan	G Brennan	B Stapleton	Organization Plan		Modifying DG2 Doc		2/28/2013	4
MLP-PM-ORG-0002	Business	R Janega	G Brennan	G Brennan	Corporate Engagement Plan		Modifying DG2 Doc		2/28/2013	5
MLP-PC-PLN-0001	Business	G Brennan	S Kirkwood	B Stapleton	Project Training & Induction Plan		Modifying DG2 Doc		2/28/2013	6
MLP-CT-PLN-0001	Business	G Brennan	C Snelgrove	C Snelgrove	Project Execution Plan		Modifying DG2 Doc		3/30/2013	7
MLP-PC-PLN-0002	Business	G Brennan	C Snelgrove	B Stapleton	Interface Management Plan		Modifying DG2 Doc		3/30/2013	8
MLP-HS-PLN-0001	Business	G Brennan	G Brennan	Harris McNamara	Project Safety, Health and Security Accountabilities Pl		Modifying DG2 Doc		3/30/2013	9
MLP-PC-PLN-0003	Business	G Brennan	S Kirkwood	B Stapleton	Issues Identification & Management Plan		Modifying DG2 Doc		2/28/2013	10
MLP-PC-RPT-0001	Business	G Brennan	S Kirkwood	A Fagan	Project and Schedule Estimate Basis Report		Modifying DG2 Doc		7/31/2013	11
MLP-PC-RPT-0002	Business	G Brennan	S Kirkwood	A Fagan	DG3 Cost and Schedule Estimate Report		Modifying DG2 Doc		7/31/2013	12
MLP-PC-RPT-0003	Business	G Brennan	S Kirkwood	A Fagan	Estimate Confidence Assessment Report		Modifying DG2 Doc		7/31/2013	13
MLP-PC-RPT-0004	Business	G Brennan	S Kirkwood	A Fagan	Cost and Schedule Risk Assessment Report		Modifying DG2 Doc		7/31/2013	14
MLP-PC-PLN-0004	Business	G Brennan	S Kirkwood	B Stapleton	Management of Change Plan		Modifying DG2 Doc		2/28/2013	15
MLP-IM-STD-0001	Business	G Brennan	S Kirkwood	Marsha Dixon-Robicheau	Info. Management Standard		Not Started		2/28/2013	16
MLP-CA-PLN-0003	Business	R Janega	G Brennan	Lois Smith	Project Governance / Decision Guideline		Modifying DG2 Doc		2/28/2013	17
MLP-QM-PLN-0001	Project Implementation	G Brennan	G Brennan	P Hillier	Project Quality Plan (includes Eng. Surveillance Plan,		Modifying DG2 Doc		2/28/2013	18
MLP-CP-PLN-0001	Business	G Brennan	B Rendell	A Fraser	Purchasing Plan (including Contract Strategy, Purchasi		Modifying DG2 Doc		2/28/2013	19
MLP-EL-SPC-0011	Project Implementation	G Brennan	T Leopold	T Leopold	Concept Design - Land Based Assets		Modifying DG2 Doc		3/30/2013	20
MLP-PC-PLN-0005	Project Implementation	G Brennan	B Rendell	A Fagan	Project Financial Risk Plan		Modifying DG2 Doc		7/31/2013	21
MLP-CT-PLN-0002	Project Implementation	G Brennan	T Leopold	C Snelgrove	Project Execution Risk Plan (Reponsibility includes M		Modifying DG2 Doc		4/30/2013	22
MLP-CT-STR-0001	Project Implementation	G Brennan	T Leopold	C Snelgrove	Operations and Turnover Strategy		Not Started		4/30/2013	23
MLP-EL-PLN-0011	Project Implementation	G Brennan	T Leopold	T Leopold	Constructability Plan - Land Based Assets		Modifying DG2 Doc		5/30/2013	24
MLP-EL-RPT-0101	Project Implementation	G Brennan	G Brennan	B Stapleton	Constructability Review - Land Based Assets		Not Started		7/31/2013	25
MLP-CP-PLN-0002	Project Implementation	G Brennan	B Rendell	A Fraser	Contracting Work Breakdown Structure		Modifying DG2 Doc		2/28/2013	26
MLP-EV-PLN-0001	Project Implementation	G Brennan	K Meade	K Meade	Environmental Management Plan		Modifying DG2 Doc		6/30/2013	27
MLP-CA-PLN-0004	Project Implementation	G Brennan	B Rendell	P Doig	Insurance Guidelines and Policies		Not Started		3/30/2013	28
MLP-EV-PLN-0002	Project Implementation	G Brennan	K Meade	K Meade	Regulatory Compliance Plan		Modifying DG2 Doc		3/29/2013	29
MLP-CO-PLN-0001	External	G Brennan	B Rendell	J Myrick	ML Communications Execution Plan		Modifying DG2 Doc		2/28/2013	30
MLP-CO-PLN-0002	External	G Brennan	B Rendell	J Myrick	Government Consultation Plan		Modifying DG2 Doc		2/28/2013	31
MLP-EV-PLN-0003	External	G Brennan	K Meade	Virginia Soehl	Stakeholder Consultation Plan		Modifying DG2 Doc		2/28/2013	32
MLP-HR-PLN-0001	External	G Brennan	B Rendell	P Butt	Labour Relations Plan		Modifying DG2 Doc		4/30/2013	33
MLP-EV-PLN-0004	External	G Brennan	K Meade	Virginia Soehl	Aboriginal Relations Strategy & Assessment Plan		Modifying DG2 Doc		2/28/2013	34
MLP-LD-PLN-0001	External	G Brennan	D Morum	D Morum	Land Strategy and Plan		Modifying DG2 Doc		2/15/2013	35
MLP-CA-PLN-0005	External	G Brennan	Lois Smith	S Woolham	UARB Implementation Plan		Modifying DG2 Doc		2/15/2013	36
MLP-PM-RPT-0001	Project Assessment	G Brennan	S Kirkwood	B Stapleton	DG3 Concept IPR and Closeout		Not Started		8/30/2013	37
MLP-EL-RPT-0102	Project Assessment	G Brennan	T Leopold	B Stapleton	Design Readiness Review - Land Based Assets		Not Started		8/30/2013	38
MLP-PC-RPT-0005	Project Assessment	G Brennan	S Kirkwood	B Stapleton	Lessons Learned / Value Improvement Report		Modifying DG2 Doc		2/28/2013	39
MLP-PM-RPT-0002	Project Assessment	G Brennan	S Kirkwood	A Fagan	DG3 Management Review Package		Not Started		8/30/2013	40
MLP-PC-BUD-0001	Funding	G Brennan	S Kirkwood	A Fagan	DG3 Funding Package		Not Started		8/30/2013	41
MLP-PC-BUD-0002	Funding	G Brennan	S Kirkwood	A Fagan	Advance Commitment Package (as req'd)		Not Started		8/30/2013	42
MLP-PC-BUD-0003	Funding	G Brennan	S Kirkwood	A Fagan	Master Authorization for Expenditure (AFE)		Not Started		8/30/2013	43
	Key Milestones	G Brennan	B Rendell	Lois Smith	Decision Board Approval		Not Started		9/21/2013	44
MLP-EM-RPT-0001	Project Implementation	G Brennan	Mohammad Saad	Mohammad Saad	Installability Plan - Marine Assets		Modifying DG2 Doc		5/31/2013	45
MLP-EM-RPT-0002	Project Implementation	G Brennan	Mohammad Saad	B Stapleton	Installability Review - Marine Based Assets		Not Started		7/31/2013	46
MLP-EM-RPT-0003	Business	G Brennan	Mohammad Saad	B Stapleton	Design Readiness Review - Marine Based Assets		Not Started		7/31/2013	47
MLP-EM-RPT-0002	Project Implementation	G Brennan	Mohammad Saad	Mohammad Saad	Concept Design - Marine Based Assets		Modifying DG2 Doc		7/31/2013	48

Coulour1 Legend	
Not Started	
Modify DG2 Document	
Completed	

CONFIDENTIAL (Attachment 1 Only)

Request IR-26:

With respect to the list of deliverables shown on the Document table in Response to Enerco/AHB2000 IR-7:

Please, provide copies of the following documents:

(1) Cost and Schedule Risk Assessment.
(2) Project Quality Strategy.
(3) Contracting Work Breakdown Structure.
(4) Contract Strategy and Procurement Plan.
(5) Purchasing / Materials Management Strategy.

Response IR-26:

(1) Cost and Schedule Risk Assessment – please refer to Confidential Attachment 1.
(2) Project Quality Strategy – please refer to Attachment 2.
(3) Contracting Work Breakdown Structure – please refer to Attachment 3.
(4) Contract Strategy and Procurement Plan – please refer to Attachment 4.
(5) Purchasing / Materials Management Strategy – is included in the Contract Strategy and Procurement Plan referenced above.

UARB-Enerco IR-26

Attachment 1

has been removed due to confidentiality

Emera
Newfoundland & Labrador

Maritime Link Project

Project Quality Strategy

MLP Document # 7001	Total pages 15

B0	22-Aug-12	Issued For Approval	P. Murray Project Engineer	D. Berringer Engineering Team Lead	G. Brennan Project Manager	
A0	6-June-12	Issued For Review	P. Murray Project Engineer	D. Berringer Engineering Team Lead	G. Brennan Project Manager	
Rev.	Date	Reason for Issue	Title Originated	Title Reviewed	Title Approved	

Authorization Page

In addition to those indicated on the cover page, the following have indicated their support of this document.

Name	Position	Signature	Date

Proprietary Notice

This content of this document is confidential and under the ownership of Emera Newfoundland and Labrador (ENL). It was prepared for the intended purpose of the planning and execution of the Maritime Link project. It will not be shared in whole or in part without the appropriate written consent of ENL.

REVISION HISTORY

Version	Author/Editor	Comments	Date
A0	Peter Murray	Issued for comment	June 6, 2012
B0	Peter Murray	Issued for approval	August 22, 2012

RELATED DOCUMENTS

Document Number	Title	Date
4001	Early Project Execution Plan	May 15/12
4011	Project Execution Risk Plan	Apr 5/12

TABLE OF CONTENTS

SECTION 1 – INTRODUCTION

1.1 Background

The Maritime Link project was launched in 2011 following partnership discussions between Emera and Nalcor and the Provinces of Nova Scotia and Newfoundland and Labrador. The scope of the project includes the design, construction, installation and commissioning of the Maritime Link with the appropriate Environmental, Regulatory, Aboriginal and other Stakeholders support and appropriate approvals. The objective of the project schedule is to commission the system in preparation for handover and start up in Q4/2016.

As part of these partnership discussions ENL Maritime Link Inc. (ENL) is to execute a transmission construction project interconnecting the electrical power systems of the island of Newfoundland and Nova Scotia.

1.2 Document Purpose

The purpose of the document is to describe the project quality management strategies through each phase of the Maritime Link project.

1.3 Scope / Requirements

The scope/requirements of this deliverable cover the main design and project execution components of the ML project through to project start-up and describe the strategies associated with quality management for the Maritime Link project.

1.4 Out of Scope

The Muskrat Falls (MF) and Labrador Island Link (LIL) projects as part of the Lower Churchill Project (LCP) are outside the scope of this document and managed by Nalcor.

1.5 Acceptance Process

This deliverable will be subject to the review and approval by only those names listed on the cover page title block and the authorization page as required.

SECTION 2 – GENERAL APPROACH TO QUALITY MANAGEMENT

As detailed in ENL document #4011 (Project Execution Risk Plan), ENL utilizes a Continuous Risk Management (CRM) process. The CRM process is a continuous, iterative process that identifies, analyzes, plans, tracks, controls, communicates, and documents risk through all life cycle phases of project development. A similar consistent, continuous and iterative approach is used for quality management for the ML Project, utilizing a Plan-Do-Check-Act methodology for all phases of the project.

Three major quality planning processes are employed in each phase of the project in order to ensure the consistent application of the quality management methodology: quality assurance, quality control and project deliverable acceptance criteria.

Quality Assurance (QA) focuses on the general systems and processes used to manage, monitor, evaluate and deliver each phase of the project. QA is a method to ensure the project will satisfy the quality standards and will define and record quality reviews, test performance, and ensure acceptance during turnover/operational activities. QA helps to establish if a deliverable is acceptable based on the processes used to create it. QA processes are used to evaluate overall project performance frequently and to determine that quality reviews were held, deliverables tested, and customer acceptance acquired.

Quality Control (QC) activities are performed continually to verify that project management and project deliverables are of high quality and meet quality standards. Quality assurance also helps to uncover causes of unsatisfactory results and to establish lessons learned to avoid similar issues in this and other projects.

Project Deliverable Acceptance Criteria ensure that key performance indicators (KPIs) are identified, tracked, monitored and adjusted through all phases and all aspects of the project. Project team members and key stakeholders agree at the project planning stage on formal project processes and major deliverable acceptance criteria that will be used to evaluate final deliverable results before the results are formally approved. Project Deliverable Acceptance Criteria also form the baselines for evaluation of the ongoing effectiveness of continuous improvement initiatives.

SECTION 3 – QUALITY MANAGEMENT ROLES AND RESPONSIBILITIES

It is the responsibility of all ENL project team members, contractors and consultants to continuously participate in the Plan-Do-Act-Check process throughout project development.

Specific responsibilities exist within the ENL Quality Management strategy as follows.

The ENL Project Manager is responsible for:

- Ensuring that the Project Quality Management Strategy is developed and communicated throughout the organization.

- Final approval of the EPC contractors' Quality Management Systems, Quality Plans and close out of any nonconformance/noncompliance items.
- Ensuring findings from all quality reviews, audits and/or assessments are reconciled appropriately prior to completion of the Project Quality Plan and Project Turnover.
- Final signatory on EPC contractors' nonconformance root cause and corrective / preventive action forms.

The ENL Quality Management Coordinator is responsible for:

- Ensuring that the Project Quality Management Strategy is communicated and understood among project team members, contractors and consultants.
- Reviewing EPC contractors' Quality Management Systems, Project Quality Plans and close out of any associated corrective action items.
- Ensuring that Project Quality Plans are developed for all aspects of the project.
- Ensuring that process KPIs are identified, measured and monitored throughout each phase of the project.
- Ensuring effective corrective action is taken to correct and prevent nonconformities.
- Ensuring a continuous improvement approach to KPI target setting is adopted throughout each phase of the project.
- Ensuring that adequate and appropriate quality management requirements are included in contracting strategies, requests for proposal, proposal evaluations and contract terms.
- Ensuring that regular compliance audits of subcontractor systems and processes are completed, documented and communicated.
- Surveillance plans for engineering, procurement and construction deliverables.
- Coordination of inspection QC activities at manufacturing facilities and construction sites.

ENL Team Leads are responsible for:

- Ensuring that the Project Quality Management Strategy is communicated and understood among team members, contractors and consultants involved in their areas of work.
- Reviewing contractors' Quality Management Systems, Project Quality Plans and close out of any associated corrective action items.
- Ensuring that appropriate process performance metrics are established, monitored and reported as part of contractors' Quality Management Systems and Project Quality Plans.
- Ensuring that corrective / preventive actions, including root cause analysis, are submitted for approval as a result of any nonconformities.
- Ensuring that contractors and subcontractors demonstrate the qualifications of all personnel.

ENL Project Team Members are responsible for:

- Ensuring that individual quality management and quality plan responsibilities are completed.

- Ensuring a continual focus on quality management during on and off-site interactions with contractors and consultants.
- Participating in worksite audits and continuous improvement initiatives as required.

ENL contractors are responsible for:

- Ensuring demonstrated commitment to Quality Management throughout all levels of their organization.
- Providing Quality Management Systems that are compliant to ISO9001 (or equivalent) standards.
- Submitting for approval Project Quality Plans for their full scope of work.
- Identifying key process performance indicators and tracking / reporting performance against those indicators on a regular basis.
- Performing regular internal and external audits of quality management systems, reporting results and taking corrective / preventive action where any nonconformities are identified.
- Participating in ENL audits of quality management systems and worksite activities.
- Completing and submitting for approval corrective / preventive actions for any nonconformities associated with their scope of work.

SECTION 4 – QUALITY MANAGEMENT ACTIVITIES

Quality management activities and requirements will cover all core quality management system elements. For land transmission and marine aspects of the Maritime Link, the three key areas of engineering surveillance, procurement surveillance (including manufacturing) and construction / installation surveillance are covered. Other quality management activities and requirements (management support, auditing, inspection, training, nonconformities, corrective and preventive action, records and continuous improvement) support these key activities throughout the project.

4.1 – Land Transmission Components

The Maritime Link Land Transmission Components consist of:

- Overhead HVDC Transmission Lines in NS and NL
- HVDC Converter Stations in Woodbine, NS and Bottom Brook, NL
- Overhead HVDC Line to Underground Cable Transition Structures in Cape Ray, NL and Point Aconi, NS
- Overhead Grounding Lines in NS and NL
- Near Shore Grounding Facilities in NS and NL
- Rebuilds of the Bottom Brook and Granite Canal Substations in NL
- Overhead AC Transmission Lines in NL

Typical examples of Quality Assurance and Quality Control related activities and Project Deliverable Acceptance Criteria for the Land Transmission Components include but are not limited to those shown in Table 1 below.

Table 1 – Land Transmission Typical QA, QC Requirements & Acceptance Criteria

	Quality Assurance	Quality Control	Deliverable Acceptance Criteria
Engineering	- ISO 9001 or equivalent quality management systems - Project-specific quality plans - Subcontractor quality management requirements - Engineering-related quality management processes	- Engineering document approval processes - As built drawings - Testing and commissioning activities - Design reviews	KPIs such as: - Trends in nonconformities identified - Results of testing and commissioning activities - Internal and external audit results
Procurement / Manufacturing	- ISO 9001 or equivalent quality management systems - Project-specific quality plans - Subcontractor quality management requirements - Inclusion and evaluation of QA systems as part of procurement initiative evaluations - Procurement-related quality management processes	- Subcontractor and supplier qualification - Material specifications and incoming inspection of materials - Raw material traceability records - Factory and field testing requirements - Material transportation monitoring (e.g. vibration, impact) - Supply chain audits and contractor management	KPIs such as: - Trends in nonconformities identified Repair and/or replacement frequency - On-time delivery of materials - Material / manufacturing test reports - Internal and external audit results
Construction / Installation / Commissioning	- ISO 9001 or equivalent quality management systems - Project-specific quality plans - Subcontractor	- Work standards, work instructions, good utility practices and any other standardized instructions required to complete the work	KPIs such as: - Performance to schedule / work completion reporting - Trends in nonconformities identified

	quality management requirements - Construction / Installation-related quality management processes	- Completed work inspection checklists - Product quality sign-off - Testing and commissioning activities - Environmental Assessment-related performance monitoring - Non-destructive testing programs - Third party inspections	- Repair and/or replacement frequency - Safety and environmental performance statistics - Internal and external audit results - Planned versus actual reporting - Results of testing and commissioning / turnover activities

4.2 – Marine Crossing Components

The Maritime Link Marine Crossing Components consist of:

- Submarine and Land Cable Supply, Installation & Offshore Protection
- Landfall Protection in NS and NL

Typical examples of Quality Assurance and Quality Control related activities and Project Deliverable Acceptance Criteria for the Cabot Strait Marine Crossing Components include but are not limited to those shown in Table 2 below.

Table 2 – Cabot Strait Marine Crossing Typical QA, QC Requirements & Acceptance Criteria

	Quality Assurance	Quality Control	Deliverable Acceptance Criteria
Engineering	- ISO 9001 or equivalent quality management systems - Project-specific quality plans - Subcontractor quality management requirements - Engineering-related quality management processes	- Engineering document approval processes - As built drawings - Testing and commissioning activities - Design reviews	KPIs such as: - Trends in nonconformities identified - Results of testing and commissioning activities - Internal and external audit results
Procurement / Manufacturing	- ISO 9001 or equivalent quality management systems	- Subcontractor and supplier qualification - Material specifications and	KPIs such as: - Trends in nonconformities identified Repair

	- Project-specific quality plans - Subcontractor quality management requirements - Inclusion and evaluation of QA systems as part of procurement initiative evaluations - Procurement-related quality management processes	incoming inspection of materials - Raw material traceability records - Factory and field testing requirements - Material transportation monitoring (e.g. vibration, impact) - Manufacturing statistical process control sheets	and/or replacement frequency - On-time delivery of materials - Material / manufacturing test reports - Internal and external audit results - Cable Type and PQ Test results / conformance to requirements
Construction / Installation / Commissioning	- ISO 9001 or equivalent quality management systems - Project-specific quality plans - Subcontractor quality management requirements - Construction / Installation-related quality management processes - Interface management plans	- Work standards, work instructions, good utility practices and any other standardized instructions required to complete the work - Completed work inspection checklists - Product quality sign-off - Testing and commissioning activities - Environmental Assessment-related performance monitoring - Non-destructive testing programs - Vessel tracking systems - Interface management documentation - Cable pre-installation landfall inspections / turnover procedures - HDD drill path / profile tracking systems - Drilling diagnostic reporting	KPIs such as: - Performance to schedule / work completion reporting - Trends in nonconformities identified - Repair and/or replacement frequency - Safety and environmental performance statistics - Internal and external audit results - Planned versus actual reporting - Results of testing and commissioning / turnover activities

		- Cable protection cover modeling - Post installation survey programs - Drilling material management plans	

4.3 – Other Quality Management Components

Other Quality Management activities and/or requirements associated with the Maritime Link project include:

- Management Support
- Audits and Quality Reviews
- Inspection and Testing
- Training and Competency
- Nonconformity and Corrective Action
- Retention of Records
- Continuous Improvement

Typical examples of Quality Assurance and Quality Control related activities and Project Deliverable Acceptance Criteria for Other Quality Management Components include but are not limited to those shown in Table 3 below.

Table 3 –Typical Other QA, QC Requirements & Acceptance Criteria

	Quality Assurance	Quality Control	Deliverable Acceptance Criteria
Management Support	- Systems to ensure and demonstrate the management support of quality management systems	- Organizational charts detailing quality management roles and responsibilities - Regular, formal management review of quality systems - Governance processes	KPIs such as: - Evidence of awareness of quality management systems throughout the organization - Minutes / attendance records for management reviews
Audits and Quality Reviews	- Systems for regular internal and external (third party) auditing - Systems for communication of findings from internal and external audits - Systems for resolving	- Auditing work instructions and checklists - Auditor training - Management support of auditing activities - Nonconformity and corrective /	KPIs such as: - Performance to audit schedules - Frequency of recurring nonconformities - Trends in nonconformities

	nonconformities, including root cause analysis and corrective / preventive actions - Systems for evaluating the effectiveness of the auditing program	preventive action report templates	
Inspection and Testing	- Systems developed that outline inspection and testing requirements - Calibration for any test equipment - Systems for ensuring that records of inspection and testing are appropriately retained, reviewed and approved	- Inspection and testing work instructions - Equipment calibration procedures - Nonconformity and corrective / preventive action report templates	KPIs such as: - Conformance to design requirements - Frequency of equipment failures - On time calibration completions
Training and Competency	- Systems for training and testing the competency of all personnel - Subcontractor qualification processes - Systems and plans for site orientations, task orientations or other orientation activities - Programs for new employee orientation, on the job training requirements, competency testing	- Records of job requirements and skills required - Training records - Orientation records - Competency review records - Field observations	KPIs such as: - Trends in field audit / employee observation findings - Competency tests - Percent on-time completion of training schedules
Nonconformities and Corrective Actions	- Systems developed for the identification, root cause analysis, correction and prevention of	- Nonconformity root cause analysis - Corrective / preventive action planning,	KPIs such as: - Average time to completion of corrective / preventive action

	nonconformities	implementation and evaluation	plans - Frequency of recurring nonconformities - Trends in nonconformities
Retention of Records	- Systems developed for the control, tracking, preservation and retention of quality management documents	- Controlled document lists including storage locations, revision levels and dates entered - Contractor document submittal, approval and management processes	KPIs such as: - Occurrence of record-related nonconformities
Continuous Improvement	- Systems developed for identifying and implementing continuous improvement to quality management systems and processes	- Continuous improvement identification meeting minutes, suggestion forms, etc - Continuous improvement initiative tracking	KPIs such as: - Continuous improvement initiatives identified per hour worked - Average time to completion of continuous improvement initiative implementation

<table>
<tr><th>Component
Activity</th><th>Subsea Cables
Note 4
(Cables, Installation and shore approach)</th><th>DC Converter Stations
(Bottom Brook & Cape Breton)</th><th>AC Transmission Line Note 5
(Granite Canal to Bottom Brook)</th><th>HVDC Transmission Line Notes 2, 3
(Bottom Brook- Cape Ray Pt. Aconi - Woodbine)</th><th>Other NL Infrastructure</th></tr>
<tr><td>Project Management</td><td colspan="5">ENL</td></tr>
<tr><td>FEED</td><td>Nalcor- ENL Marine</td><td colspan="4">ENL</td></tr>
<tr><td>Detailed Engineering</td><td rowspan="4">EPC1</td><td rowspan="4">EPC2</td><td colspan="3">Engineering Contractor</td></tr>
<tr><td>Procurement</td><td colspan="2" rowspan="3">Construction Contractor</td><td rowspan="3">Other EPC Note 1</td></tr>
<tr><td>Manufacturing - Fabrication</td></tr>
<tr><td>Installation</td></tr>
<tr><td>Hook-up & Testing</td><td colspan="4">ENL with EPC1 and EPC2 support</td></tr>
<tr><td>Static & Dynamic Commissioning</td><td colspan="3">ENL/NSPI</td><td>ENL/NSPI/NL Hydro</td></tr>
<tr><td>Start-up & Operations</td></tr>
</table>

Note [1] Other EPC - scope of work and extent of services unknown at this time. Could be included under other EPC.
Note [2] - scope of work includes Electrode Lines and Shore Line DC Electrode
Note [3] - scope of work includes Undergrounf to Overhead HVDC Cable Transition Compound Grouping
Note [4] - scope of work includes Submarine to Land Cable Anchor / Splice Structure Grouping
Note [5] - scope of work includes AC Line Termination Substation Bus Interconnect Grouping

Emera
Newfoundland & Labrador

Maritime Link Project

Contract Strategy & Procurement Plan

MLP Document # 5006 (includes 5004, 5007, 4007)	Total pages 42

A7	Oct 19, 2012	Issued for approval with signature and date	Oct 20/12	Oct 20/12	22/10/12	
			A. Fraser Procurement Manager	B. Rendell Vice President, ENL	G. Brennan Project Manager	
Rev.	Date	Reason for Issue	Title Originator	Title Reviewer	Title Approver	

Proprietary Notice

The content of this document is confidential and under the ownership of Emera Newfoundland and Labrador (ENL). It was prepared for the intended purpose of the planning and execution of the Maritime Link project. It will not be shared in whole or in part without the prior written consent of ENL.

REVISION HISTORY

Version	Author/Editor	Comments	Date
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A7	Allan Fraser	Issued for approval from PMO	Oct 19, 2012

RELATED DOCUMENTS

Document Number	Title	Date
4001	Early Project Execution Plan	Oct 8, 2012

TABLE OF CONTENTS

SECTION 1 – INTRODUCTION

1.1 Background

The Maritime Link project was launched in 2011 following partnership discussions between Emera and Nalcor and the Provinces of Nova Scotia and Newfoundland and Labrador. The scope of the project includes the design, construction, installation and commissioning of the Maritime Link with the appropriate Environmental, Regulatory, Aboriginal and other Stakeholders support and appropriate approvals. The objective of the project schedule is to commission the system in preparation for handover and start up in Q4/2016.

As part of these partnership discussions Emera Newfoundland and Labrador (ENL) is to execute a transmission construction project interconnecting the electrical power systems of the island of Newfoundland and Nova Scotia.

1.2 Document Purpose

The purpose of the document is to describe the contracting and procurement strategies through each phase of the Maritime Link project. This document fulfills the requirements for the following Decision Gate deliverables.

- Purchasing Plan
- Purchasing/Materials Management Strategy
- Long Lead Equipment list Strategy

1.3 Consolidation of Work Packages

As part of the RFP development for the various work packages it is possible that the scope (or part of the scope) associated with a Work package could also be consolidated with other similar work packages in an effort to increase the overall economic attractiveness of a particular package or to attract a larger potential vendor base.

1.4 Scope / Requirements

The scope of this document is limited to the procurement of the major technical and associated installation components of the Maritime Link Project.

The main components of the Maritime Link Project consist of:

a) Construction and interconnection of a 500MW +/- 200kV asymmetric bipole AC/DC converter station into the 345kV station bus at the Nova Scotia Power Woodbine substation.

b) Establishment of a saltwater near shore converter station remote grounding facility in Nova Scotia and interconnect this grounding facility to the Woodbine converter station via a twin overhead conductor line.

c) Development of approximately 46km of +/- 200kV overhead transmission line from the Woodbine converter station, along the existing line L-7015 right of way, to a location approximately 2 km from the shoreline of the Point Aconi Power Plant.

d) Construction of a transition facility, approximately 2km from the Point Aconi landfall structure, to change from an overhead line to an underground HVDC cable configuration.

e) Establishment of a shoreline submarine cable anchor structure and, proceeding in a easterly direction across the Cabot Strait, the installation of two HVDC cables, each approximately 170 km in length, terminating in a similar cable landfall anchor structure located at Cape Ray, Newfoundland.

f) Construction of a second transition facility, approximately 2 km from the Cape Ray landfall structure, to return to an overhead transmission line configuration.

g) Construction from the Cape Ray transition facility, in a northerly direction, of approximately 130km of +/- 200 kV overhead transmission line adjacent to existing Newfoundland & Labrador Hydro (NLH) transmission lines TL 214 and TL 215 to the NLH Bottom Brook substation, located outside Stephenville.

h) Construction and interconnection of a 500MW +/- 200kV asymmetric bipole AC/DC converter station into the 230kV station bus at the Bottom Brook substation.

i) Establishment of a converter station saltwater near shore remote grounding facility in Newfoundland and Labrador and interconnection of this grounding facility to the Bottom Brook converter station via a twin overhead line conductor.

j) Replacement and reconfiguration of the existing 230kV portion of the Bottom Brook substation to accommodate a revised 230kV line terminal arrangement and the interconnection of the AC/DC converter station.

k) Construction of a 230kV breaker and reactor switching station adjacent to the Granite Canal hydro station to accommodate termination and interconnection of the proposed Granite Canal to Bottom Brook line into the NLH system.

l) Construction of approximately 160km of 230kV overhead transmission line from Granite Canal to the NLH Bottom Brook substation.

1.5 Out of Scope

The Procurement Plan will be implemented in such a manner so as to be in full compliance with both the ENL Health and Safety and Environmental Management Programs, descriptions of the specific activities related to those programs remain outside the scope of the Procurement Plan document.

Other items out of scope include:

a) Aspects and activities related to land acquisition, environmental permitting, terms and conditions of legal and commercial agreements, any and all modifications required to NSPI System assets.
b) System modifications required to the NLH assets beyond the Granite Canal and Bottom Brook substation revisions/modifications.
c) The Muskrat Falls (MF) generation and the Labrador Transmission Assets and Labrador Island Link (LIL) transmission projects.

1.6 Acceptance Process

This deliverable will be subject to the review and approval by only those names listed on the cover page title block and the authorization page as required.

SECTION 2 – GENERAL APPROACH TO PROCUREMENT

ENL will procure materials and services through non-discriminatory practices in accordance with the highest standards of ethical and professional business conduct. ENL will strive to cultivate harmonious, profitable business relationships with competent, quality firms.

Approved contracting strategies and /or purchase requisitions by authorized approvers is a precondition to placing a purchase order or entering into a contract for goods or services. Upon receiving internal authorization, the Procurement Group will enter into agreements, in accordance with ethical business practices that will maximize value to ENL, minimize risk and provide maximum protection to people, equipment, materials and the environment.

Procurement will establish sourcing and selection processes to ensure that goods and services procured comply with all standards, codes, and regulations prescribed by the law and ENL. Procurement shall manage the process used to procure goods, equipment and supplier services. This will include supplier sourcing & selection, the development of the commercial terms, the award process, the resolution of claims and the purchase of goods and services by company agents.

In accordance to the Nova Scotia and Newfoundland benefits agreement Procurement will promote and seek the use of local labour, suppliers, contractors and aboriginal organizations, and encourage business development within the Province(s) of operations to the extent that local suppliers are and can be competitive in areas of cost effectiveness or does not negatively or materially impact business objective or performance. Procurement will collaborate with key stakeholders to develop contracting strategies to be employed.

Competitive procurements will be the primary approach when sourcing goods and services, but it is only one of a suite of strategies to be used to create a competitive environment. Sole sourcing may be used with the appropriate justification.

Information shall not be disclosed regarding negotiations, proposals, which in the opinion of ENL could jeopardize an individual proponent, or the intent of our procurement process.

Procurement shall ensure that standards and procedures are developed that define the governance and accountabilities of Procurement, NSPI and Business Units as they pertain to the procurement process.

SECTION 3 – PROCUREMENT PROCESS

Procurement will be managed from the Maritime Link Project offices in the Provinces of Nova Scotia and Newfoundland & Labrador.

The Maritime Link Project procurement team and its designated contractors will be responsible for the following:

- Issue all Requests for Proposals and procurement related documents
- Primary point of contact for all inquiries regarding contracts and procurement
- Co-ordinate supplier development activities
- Make all decisions related to procurement, with the exception of those items that are to be submitted to the Maritime Link Decision Board and otherwise subject to corporate governance decision making processes.
- Issue procurement awards
- Conduct all meetings with suppliers related to procurement

The general procurement process will include:

- Development of Contracting strategies of each procurement work package
- Notification of Expression of Interest Questionnaire will be posted on ENL's external website along with other industry websites.
- Identification of potential suppliers from multiple sources
- Potential suppliers to complete and submit EOI questionnaires
- EOI questionnaire responses are reviewed and evaluated
- Potential supplier list determined based on established criteria
- Proponent listing for major work packages to be posted on ENL's external website.
- Request for Proposal issued to Supplier listing
- Proposals received and evaluated based on a pre-established criteria
- Successful Proponent will be posted on ENL's external website

The general evaluation process will include:

For the Expression of Interest (EOI), proponents will be required to provide information on technical capabilities (previous experience, key personnel, references, etc.), financial history, HSSE systems and quality management systems.

For the Request for Proposals (RFP) phase, Proponents will be required to respond to the technical and the commercial/financial sections under separate covers. The technical

evaluation will be scored separately from the commercial/financial for independence purposes.

RFP proposals will be evaluated using a weighted point scoring method. Within the sections, each question is assigned a weighting which reflects its relative importance in the section. The total of the question weightings equals that of the section weighting. The scoring within the sections will be defined prior to receipt of proposals. The overall score for the proponent is calculated by adding the individual weighted question scores.

SECTION 4 – RISKS

Key risks that may arise in connection with Maritime Link Project procurement processes include commodity pricing risk, currency exchange risk, risk of inadequate insurance coverage counterparty creditworthiness and the risk relative to the need to make material contractual commitments prior to Project Sanction.

ENL has determined that in the majority of cases the successful Proponent will be in the best position to mitigate commodity pricing risk. As a part of the proposal requirements ENL will require proponents to provide a strategy for dealing with changing commodity pricing thus allowing them to fix their pricing.

While Canadian or US dollars are ENL's preferred currencies, proposals will be accepted in the proponents' preferred currencies. Currency exchange risk will be evaluated by Emera's Treasury group and included as part of the proposal normalization process. In the event of award in a foreign currency the Emera treasury group will take the necessary measures to mitigate currency risk.

As part of the RFP process, Proponents will be required to provide a proposal including proposed policy details as to the scope of the proponents' proposed project insurance. ENL will reserve the right to amend or alter the requirement for the proponent to provide project insurance and reserves the right for the Company to place some or all of the policies as it deems necessary after review of the proponent's proposal.

ENL, with the assistance of Emera's risk management team, will do an assessment of major contractors' creditworthiness in a manner consistent with existing Emera policies.

Due to the fact that some major contracts may have to be awarded prior to project sanction to secure a manufacturing slot, ENL will need to identify and include the appropriate cancellation terms within the associated contract.

SECTION 5 – CONTRACT PACKAGING

This section provides relevant information regarding the Project Delivery Strategy and contract packaging along with the various contract arrangements that might be used in connection with the construction of the Maritime Link.

The Project Delivery Strategy selected is the result of input obtain from various internal and external sources, all focused on the section of the most appropriate project delivery model as well as the optimum contracting strategies to engineer, procure and construct this project.

The Project Delivery packages considered for the Maritime Link Project included:

EP – In an Engineering and Procurement contracting model, the EP Contractor is responsible for the Engineering and Procurement of selected materials. The purchase orders and contracts placed by the EP Contractor on behalf of ENL and may be in the form of lump sum, fixed price, unit rate contracts.

EPC – In an Engineering, Procurement and Construction contracting model, the EPC contractor is responsible for all activities and assumes certain associated risks. These contracts frequently carry a cost premium and require greater definition of scope at time of contract award.

EPCM – In an Engineering, Procurement and Construction Management contracting model, the EPCM Contractor, acting as the Owner's representative, is responsible for the Engineering, Procurement and Construction Management of suppliers and Contractors. The purchase orders and contracts placed by the EPCM Contractor on behalf of ENL and may be in the form of lump sum, fixed price, unit rates or reimbursable contracts.

SECTION 6 –CONTRACT TYPES

Contract Types
This section provides relevant information regarding the various contractual arrangements available to ENL's procurement team.

LUMP SUM
The contractor agrees to build a project with a specific scope for a fixed price. A lump-sum contract is suitable if the scope and schedule of the project are sufficiently defined to allow the contractor to fully estimate project costs.

UNIT PRICE
This kind of contract is based on estimated quantities of items included in the project and their unit prices. The final price of the project is dependent on the quantities needed to carry out the work.

COST PLUS

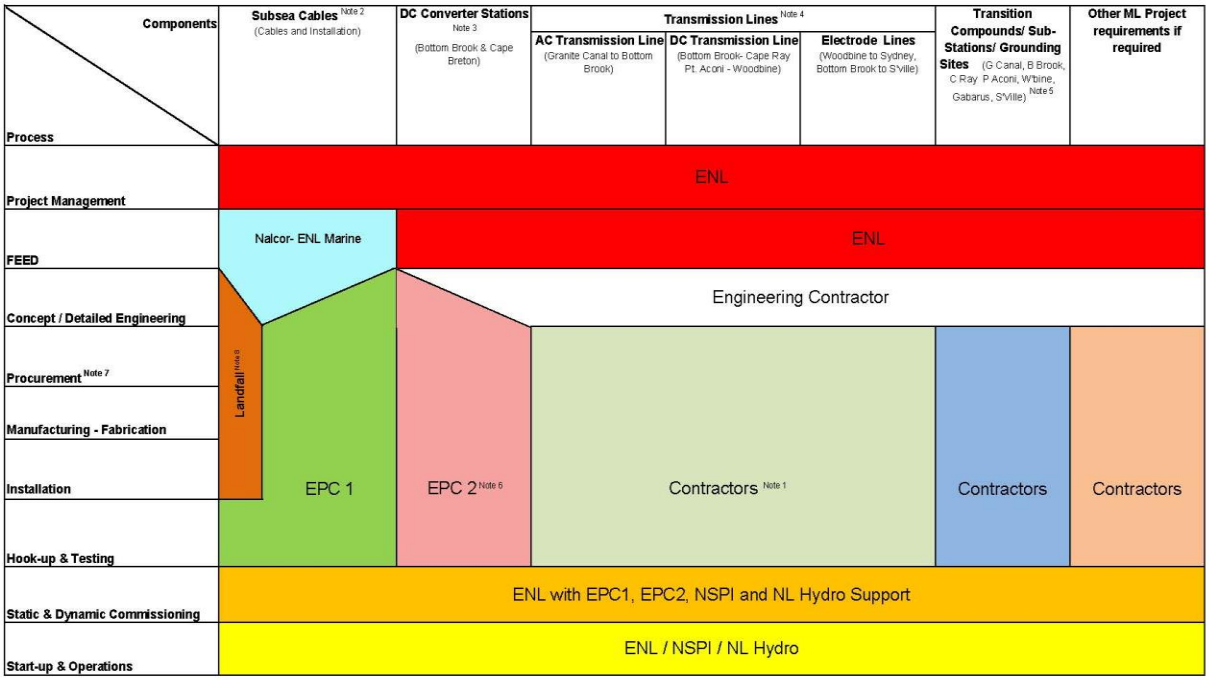
Cost plus is a contract agreement wherein the Company agrees to pay the cost of the work, including all trade contractor work, labor, materials, and equipment, plus an amount for contractor overhead and profit. These types of contracts are favored where the scope of work is indeterminate or highly uncertain, and the kinds of labor, material, and equipment needed are also uncertain.

TIME & MATERIAL

Time and materials is a contract agreement in which the buyer agrees to pay the contractor based upon the work performed by the contractor's employees and subcontractors, and for materials used in the construction no matter how much work is required to complete construction. This is opposed to a lump-sum contract in which the Company agrees to pay the contractor a lump sum for construction no matter what the contractors pay their employees, sub-contractors and suppliers.

SECTION 7 – PROCUREMENT PLAN

The table presented below was extracted from "The Early Project Execution Plan" document number 4003.



Note 1 - Contractors could be one or many
Note 2 - Scope of work includes cable terminator to cable terminator, excluding landfall design / install
Note 3 - Scope of work may or may not include the buildings and foundations
Note 4 - Scope of work includes transmission lines only
Note 5 - Scope of work does not include modifications to 1)Woodbine site under control of NSPI 2) GC and BB substances under control of NL Hydro (To be confirmed)
Note 6 - Conceptual and Detailed Design is shared with EPC2 and Engineering Services Contractor
Note 7 - Procurement of materials to be determined through Decision Board excluding EPC 1 and EPC 2
Note 8 - Scope of work includes design which will be from the Engineering Contractor and the Landfall Contractor

7.1 Submarine & Land Cable Supply Installation & Protection

7.1.1 Scope of Work

The proposed scope of Work (contract package referenced as EPC1) includes all design, manufacture, testing, transport, installation, protection and pre-commissioning activities of the +/- 200kV bi-pole system power capacity of 500 MW HVDC submarine cable and accessories for the Maritime Link Cabot Strait crossing.

Major items of work include manufacture, transport, installation and protection of submarine cable across the Cabot Strait between Cape Ray, NL and Point Aconi, NS, including accessory/ancillary/spare equipment, construction of cable anchor structures, pull-in of cables at landfall locations, jointing and burial of several kilometers of underground cable and completion of all testing and commissioning requirements at various stages of the project.

Note: The design and construction of the cable landfall HDD civil arrangements are outside the proposed Work scope; however ENL will request optional pricing to manage the construction of the civil arrangement within the RFP.

The scope of work for Landfall Protection (contract package referenced as Contractors Other ML Project Requirements) includes the preparation and construction of subsea cable landfall approaches. This scope of work is also being considered for inclusion in the Submarine & Land Cable Supply, Installation and Protection scope of work.

Major items of work include landfall site preparation and access roads, completion of the landfall construction and preparation of the landfall exit location for cable installation.

Inclusion of this work into the Submarine & Land Cable Supply, Installation and Protection scope of work is viewed as a risk mitigation effort to link the construction management of the landfall undertaking with the cable installation activities.

7.1.2 Influencing Factors/Constraints

Influencing factors on the contracting strategy for the Subsea Cables include:

- Conditions that may be imposed with the EA release & Federal Loan Guarantee
- Schedule and construction methodologies
- Long procurement lead times for the subsea cables
- Limited capacity in the marketplace
- Limited number of qualified vendors
- Marine Conditions

7.1.3 Procurement Plan

The Subsea Cable (contract package referenced as EPC1) is planned to be completed through the issuance of individual work packages for various aspects of construction as follows:

Work package 1 - Design, supply, installation & protection HVDC submarine and land cables.

- Contract Strategy - EPC
- Contract Type – Lump Sum & Unit Price
- EOI schedule for issue in 2011
- RFP scheduled for issue Q2 2012
- RFP scheduled for award Q1 2013

- Site work to commence Q2 2016 and be completed late Q3/early Q4 2016 (commissioning and testing Q4 2016)

Construction is planned one year ahead of the cable installation campaign to de-couple any possible impact to the cable installation activities due to delays with the landfall construction.

The timeframe for landfall construction will be planned for times of year when resource loading can be optimized and impact of construction activities on environment and/or stakeholders can be minimized.

Work package 2 - HDD Geotechnical Program and Detailed Site Preparation/Drilling Design

- Contract strategy – Utilize a consulting engineering firm for the design and completion of a near shore geotechnical program and the detailed design of HDD site preparation civil works and HDD drill paths/profiles
- Contract Type – Lump Sum
- EOI scheduled for issue Q2,2012
- RFP scheduled for issue Q3 2012
- RFP scheduled for award Q1 2013
- Geotechnical field program to be completed Q2 2013
- Detailed design to commence Q3 2013 and be completed late Q1 2014

Work package 3 - HDD Site Preparation Civil Works

- Contract Strategy – Utilize one or more contractors to complete HDD site preparation civil works. Site preparation will run concurrent in both locations.
- Contract Type – Lump Sum & Unit Price
- EOI/RFP scheduled for issue Q1 2014
- RFP scheduled for award Q2 2014
- Site work to commence Q3 2014 and be completed Q1 2015

Work package 4 - HDD Drilling Program

- Contract Strategy – Utilize one or more contractors to complete drilling, reaming and lining at the HDD landfall locations. Landfall construction operations will run concurrently in both NS and NL landfall locations.
- Contract Type - Lump Sum & Unit Price
- EOI/RFP scheduled for issue Q1 2014
- RFP scheduled for award Q3 2014
- Site work to commence Q4 2014 and be completed Q4 2015

7.2 Converter Stations

7.2.1 Scope of Work

The scope of work for the Woodbine and Bottom Brook Converter (contract package referenced as EPC2 DC Converter Stations) consists of the detailed engineering, supply, construction and interconnection of an AC to DC converter station adjacent to existing NSPI substation facilities at Woodbine, NS and an AC to DC converter station adjacent to existing NLH substation facilities at Bottom Brook, NL.

Major items of work include site and access road preparation, construction of multi-story converter buildings, installation of power electronics and associated control and protection /special protection systems, development of an accompanying electrical switchyard containing isolation/grounding apparatus as well as AC/DC filtering equipment and the converter station balance of plant /cooling equipment and ancillary station service systems.

7.2.2 Influencing Factors/Constraints

Influencing factors on the contract strategy for the Woodbine and Bottom Brook Converter Station include:

- Conditions that may be imposed with the EA release & Federal Loan Guarantee
- Schedule and construction methodologies
- Long procurement lead times for electronic power equipment
- Limited number of suppliers

7.2.3 Procurement Plan

The Woodbine and Bottom Brook Converter Station (contract package referenced as EPC2) is planned to be completed through the issuance of individual work packages for various aspects of construction as follows:

Work package 5 - Design, supply and installation of the Woodbine and Bottom Brook Converter Stations.

- Contract Strategy - EPC
- Contract Type – Lump Sum
- EOI/RFP scheduled for issue Q1 2013
- RFP scheduled for award Q3 2013
- Site work to commence Q1 2015 and completed mid 2016

Work package 6 - Access road construction and site preparation including the installation of on-site water and waste systems.

- Contract Strategy – Source requirements through one or more contractors.
- Contract Type – Lump sum & unit price
- EOI/RFP scheduled for issue Q1 2014
- RFP scheduled for award Q3 2014
- Site work to commence Q4 2014 and completed Q2 2015

Work package 7 - Supply and install overhead line to underground cable transition structure and DC cable converter station interconnection.

- Contract Strategy **–** EPC
- Contract Type – Lump sum & unit price
- EOI/RFP scheduled for issue Q2 2014
- RFP scheduled for award Q1 2015
- Site work to commence 2015 and completed Q3 2016

Work package 8 – Covers miscellaneous items to support both the Woodbine and Bottom Brook sites.

- Contract Strategy **–** Source requirements through one or more contractors per site.
- Contract Type **–** Dependent on good or service being sourced
- Examples potentially include **–** Site security, etc.

7.3 Overhead HVDC Transmission Line – Woodbine to Point Aconi

7.3.1 Scope of Work

This scope of work (contract package referenced as Transmission Lines) consists of the construction and interconnection of approximately 46km of 200kV HVDC overhead transmission line from Woodbine Station to the Point Aconi Transition Structure.

Supply of major transmission line components (towers, insulators, etc) will be sourced by the owner and free issued to the contractor. Minor components will be included in the construction contract package.

Major items of work include acquisition of line right of way (ROW) parcels, relocation of segments of existing NSPI AC 138kV and 230 kV transmission lines, ROW site surveying, ROW land clearing, foundation installation, structure framing, conductor stringing/tensioning and interconnection to the converter station and Point Aconi underground transition structure.

7.3.2 Influencing Factors/Constraints

Influencing factors on the contracting strategy for the Woodbine to Point Aconi HVDC Line include:

- Conditions that may be imposed with the EA release & Federal Loan Guarantee
- Schedule and construction methodologies
- Long procurement lead times for transmission structures
- Environmental considerations including wetland areas and water crossings
- Limited material laydown areas
- Geographic distance

7.3.3 Procurement Plan

The Woodbine to Point Aconi HVDC Line is planned to be completed through the issuance of individual work packages for various aspects of construction. In an effort to minimize cost while attracting a wide variety of potential proponents all transmission line construction may be bundled under one RFP by type and province.

- ROW surveying and land acquisition - Planned for 2012 & 2013

Work package 9 - Access and ROW clearing packages.

- Contract Strategy – Source requirements through one or more contractors per site.
- Contract Type – Lump Sum & unit price
- EOI/RFP scheduled for issue Q1 2013
- RFP scheduled for award Q3 2013
- Site work to commence Q4 2013 and completed Q1 2014

Work package 10 – Materials Procurement Package (towers. Insulators and other long lead items)

- Contract Strategy – The detailed design of the transmission structures required for the Woodbine to Point Aconi line has not been finalized and the sourcing of structures will be conducted by the successful detailed design engineering firm.
- Contract Type – Unit price
- EOI/RFP scheduled for issue TBD
- RFP scheduled for award TBD
- Materials ready for Site work to commence Q1 2014 and completed Q3 2015

Work package 11 - Supply of minor components and installation of Woodbine to Point Aconi line segment

- Contract Strategy – Source requirements through one or more contractors. In an effort to minimize cost while attracting a wide variety of potential proponents all transmission line construction may be bundled under one RFP by type and province.
- Contract Type – Unit price
- EOI/RFP scheduled for issue Q1 2013
- RFP scheduled for award Q3 2013
- Site work to commence Q1 2014 and completed Q3 2015

7.4 Point Aconi Overhead Line to Underground Cable Transition Structure

7.4.1 Scope of Work

The scope of work for this item (contract package referenced as Contractors Transition Compounds/Substations/Grounding Sites) consists of the supply and construction of a transition structure which allows for the interconnection of overhead high voltage transmission equipment to an underground cable arrangement.

Major items of work include the construction of a secure transition structure that provides the connection points for the overhead line configuration to an underground cable arrangement and provides an ongoing secure / dry environment to the enclosed specialized cable termination / monitoring equipment and associated switchgear /cable grounding apparatus.

7.4.2 Influencing Factors/Constraints

Influencing factors on the contracting strategy for the Point Aconi Transition Structure include:

- Conditions that may be imposed with the EA release & Federal Loan Guarantee
- Schedule and construction methodologies
- Resource availability

7.4.3 Procurement Plan

The Point Aconi Transition Structure is planned to be completed through the issuance of individual work packages for various aspects of construction as follows:

Work package 12 - Access road construction and site preparation

- Contract Strategy – Source requirements through one or more contractors.
- Contract Type – Lump Sum
- EOI/RFP scheduled for issue Q3 2013
- RFP scheduled for award Q1 2014
- Site work to commence Q2 2014 and completed Q3 2014

Work package 13 - Supply/install transition structure and interconnect to underground cable

- Contract Strategy – Source requirements through one or more contractors. As part of the RFP development for the converter stations, it is possible that the scope (or part of the scope) associated with Work package 13 could also be included.

- Contract Type – Lump Sum

- EOI/RFP scheduled for issue Q4 2013

- RFP scheduled for award Q2 2014

- Site work to commence Q3- 2014 and completed Q1 2015

7.5 NS Converter Station Near Shore Grounding Facility

7.5.1 Scope of Work

This scope of work (contract package referenced as Contractors Transition Compounds/Substations/Grounding Sites) consists of the supply and construction of a near shore marine facility that provides the necessary level of grounding resistance and current flow diversity to achieve the operational performance requirements of the Woodbine Converter Station.

Major items of work include the construction of a marine rock filled near shore breakwater/berm, a medium sized electrical interconnection building and installation of multiple arrays of underwater grounding devices.

7.5.2 Influencing Factors/Constraints

Influencing factors on the contracting strategy for the NS Grounding Facility include:

- Conditions that may be imposed with EA release and Federal Loan Guarantee
- Marine environment
- Factors arising from regional community / stakeholder feedback
- General security aspects associated with having electrical utility equipment located in a remote area

7.5.3 Procurement Plan

The NS Grounding Facility is planned to be completed through the issuance of individual work packages for various aspects of construction as follows:

Work package 14 - Access road construction and site preparation

- Contract Strategy – Source requirements through one or more contractors per site. As part of the RFP development for the access roads and site preparation, it is possible that the scope (or part of the scope) associated with Work package 14 could also be bundled with other similar work packages.
- Contract Type – Lump Sum & unit price
- EOI/RFP scheduled for issue Q2 2014
- RFP scheduled for award Q4 2014
- Site work to commence Q1 2015 and completed Q2 2015

Work package 15 - Supply/install marine breakwater structure

- Contract Strategy – Source requirements through one or more contractors.
- Contract Type – Lump Sum
- EOI/RFP scheduled for issue Q3 2014
- RFP scheduled for award Q1 2015
- Site work to commence Q2 2015 and completed Q4 2015

Work package 16 - Construction of grounding device interconnection building and installation of underwater grounding devices.

- Contract Strategy – Source requirements through one or more contractors.
- Contract Type – Lump Sum & unit price
- EOI/RFP scheduled for issue Q2 2015
- RFP scheduled for award Q3 2015
- Site work to commence Q4 2015 and completed Q2 2016. The construction timeframe for the NS Grounding Facility is expected to run in parallel with the similar Newfoundland Near Shore Grounding Facility.

7.6 Overhead Grounding Line – Woodbine to NS Converter Grounding Site

7.6.1 Scope of Work

The Overhead Grounding Line scope of work (contract package referenced as Contractors Transmission Lines) consists of the supply and construction of a wood pole overhead ground line from Woodbine Station to the NS Converter Grounding Facility location. Major items of work include acquisition of line right of way (ROW) along public roadways and through required off road areas, completion of distribution pole joint use, make ready activities and construction of the overhead grounding line.

7.6.2 Influencing Factors/Constraints

Influencing factors on the contracting strategy for the NS Overhead Grounding Line include:

- Conditions that may be imposed with the EA release & Federal Loan Guarantee
- Schedule and construction methodologies
- Availability of vacant corridor/ROW space adjacent to public roadways
- Geographic distance associated with line length
- Coordination with the electrical and communication Utilities regarding scheduling and coordination of work activities along the proposed line route

7.6.3 Procurement Plan

The NS Overhead Grounding Line is planned to be completed through the issuance of individual work packages for various aspects of construction as follows: In an effort to minimize cost while attracting a wide variety of potential proponents all transmission line construction may be bundled under one RFP by type and province.

Work package 17 - Supply and installation of grounding line Woodbine to NS Converter Grounding Site

- Contract Strategy – Source requirements through one or more contractors. In an effort to minimize cost while attracting a wide variety of potential proponents all transmission line construction may be bundled under one RFP by type and province.
- Contract Type – Lump Sum & unit price

- EOI/RFP scheduled for issue Q3 2013
- RFP scheduled for award Q1 2014
- Construction to commence Q2 2014 and completed Q1 2015.

7.7 Cape Ray Overhead Line to Underground Cable Transition Structure -NL

7.7.1 Scope of Work

The scope of work for this item (contract package referenced as Contractors Transition Compounds/Substations/Grounding Sites) consists of the supply and construction of a transition structure which allows for the interconnection of overhead high voltage transmission equipment to an underground cable arrangement.

Major items of work include the construction of a secure transition structure that provides the connection points for the overhead line configuration to an underground cable arrangement and provides an ongoing secure environment to the enclosed specialized cable termination equipment.

7.7.2 Influencing Factors/Constraints

Influencing factors on the contracting strategy for the Cape Ray Transition Structure include:

- Conditions that may be imposed with the EA release & Federal Loan Guarantee
- Schedule and construction methodologies
- Existence of an aggressive sea coast environment
- Security aspects associated with equipment located in a semi-remote area

7.7.3 Procurement Plan

The Cape Ray Transition Structure is planned to be completed through the issuance of individual work packages for various aspects of construction as follows:

Work package 18 - Access road construction and site preparation

- Contract Strategy – Source requirements through one or more contractors. As part of the RFP development for the access roads and site preparation, it is possible that the scope (or part of the scope) associated with Work package 18 could also be bundled with other similar work packages.
- Contract Type – Lump Sum & unit price
- EOI/ RFP scheduled for issue Q2 2014
- RFP scheduled for award Q4 2014

- Site work to commence Q1 2015 and completed Q2 2015

Work package 19 - Supply/install transition structure & interconnect to underground cable

- Contract Strategy – Source requirements through one or more contractors.
- Contract Type – Lump Sum & unit price
- EOI/RFP scheduled for issue Q3 2014
- RFP scheduled for award Q1 2015
- Site work to commence Q2 2015 and completed Q4 2015

7.8 Overhead HVDC Transmission Line – Bottom Brook to Cape Ray

7.8.1 Scope of Work

This scope of work (contract package referenced as Contractors Transmission Lines) includes the supply and construction of an approximately 136km, 200 kV DC overhead transmission line from Bottom Brook to the Cape Ray Transition Structure.

Major items of work include acquisition of line right of way (ROW) parcels, ROW site surveying, ROW land clearing, foundation installation, structure framing, conductor stringing/tensioning and interconnection to the converter station and Cape Ray Transition Structure.

7.8.2 Influencing Factors/Constraints

Influencing factors on the contracting strategy for the Bottom Brook to Cape Ray HVDC Line include:

- Conditions that may be imposed with the EA release & Federal Loan Guarantee
- Schedule and construction methodologies
- Acquisition of the right of way land component
- Environment considerations such as wetland areas and water crossings
- Geographic distance
- Coordination with Newfoundland & Labrador Hydro regarding scheduling of adjacent necessary line outages

7.8.3 Procurement Plan

The Bottom Brook to Cape Ray HVDC Line is planned to be completed through the issuance of individual work packages for various aspects of construction. In an effort to minimize cost while attracting a wide variety of potential proponents all transmission line construction may be bundled under one RFP by type and province.

Work package 20 - Access and ROW clearing packages.

- Contract Strategy – Source requirements through one or more contractors. As part of the RFP development for the access roads and site preparation, it is possible that the scope (or part of the scope) associated with Work package 18 could also be bundled with other similar work packages.
- Contract Type – Lump Sum & unit price
- EOI/RFP scheduled for issue Q1 2013

- RFP scheduled for award Q3 2013
- Site work to commence Q4 2013 and completed Q1 2014

Work package 21 – Materials Procurement Package (towers, Insulators & long lead items)

- Contract Strategy – The detailed design of the transmission structures required for the Bottom Brooke to Cape Ray HVDC line has not been finalized and the sourcing of structures will be conducted by the successful detailed design engineering firm.
- Contract Type – Unit price
- RFP scheduled for issue TBD
- RFP scheduled for award TBD
- Materials ready for site work to commence Q3 2014 and completed Q3 2016.

Work package 22 - Supply of minor components and installation of the Bottom Brook to Cape Ray line Build.

- Contract Strategy – Source requirements through one or more contractors. In an effort to minimize cost while attracting a wide variety of potential proponents all transmission line construction may be bundled under one RFP by type and province.
- Contract Type – Unit price
- EOI/RFP scheduled for issue Q4 2013
- RFP scheduled for award Q2 2014
- Site work to commence Q3 2014 and completed Q3 2016

7.9 NL Converter Station Near Shore Grounding Facility

7.9.1 Scope of Work

This scope of work (contract package referenced as Contractors Transition Compounds/Substations/Grounding Sites) consists of the supply and construction of a near shore marine facility that provides the level of grounding resistance and current flow diversity to achieve the operational performance requirements of the Bottom Brook Converter Station.

Major items of work include the construction of a marine rock filled near shore breakwater, medium sized electrical interconnect building and multiple arrays of underwater grounding devices.

7.9.2 Influencing Factors/Constraints

Influencing factors on the contracting for the NL Grounding Facility include:

- Conditions that may be imposed with the EA release & Federal Loan Guarantee
- Schedule and construction methodologies
- Marine environment
- General security aspects associated with having electrical utility equipment located in a remote area

7.9.3 Procurement Plan

The NL Grounding Facility is planned to be completed through the issuance of individual work packages for various aspects of construction as follows:

Work package 23 - Access road construction and site preparation

- Contract Strategy – Source requirements through one or more contractors per site. As part of the RFP development for the access roads and site preparation, it is possible that the scope (or part of the scope) associated with Work package 23 could also be bundled with other similar work packages.
- Contract Type – Lump Sum & unit price
- EOI/RFP scheduled for issue Q2 2013
- RFP scheduled for award Q4 2013
- Site work to commence Q1 2014 and completed Q2 2014

Work package 24 - Supply/install marine breakwater structure

- Contract Strategy – Source requirements through one or more contractors.
- Contract Type – Lump Sum
- EO/RFP scheduled for issue Q3 2013
- RFP scheduled for award Q1 2014
- Site work to commence Q2 2014 and completed Q4 2014

Work package 25 - Construction of grounding device interconnection building and installation of underwater grounding devices.

- Contract Strategy – Source requirements through one or more contractors.
- Contract Type – Lump Sum & unit price
- EOI/RFP scheduled for issue Q2 2015
- RFP scheduled for award Q3 2015
- Site work to commence Q3 2014 and completed Q4 2014.

7.10 Overhead Grounding Line – Bottom Brook to NL Converter Grounding Site

7.10.1 Scope of Work

This scope of work (contract package referenced as Contractors Transmission Lines) consists of the supply, construction and interconnection of an approximately 35km wood pole overhead ground line from Bottom Brook to the Newfoundland Grounding Facility location.

Major items of work include acquisition and clearing of the line right of way (ROW) in required off road areas and construction of the overhead grounding line.

7.10.2 Influencing Factors/Constraints

Influencing factors on the contracting strategy for the NL Overhead Grounding Line include:

- Conditions that may be imposed with the EA release & Federal Loan Guarantee
- Schedule and construction methodologies
- Ability to utilize existing transmission line corridors
- Availability of ROW access points

7.10.3 Procurement Plan

The NL Overhead Grounding Line is planned to be completed through the issuance of individual work packages for various aspects of construction. In an effort to minimize cost while attracting a wide variety of potential proponents all transmission line construction may be bundled under one RFP by type and province.

Work package 26 - Supply and installation of grounding line Bottom Brook to NL Converter Grounding Site

- Contract Strategy – Source requirements through one or more contractors. In an effort to minimize cost while attracting a wide variety of potential proponents all transmission line construction may be bundled under one RFP by type and province.
- Contract Type – Lump Sum & unit price
- EOI/RFP scheduled for issue Q3 2013
- RFP scheduled for award Q1 2014
- Construction to commence Q2 2014 and completed Q4 2014.

The construction timeframe for the NL Overhead Grounding Line will span multiple seasonal intervals to manage and balance resource loading. Construction will advance in a progressive

and flexible manner that will provide for and accommodate both single and multiple work locations in a manner which most effectively aligns to the specific geographic area or circumstance while meeting a Q4 2014 completion timeframe.

7.11 Rebuild Portions of the Existing Bottom Brook 230/138kV Substation

7.11.1 Scope of Work

The scope of work for this item (contract package referenced as Contractors Transition Compounds/Substations/Grounding Sites) consists of the construction of a 230kV multi-terminal, breaker and a half bus arrangement, adjacent to the existing NLH 230-138kV substation facilities at Bottom Brook, NL.

Major items of work include site preparation, installation of electrical ground grid, control building, breaker and structure foundations, primary electrical equipment, isolation and grounding switches and rigid bus arrangement, addition/replacement and interconnection of new or replacement electrical panels, protective relay systems, control and metering circuitry, security and ancillary systems, interconnection of the rebuilt portion of the substation with remaining segment and adjacent AC/DC converter station.

7.11.2 Influencing Factors/Constraints

Influencing factors on the contracting strategy for the Bottom Brook Substation Rebuild include:

- Conditions that may be imposed with the EA release & Federal Loan Guarantee
- Schedule and construction methodologies
- Simultaneous adjacent site construction activities
- Multiple technical and resource Interface points between existing and rebuilt Bottom Brook substation, converter station and DC cable entrance transition structure
- Coordinated outages and replacement power arrangements required due to customer supplied radial transmission circuits.
- Coordination with NLH regarding scheduling of necessary line and equipment outages

7.11.3 Procurement Plan

The Bottom Brook Substation Rebuild is planned to be completed through the issuance of individual work packages for various aspects of construction as follows:

Work package 27 - Access road and site preparation including installation of on-site water and waste system.

- Contract Strategy – Source requirements through one or more contractors per site. As part of the RFP development for the access roads and site preparation, it is possible that the scope (or part of the scope) associated with Work package 27 could also be bundled with other similar work packages. The Bottom Brook Rebuild site work is planned to be scheduled and coordinated to maximize synergies and economies of

scale/scope between substation and Bottom Brook Converter Station construction activities.

- Contract Type – Lump Sum
- EOI/RFP scheduled for issue Q1 2014
- RFP scheduled for award Q3 2014
- Site work to commence Q4 2014 and completed Q3 2015

Work package 28 – Long Lead Materials

- Contract Strategy – Source requirements through one or more contractors.
- Contract Type – Unit price
- EOI/RFP's scheduled for issue Q1 2013
- RFP's scheduled for award - Various

Work package 29 – EPC design, supply of minor components, install necessary foundations, grounding grid, bus work, primary equipment and secondary systems complete with all interconnection to adjacent converter station and remaining portions of Bottom Brook station

- Contract Type – Lump Sum & unit price
- EOI/RFP's scheduled for issue Q1 2013
- RFP's scheduled for award – Q4 2013
- Site work to commence – Q3 2014 and completed Q3 2015

Work package 30 – Commissioning Technical support services across full project to compliment utility operators and original equipment manufacturer (OEM) representatives from selected EPC contractor.

- Contract Strategy – Source requirements through one or more contractors.
- Contract Type – Lump Sum & unit price
- EOI/RFP's scheduled for issue Q1 2015
- RFP's scheduled for award – Various
- Services planned for Q3 2015 and completed Q4 2015

7.12 Overhead 230kV Transmission Line – Bottom Brook to Granite Canal

7.12.1 Scope of Work

The scope of work for this item (contract package referenced as Contractors Transmission Lines) consists of the supply and construction of approximately 160km of 230kV AC overhead transmission line from Bottom Brook to Granite Canal substation. Construction in this scope of work will occur in remote areas, including a segment of unorganized territory with no existing right of way (ROW).

Major items of work include acquisition of line ROW parcels, ROW site surveying, ROW land clearing, foundation installation, structure framing, conductor stringing/tensioning and interconnection to the Bottom Brook and Granite Canal line terminals.

7.12.2 Influencing Factors/Constraints

Influencing factors on the Contracting strategy for the 230kV Overhead Line include:

- Conditions that may be imposed with the EA release & Federal Loan Guarantee
- Schedule and construction methodologies
- Line route passes through a segment of unorganized territory (distantly remote wilderness with extensive areas of bog)
- Limited ROW access points
- Multitude of environment wetland areas and water crossings
- Limited material laydown areas
- Majority of line constructed in remote areas with minimum support infrastructure
- Geographic distance
- General material logistic challenges
- NLH coordination?

7.12.3 Procurement Plan

The 230kV Overhead Line is planned to be completed through the issuance of individual work packages for various aspects of construction. In an effort to minimize cost while attracting a wide variety of potential proponents all transmission line construction may be bundled under one RFP by type and province.

Work package 31 - Access road construction and site preparation

- Contract Strategy – Source requirements through one or more contractors. As part of the RFP development for the access roads and site preparation, it is possible that the scope (or part of the scope) associated with Work package 31 could also be bundled with other similar work packages.
- Contract Type – Lump Sum & unit price
- EOI/RFP scheduled for issue Q4 2013
- RFP scheduled for award Q2 2014
- Site work to commence Q3 2014 and completed Q3 2015

Work package 32 - Supply and installation of Bottom Brook to Granite Canal line segment

- Contract Strategy – Source requirements through one or more contractors per site. In an effort to minimize cost while attracting a wide variety of potential proponents all transmission line construction may be bundled under one RFP by type and province.
- Contract Type – Lump Sum & unit price
- RFP scheduled for issue Q3 2014
- RFP scheduled for award Q1 2015
- Site work to commence Q3 2015 and completed Q4 2016

The construction timeframe for the 230kV Overhead Line is planned to span an interval of multiple years to provide opportunities to manage resource loading and availability as well as material logistics challenges, facilitate and coordinate required outages to adjacent transmission lines and minimize environmental impacts resulting from ROW construction activities.

7.13 Rebuild Portion of Existing 230kV Granite Canal Substation

7.13.1 Scope of Work

This scope of work (contract package referenced as Contractors Transition Compounds/Substations/Grounding Sites) consists of the supply and construction of a new switching station located adjacent to the existing 230kV Granite Canal station. This 4 breaker, one reactor station will interconnect the Bottom Brook /Granite Canal line to the existing Granite Station as well as the 230kV line from the Upper Salmon hydro development. Installation of the reactor is associated with managing cross island system voltage control issues.

Major items of work include site preparation, installation of electrical ground grid, breaker and structure foundations, primary electrical equipment; isolation and grounding switch arrangements, addition and interconnection of new electrical panels, protective relay systems, control and metering circuitry and security and ancillary systems.

7.13.2 Influencing Factors/Constraints

Influencing factors on the contracting strategy for the Granite Canal Rebuild include:

- Conditions that may be imposed with the EA release & Federal Loan Guarantee
- Schedule and construction methodologies
- Coordination with NLH regarding scheduling of necessary line and equipment / generator outages
- Remote site and logistic challenges

6.13.3 Procurement Plan

The Granite Canal Rebuild is planned to be completed through the issuance of individual work packages for various aspects of construction as follows:

Work package 33 - Site preparation rebuild portion of existing 230kV Granite Canal Substation

- Contract Strategy – Source requirements through one or more contractors. As part of the RFP development for the access roads and site preparation, it is possible that the scope (or part of the scope) associated with Work package 33 could also be bundled with other similar work packages.
- Contract Type – Lump Sum & unit price
- RFP scheduled for issue Q3 2014
- RFP scheduled for award Q1 2015

- Site work to commence Q2 2015 and completed Q3 2015

Work package 34 - EPC design, supply, install necessary foundations, grounding grid, bus work, primary equipment and secondary systems complete with all interconnection to adjacent station infrastructure

- Contract Strategy – EPC
- Contract Type – Lump Sum
- RFP scheduled for issue Q2 2014
- RFP scheduled for award Q1 2015
- Site work to commence Q2 2015 and completed Q3 2016

7.14 Transmission Line and Switchyard Detail Design

7.14.1 Scope of Work

This scope of work includes the required Engineering services to advance the previous functional basis of design activities (FBOD) and develop the necessary detail construction design, specifications and associated drawing packages which includes, assisting ENL with the procurement of steel towers, major electrical equipment and other identified long lead items, in order to enable the construction of the associated ML Project components.

The ML Project components addressed in this suite of activities include:

- Bottom Brook to Granite Canal 230 kV AC line
- Bottom Brook to Cape Ray HVdc line
- Point Aconi to Woodbine HVdc line
- Bottom Brook to the NL shoreline grounding site line
- Woodbine to the NS shoreline grounding site line
- Granite Canal Switchyard (new yard development)
- Bottom Brook Switchyard (new yard development) and the associated Converter Station Interconnections
- Woodbine OH transmission line to UG transition structure, Converter Station underground HVdc electrical entrance arrangement and the associated AC interconnections to the Woodbine Substation
- Electrical equipment specifications for the Cabot Strait OH/UG Transition Compounds (optional)

Finalization of the pre-construction site civil design packages is also to be addressed for the associated Converter Stations, Cabot Strait Transition Compounds and, the Converter Grounding Site areas.

Work package 35 – EP, Engineering services to advance FBOD activities and develop the necessary detail construction design, specifications and associated drawing packages which includes, assisting ENL with the procurement of steel towers, major electrical equipment and

other identified long lead items, in order to enable the construction of the associated ML Project

- Contract Strategy – Engineer & Procure (EP)
- Contract Type – Lump Sum & Unit Price
- EOI/RFP scheduled for issue Q3 2012
- RFP scheduled for award Q4 2012

REDACTED

Request IR-27:

With respect to Response to Enerco/AHB2000 IR-9 (c):

Please provide a breakdown showing how the $147 million contingency is allocated among the 5 line items of Figure 4.1.

Response IR-27:

Allocation of contingency

Transmission assets- [redacted]
Converter stations & related infrastructure - [redacted]
Marine - [redacted]
Project management - [redacted]
Other Costs - [redacted]
Total Contingency - $147M

Request IR-28:

With respect to Response to Enerco/AHB2000 IR-10:

Please provide the latest issue of the full risk register, showing all the identified risks and their evaluation, including their financial impact in the event they occur and the probability of their occurrence.

Response IR-28:

The ML Project Execution Risk Plan includes a system to identify risks, assess, mitigate and close. There are several different types of risk reviews to be completed throughout each phase of the project for a total of more than 40 sessions.

The Project Risk Register is an evolving register which is reviewed on a regular basis. Please refer to Attachment 1 for that document in its current state. Please refer to Attachment 2 for the Execution Risk Plan, which has been included with this response.

The Attachment 1 risk register does not include the measured financial impact analysis associated with each risk. An Estimate Confidence Assessment analysis was completed for DG2 which incorporated the known project risks at the time. This analysis resulted in a Probabilistic Model with a P10-P90 confidence level. Five key risks impacting multiple WBS (define) cost elements were assessed and incorporated in the model including; Metallic Return, Unbundling of the Marine Cable, 1 in 10,000 contact with sea ice, System Stability/SPS and Major Project Delays. In a broader activity P10 and P90 schedules developed for the land assets and marine assets. The Marine P90 schedule included a 2017 implementation of one of the subsea cables. This analysis provided support for the conclusion that implementation in 2016 was realistic and if necessary, a 2017 implementation would have minimal impact.

Mitigation actions and plans are the responsibility of designated owners. For example, many risks are mitigated through detailed design and commercial agreements while others such as foreign exchange may also require hedging plans. In some cases, the mitigation plans cover a variety of related and overlapping or duplicated risks as identified on the risk register.

Risk Rev Code	ID	Key Risks	Risk Name	Risk Description	Probability	Risk Impact	PID Rating
EXR	1		Uncertainty of terrain and route footprint	The knowledge of this area is limited. The concerns of the terrain and the delineation of the wetlands will require various engineering and environment studies. Possible impacts during construction and the need for camps for the crews have to be considered.			
EXR	2		Uncertainty of Footprint of new BB Substation / Converter Station	The footprint of new BB substation / Converter station may extend to crown land which has model forest. This may have unique conditions with it that need to be considered.	2 Unlikely	3 Moderate	Green
EXR	3		Uncertainty of terrain and route footprint	The knowledge of this area is limited. The concerns of the terrain and the delineation of the wetlands will require various engineering and environment studies. Possible impacts during construction and the need for camps for the crews have to be considered.	3 Possible	3 Moderate	Yellow
INT	4	No	Uncertainty of the subsea route	Currently the ML marine team has identified a 2 km corridor for the subsea route and potential sites for the land fall in both NS and NL. Due to the uncertainty of these routes and sites, there may be existing property rights that will need to be considered and could affect schedules and costs.	3 Possible	2 Low	Green
CSH	5		Unexpected geotechnical results	Unexpected geotechnical results resulting in impacts to: cable design (i.e. thermal resistivity small risk 5% of total cable cost), slower HDD drilling rates, landfall complications with geology at Pt. Aconi, tower foundations	3 Possible	3 Moderate	Yellow
CSH	6	No	Unexpected obstacles in route	Unexpected obstacles in route encountered during pre-installation survey or grapnel run – UXO, boulders, etc	3 Possible	2 Low	Green
CD	7		Unexpected obstacles in route	Unexpected obstacles in route encountered during pre-installation survey or grapnel run – UXO, boulders, etc			
ENG	8		Unforseen regulatory requirements	Unforseen regulatory requirements potentially resulting in design changes	2 Unlikely	3 Moderate	
INT	9	Yes	Unknown Conditions of the Federal Loan Guarantee	The Federal Government may attach conditions to the FLG.			
EXR	10		Unknown terrain / route 26 KM	This area is least known. Environmentally it may be the most sensitive and have environment approval conditions associations with it. It may a significant restrictions to access roads, marshaling points, the delivery of materials and other logistics etc. It will require geotechnical studies which will be weather dependent and restricted available periods for the studies.	3 Possible	2 Low	Green
EXR	11		Unknown weight restrictions of road	Unknown weight restrictions of the access road and potentially the TCH. This may impact the size of available equipment and the logistics of moving the materials.			
EXR	12		Unpredictable weather patterns and impact on construction schedules.	The weather will always be a potential threat to the narrow suitable windows for construction in 2014-15-16.			
EXR	13		Vistas / viewing planes	Consider vistas and viewing planes on the West Coast of NL			
ENG	14		Lower Churchill Falls project could be stoped or postponed	Until it is completed, the Lower Churchill Falls project could be stoped or postponedll, it may even come to a halt. Parties may not be committed	1 Rare	5 Very High	
INT	15	No	Signing of Cable Contract pre-Sanction	Cable contract may be signed in Q3, 2012, a year prior to Sanction . This commitment will increase the cost exposure if the project is not sanctioned. This exposure will be better understood when responses to the RFP can be reviewed, hopefully prior to DG2. It is assumed that exit conditions will be negotiated in the contract.	2 Unlikely	2 Low	Green
CSH	16	Yes	Trenching rates for the protection scope	Slow than expected trenching rates for the protection scope beyond assumptions the cable installer would have in the contract	3 Possible	3 Moderate	Yellow
EXR	17		Zone of Influence of Grounding System	More information is required to understand and adequately inform the public.			
CSH	18		"archaeological Artefacts" contingency plan	"archaeological Artefacts" contingency plan in place in areas of high potential. Probability?			
INT	19		Ability to raise capital at acceptable terms	The approach of raising capital			
EXR	20	Yes	Access to land	The footprint of the ML requires access to Crown and private land which requires agreements from all land owners.			
EXR	21	Yes	Access to Private lands	Access to private lands in a timely manner will require title searches and negotiations with land owners.			
CSH	22		Accommodation facility	Accommodation facility labour issues			
CD	23		Accommodation facility	Accommodation facility labour issues			
CSH	24		Additional add ons for contracts	Additional add ons for contracts in lieu of productivity issues			
EXR	25	No	Anchor site Interface of contractors	The coordination of the install of the anchor site civil structure, the two cables, with splicing, the testing and commission will require the clarity of scopes of work for all the contractors. Without the clarity, the implementation can be compromised leading to malfunctions, delays, and additional costs.	2 Unlikely	2 Low	Green
EXR	26	No	Anchor site Interface of technology	The anchor site is where the subsea cable will interface to the underground cable. The site must withstand the forces from the pull of the subsea cable. The cutting and splicing of the sheeting will compromise the protective ability of both cables. The butting of both conductors must be designed to allow the uninterrupted flow of current. The civil structure must be able to sustain the forces at play such as the pull of the subsea cable and the elements such as water seepage in the structure. Without the proper detail design specifications for the integration of the two cables, the conductibility may be compromised and the structural compound must not support the cables for the 50 year lifecycle.	2 Unlikely	2 Low	Green

Risk Rev Code	ID	Key Risks	Risk Name	Risk Description	Probability	Risk Impact	PID Rating
CD	27		Archaeological considerations	Consider risk of running into sites of high archaeological value which will have provincial protocols. These important sites must be treated respectfully.			
EXR	28		Archeological considerations	Consider risk of running into sites of high archeological value which will have provincial protocols. These important sites must be treated respectfully.			
EXR	29		Armour rock uncertainty	Due to armour rock, there is significant uncertainty and potentially additional cost when constructing in a terrain with Armour rock	3 Possible	2 Low	Green
CD	30	Yes	Availability of qualified resources	Possible lack of qualified resources for the construction of the transmission lines in NL and NS when required.	3 Possible	3 Moderate	Yellow
ENG	31	Yes	Bidding prices may be higher	Bidding prices may be higher than expected	3 Possible	4 High	Yellow
CSH	32		Bog and soil conditions	Bog and soil conditions along transmission route – may drive a route revision as well as impact productivity	3 Possible	2 Low	Green
CSH	33	No	Cable Bundling not viable	Cable Bundling not viable	3 Possible	2 Low	Green
CSH	34	No	Changes to cable routing	Changes to cable routing due to issues discovered on subsea floor	3 Possible	2 Low	Green
CSH	35		Grounding Sites not acceptable	Grounding stites could be not acceptable from a EA or ablity to site.	2 Unlikely	4 High	Yellow
CSH	36	No	Cable ice contact	Cable 1/1000 ice contact not acceptable	2 Unlikely	2 Low	Green
CD	37	Yes	Cable Ice protection - soils	Uncertainty over achieving large (circa 4.5 m) trenching burial for ice protection in soils in current baseline. Trenched depth above 2.5 m are likely to carry considerable uncertainty.	3 Possible	3 Moderate	Yellow
CD	38	Yes	Cable Ice protection in rock	Uncertainty over feasibility of trenching through rock (up to 9km). At present rock properties have not been investigated at site and current understanding is that upper capability for trenchers is 60 to 70 MPA. Issue mainly a concern at NS end.	3 Possible	3 Moderate	Yellow
CD	39	Yes	Cable installation window	Aggregated delays leading to overall risk of missing favourable weather window	2 Unlikely	4 High	Yellow
CD	40	No	Damage to cable during cable protection construction	There were limits to the data available along the cable corridor when performing ice risk, metocean and sediment transport studies. In some cases, data on ice scour, currents and pack ice movement had to be extrapolated from other comparable regions. Risks and recommended additional data collection are identified in each external factor report.	3 Possible	2 Low	Green
EXR	41	No	Cable Load-out/Transportation/Mobilization	Risks include: damage during load-out, vessel load weight restrictions, delays due to immigration or import regulations, adequate port facilities and equipment.	3 Possible	3 Moderate	Yellow
EXR	42	No	Cable manufacturing	Process controls during manufacturing are required to ensure and verify dimensional stability, quality control, raw material compliance to specification, testing compliance and safety.	3 Possible	2 Low	Green
EXR	43	No	Cable Protection	Risks include: unexpected debris encountered during deep water trenching, constraints associated with transporting and placing rock in a marine environment, stakeholder issues, adequate rock supply/port facilities/equipment.	3 Possible	3 Moderate	Yellow
EXR	44	No	Cable pull in installation challenges	The subsea cable will come ashore through a tunnel into the anchor civil structure. The cable must be pulled from the sub sea through the tunnel with smooth surface and gentle slope so as not to compromise the cable integrity. The tension must be monitored at all time to ensure it does not exceed the specifications. When pulled into the structure, it must be bound securely without compromising the conductor or the protective covers.	3 Possible	3 Moderate	Yellow
EXR	45	No	Cable route - stakeholder issues	The cable corridor passes through a variety of known fishing areas.	3 Possible	2 Low	Green
EXR	46		Cable routing risks - corridor conditions	Seabed features along the proposed cable corridor cause issues with cable placement and/or cable protection and require significant departure from the proposed route.		4 High	Yellow
CSH	47		Cable Weather delays	Cable Weather delays, damages to cable during installation			
FIN	48		Canadian Dollar	Canadian Dollar may decrease vs US dollar and other currencies	2 Unlikely	4 High	
INT	49		CEA and Federal Loan Guarantee relationship .	There is uncertainty of the relationship between the EA approval process and the Federal Loan Guarantee which could impact the timing and / or approval of each.			
EXR	50		Challenges to building underground cable 1K to and from anchors near shoreline	The cables from the transition compound to the anchor will be buried into a trench for approximately 1 km. During construction, significant rock formations may be encountered that need blasting or rock crushing etc. Need to consider the appropriate design, permits and approach to construction.			
CSH	51		Schedule delays Procurement, regulatory, EA, resources availability etc.	Schedule delays Procurement, regulatory, EA, resources availability etc.			
CD	52		Clarity of roles with Fortis at BB	BB has Fortis cable and other assets which they support. Planning and execution will need to engage Fortis to avoid unforeseen conflicts and properly coordinate.	2 Unlikely	2 Low	Green
CSH	53	No	commodity pricing	Wild swings in commodity pricing affecting material pricing (e.g. cable, towers…) – conduct sensitivity analysis	3 Possible	2 Low	Green
ENG	54		Communication limitations	Communication limitations may impact reliability and performance	2 Unlikely	2 Low	Green
CD	55		Consistent communications of the value proposition for the ML	The value proposition for the ML needs to be clearly articulated to educate stakeholders and the public, and create awareness of the benefits of the project.			
EXR	56		Constructability issues due to size of work site and access road.	There are limitations to the access road and the site size which will restrict and slow construction.			

Risk Rev Code	ID	Key Risks	Risk Name	Risk Description	Probability	Risk Impact	PID Rating
CD	57		Constructability risks at GC.	There are significant construction challenges due to rock formations and environmental considerations which limit rock blasting options. Modifications must align to construction window that is acceptable to NLH. It also has to be coordinated with the maintenance shut down. The site is restricted since its surrounded by crown lands. The remoteness of the site restricts the availability of BOM. The weather restricts road access to limits periods for construction which may impact the project budget.			
ENG	58		construction workers would be less supervised	The construction workers would be less supervised than on other projects	2 Unlikely	3 Moderate	
EXR	59		Contractors Level of Environmental and safety competencies	Contractors in remote regions of NS and NL may rely on traditional methods and not have the knowledge and experience with the latest environmental and safety standards.			
CD	60		Contractors Level of Environmental and safety competencies	Contractors in remote regions of NS and NL may rely on traditional methods and not have the knowledge and experience with the latest environmental and safety standards.		2 Low	
CD	61		Control spillage from flood plains and impact on tower structures	There is an existing man made dam and flood plain near granite canal. When there is a heavy rain or run off, the flood plain is filled and the spillage flows into the old river route. If this route is selected for the Overhead Line, the design must consider the effect from the spillage on the structures.	3 Possible	2 Low	Green
CD	62		Converter Station long lead time to delivery	The marketplace indicates a 3 year window from order to delivery for this technology which must be completed by mid 2016.	3 Possible	4 High	Yellow
EXR	63		Coordination with NLH on go live transition of BB substation.	The cut over to the new BB substation will require a few hours of down time and /or a temporary site running on fuel. The fuel will be expensive and difficult to bring into the site. The scope and the roles and responsibilities related to the change must be clear to avoid unforeseen costs to the project and unforeseen service interruptions.			
CD	64		Counterparty / contractor risks	Relying on contractors for the supply and installation of cable and converter stations as well as construction of transmission lines and substations has counterparty risks which will be assessed in the evaluation, selection and negotiation process. Chris Rockwell will review and engage.			
INT	65		Credit rating process on the New Regulated Company	The Federal Loan Guarantee may require a credit rating on the company who has the asset.			
CD	66		Critical access points availability	Non availability of critical access point (eg crossing/bridge)	2 Unlikely	3 Moderate	
ENG	67		Critical equipment may be damaged	Critical equipment may be damaged upon reception	2 Unlikely	5 Very High	
EXR	68		Crossing NL trail way is protected	The NL trail way, which is the old NL railway line, is protected and used for recreation purposes by the public.			
EXR	69		Crossing TCH high way and traffic control	The overhead lines will cross the TCH in several locations. Safety precautions must be kept paramount to ensure the safety of the workers and the travelling public during construction.			
CSH	70		Currency fluctuations	Currency fluctuations			
EXR	71		Damage cable during backfilling	Underground cable damage will be susceptible to backfilling of the trench which can cause delays and use of spares etc.			
EXR	72		Damage to cable during cable protection construction	The subsea cable may be damaged during rock dumping, mattress placement, simultaneous trenching/placement operations or during installation of other offshore protection methods.			Yellow
EXR	73		Data Limitations to External factors	There were limits to the data available along the cable corridor when performing ice risk, metocean and sediment transport studies. In some cases, data on ice scour, currents and pack ice movement had to be extrapolated from other comparable regions. Risks and recommended additional data collection are identified in each external factor report.	3 Possible	3 Moderate	Yellow
CD	74		Delay in Footprint Decision	Delay in selection of route and landing sites will create delays in the completion of EA studies and overall studies timeline.	2 Unlikely	2 Low	Green
CD	75		Delay of Environmental Approvals	The environmental approvals may be delayed due to the complexity of the initiative, the coordination of the three jurisdictions and the uncertainty of the newly introduced EA process. All parties will be consulted including outside expert advice and the submission of the project description to initiate the official public process in Q3 2011.			
INT	76		Delayed MF sanction	UARB submission impacted by timing of MF sanction	3 Possible	3 Moderate	
INT	78		Delays with Resourcing Plan for Environment Team	Delays in recruiting resources is creating delays in EA study work.	5 Almost Certain	3 Moderate	
ENG	79		Delivery of equipment	Delivery of equipment and supplie may be delayed. The project could miss the 'Wndow of opportunity' for MLP which would defer portion of the project by many months or even a year	3 Possible	5 Very High	Red
CSH	80		Design errors	Design errors, defective design or omissions	2 Unlikely	3 Moderate	Green
ENG	81		Design may not be robust	Design may not be robust enough or too robust	2 Unlikely	2 Low	Green
ENG	82		Design may not be robust enough or too robust	Design may not be robust enough or too robust	2 Unlikely	2 Low	Green
ENG	83		Detailed design may identify additional reinforcements	Detailed design may show additional reinforcement needed	2 Unlikely	2 Low	Green

Risk Rev Code	ID	Key Risks	Risk Name	Risk Description	Probability	Risk Impact	PID Rating
INT	84		EA Study period in 2011 reduced	Due to the timing of RFP's issued in 2011, the period for some studies is significantly reduced leading to a shortage of quality information which may be insufficient for CEAA.	3 Possible	3 Moderate	
CSH	85		Environmental protected areas	Environmental protected areas or "found" rare species which require line routing modifications "Black out periods" result in only 4 months of clear construction time – could result in 40% schedule impact and 20% on cost. $100-$200K			
EXR	86		Erosion sediment control	The erosion of sediment during construction will impact the ecosystems of the environment.			
CSH	87	No	Escalation due to market pressures	Escalation due to market pressures	3 Possible	3 Moderate	Yellow
ENG	88		Design may not be robust	Design may not be robust enough or too robust	3 Possible	2 Low	Green
INT	89		Expenditures before sanction.	Project expenditures before sanction increases shareholder risk.			
EXR	90		Extended length for First Water Crossing	First significant water crossing may require larger structures near Abitibi. Distribution poles may not be adequate for Harry's river.	2 Unlikely	2 Low	Green
CSH	91	Yes	Extreme weather	Extreme weather during installation leads to cable abandonment	3 Possible	3 Moderate	Yellow
CD	92		Failure of substation or converter equipment acceptance tests	Failure of substation or converter equipment acceptance tests (mainly transformers)	2 Unlikely	3 Moderate	Yellow
ENG	93		Failure to get approval for transmission ROW	Failure to get approval for transmission ROW	1 Rare	3 Moderate	Green
INT	94		Federal Loan Guarantee and the UARB Approval	FLG may be tied to the UARB approval and schedule.			
INT	95		Financial conditions - land access	If the financial conditions in the FLG require options to be completed and executed or land to be purchased in order for access to land to construct the ML to be available, then financing agreements will be delayed.			
INT	96		Financing structure for the MLP.	Rationale for ML structure must be clearly articulated to assist with UARB review.			
CSH	97		Fire & theft	Fire low probability & theft			
CD	98		Foreign Currency exposure	Foreign currency strategy for the ML Project needs clarification. In the major RFPs for cable and converters, we included Can$ but provided the option for local currency. Hedging strategy needs to be assessed. Financial estimates not accurate due to timing of phase, market commodity fluctuations, interest rate changes and major procurement cost differences			
CD	99		Forest Fire considerations during construction	Consider whether workers engaged in the construction of the ML in the remote regions may be vulnerable to starting or being affected by forest fires especially during the dry summer months.			
ENG	100		Foundation Design	Foundation Design may be underestimated or overestimated/Soil Conditions	3 Possible	2 Low	Green
EXR	101		GC site limitations	The existing substation at GC has significant site restrictions which limits the modification options to the existing site.	2 Unlikely	2 Low	Green
CSH	102		Gender & Diversity requirements	Gender & Diversity requirements (quantitative & qualitative targets) within the next couple of weeks will know more on probability and cost			
CSH	103		General labour productivity – execution efficiencies	General labour productivity – execution efficiencies			
CSH	104	No	Geotechnical conditions	Geotechnical conditions are different than anticipated based on survey results – impacts HDD set up costs and/or drilling rates.	3 Possible	3 Moderate	Yellow
CSH	105		Habitat compensation variability	Habitat compensation variability			
CD	106	No	HDD - Cable Interface risk	Design interface risk between HDD and cable. HDD contractor may not be familiar with landfall experience	2 Unlikely	4 High	Yellow
CSH	107	Yes	HDD drilling pushing schedule into 2016	Issue with HDD drilling pushing schedule into 2016 as well as knock-on impacts with cable installation	3 Possible	3 Moderate	Yellow
EXR	108	No	HDD landfall risks	HDD risks include: management and control of drilling fluids, ability to keep HDD on designed drilling trajectory, hole integrity, potential for drilling mud loss (land or sea) and cuttings disposal/control.	3 Possible	4 High	Yellow
EXR	109		Heavy equipment availability and transport issues	In remote regions of NL and NS, there will be limited heavy equipment availability due to robust economic environment. This limit availability can result in delays and additional costs.			
CSH	110	No	helicopter construction costs	Higher than anticipated helicopter construction costs (extended duration)	1 Rare	2 Low	Green
EXR	111		Helicopter utilization	The construction of this line may require helicopter utilization which brings significant flight risk. The contractors will require safety programs and monitoring processes.			
CSH	112		Higher Interest due to funding issues	Higher Interest due to funding issues, interest outside project cost			
INT	113		Higher project estimates and / or actual costs.	That UARB will find certain costs are not reasonably justified.			
CSH	114		Higher than expected Benefits agreement compliance costs	Higher than expected Benefits agreement compliance costs this is the case now in 2012 on Engineering $1M on 3M			
CD	115		Higher than expected Benefits agreement compliance costs	Higher than expected Benefits agreement compliance costs this is the case now in 2012 on Engineering $1M on 3M			
EXR	116		Hilly terrain of route and concerns of safety construction	The terrain may be hilly and the route parallel to energized lines. This poses challenges to the design and to the construction of the structures. Some of the challenges are slope conditions, sediment run off, working next to energized lines etc.	4 Likely	3 Moderate	Yellow
EXR	117		Hunting season safety considerations	Construction workers may be vulnerable to hunting mishaps in remote regions of NL and NS during the hunting seasons usually the fall of each year.			
INT	118		Hydro Quebec challenge to EA process	Possible challenge to the EA process	3 Possible	4 High	

Risk Rev Code	ID	Key Risks	Risk Name	Risk Description	Probability	Risk Impact	PID Rating
CD	119	No	Ice study uncertainty	Studies supporting ice protection work have limitations - in particular there appears to be no distinction in risk across depths ranging up to 200m. Furthermore, the analysis is based on return period of 1/1000 per m (rather than for the whole span). Not clear how the two are related.	3 Possible	4 High	Yellow
ENG	120		IGBT Commissioning and ramp-up	IGBT Commissioning and ramp-up may take longer than expected	2 Unlikely	2 Low	Green
ENG	121		IGBT Life expectancy	IGBT Life expectancy could be shorter than expected	2 Unlikely	1 Very Low	Green
ENG	122		IGBT performance reliability	IGBT performance reliability lower than expected	1 Rare	1 Very Low	Green
INT	123	Yes	Incurring costs before Sanction	Emera (and Nalcor) will incur costs prior to sanction for the Maritime Link project. Large capital expenditures such as the costs associated with the early ordering of the sub-sea cable, will only take place following a signed agreement with Nalcor with mitigating conditions to reduce the risk.	1 Rare	4 High	
INT	124		Independent Engineers Review of project	Independent Engineers will be required to assess the progress of the project. This may be required for various reasons including financial institutions process when drawing on credit.			
CD	125		Input from NSPI	Review by NSPI required for some elements of project such as system integration.	3 Possible	2 Low	Green
INT	126		Integrated Communications/ Public Relations Processes and Governance	With out an integrated plan there is the risk of inconsistent messaging to stakeholders.			
INT	127		Integrated Insurance plan	There scope of the insurance requirements for the project is unclear at this time.			
INT	128	Yes	Labor availability at appropriate terms and conditions	Potential labour shortages and qualifiaction, particularly in NL. This is expected for the Power Line Technicians (PLTs). The shortage could result in delays as well as a higher cost of Labour to the project.			
INT	129		Labour Cost in NL	The strong economy in NL is inflating salaries and wages which will constrain the budget.	3 Possible	3 Moderate	
CD	130		Labour disputes	Labour disputes			
CSH	131		Labour disputes (Wildcats)	Labour disputes (Wildcats) Likely that project will have an SPO			
CSH	132		Labour shortages	Labour shortages/TFWs(transportation to & from site, extra costs, OT)			
ENG	133		lack of adherence by contractors to environmental conditions	Non complinace and lack of adherence by contractors to all aplicable environmental conditions of approvals and related legislation. This may result in fines and even work stoppage	3 Possible	1 Very Low	
CD	134		lack of adherence by contractors to environmental conditions	Non compliance and lack of adherence by contractors to all applicable environmental conditions of approvals and related legislation. This may result in fines and even work stoppage	3 Possible	1 Very Low	Green
CD	135		Lack of availability of large cranes and large equipment	There may be a lack of large equipment especially cranes in the remote regions of NL and potentially NS. The lack of availability could result from the increased demand on all resources for other projects. The lack of appropriate equipment may require early commitments to contractors for scheduling purposes.			
CD	136		Lack of clarity of responsibility with NLH of BB substation deconstruction and decommissioning	The deconstruction and decommissioning of the existing BB substation is planned as a new substation is designed. Require clarity with respect to the decommissioning and deconstruction of existing BB substation (Brownfield construction).	3 Possible	3 Moderate	Yellow
EXR	137		Lack of Geotechnical data for BB construction site	There is no geotechnical data available for the proposed BB site.	1 Rare	1 Very Low	Green
CD	138		Lack of telecommunication infrastructure at BB	The new converter station at BB will need to integrate communications for monitoring the systems. Currently there are restrictions to the existing environment in NL since NL is not part of NERC or comply with the standards and the use of SPS (and potential SCADA).	2 Unlikely	2 Low	Green
INT	139	No	Land fall implementation uncertainty	The land fall site is uncertain at this point. Once selected, the construction will face challenges such as land access, environmental protection, and difficult terrain.	1 Rare	1 Very Low	Green
EXR	140		Late completion of LiDAR due to weather	The LiDAR study, required for the functional design, must take place after the snow has melted, the temperature is above o C and the level of surface water is negligible. Delays to these weather conditions due to a late spring will delay the Lidar study and delay the functional designs.	1 Rare	1 Very Low	Green
ENG	141		Lightening performance	Lightening performance may affect reliability	2 Unlikely	2 Low	Green
INT	142		LIL Sanction will trigger payment	LIL sanction will trigger payment equal to amount spent to date. This increases the overall funds spent to date without a contract and prior to the Sanction of the ML project.			
EXR	143		Line crossing on highways or secondary roads	The construction of lines across highways make workers vulnerable to highway traffic which will require traffic control.			
EXR	144		Load limits on highway for moving materials	The roads in the remote regions are restrictive to load limits which could require upgrades for moving structures and other materials to various locations along the route.	3 Possible	3 Moderate	Yellow
CD	145		Long lead list of materials	A long lead list of materials is not available and could impact the schedule of the project if there are availability issues of the materials.	2 Unlikely	3 Moderate	Green
ENG	146		Loopholes and unclear scope of work (Maybe related to Permits)	Loopholes and unclear scope of work may lead to additionnal costs	2 Unlikely	3 Moderate	
ENG	147	No	Lose scope control which leads to cost control	Lose scope control which leads to cost control	2 Unlikely	2 Low	Green
CD	148		Lower Churchill Falls project could be stopped or postponed	Until it is completed, the Lower Churchill Falls project could be stopped or postponed, it may even come to a halt. Parties may not be committed			

Risk Rev Code	ID	Key Risks	Risk Name	Risk Description	Probability	Risk Impact	PID Rating
CD	149		Mairne Cable Manufacture Lead time	Cable contract may be signed in Q1, 2013 - 6 months prior to Sanction. This commitment will increase the cost exposure if the project is not sanctioned - a risk which will be better understood when responses to the RFP are reviewed. It is assumed that exit conditions will be negotiated in the contract.	2 Unlikely	4 High	Yellow
EXR	150	Yes	Marine SIMOPS	Risks associated with simultaneous operations in a marine work environment.	3 Possible	3 Moderate	Yellow
CD	151	No	Marine weather/sea-state conditions	Historical data with hindcast confirmation of modelling will be used to forecast expected downtime due to weather and sea states. Actual conditions at the time of cable placement may vary from these forecasts.	2 Unlikely	4 High	Yellow
CD	152		Metallic return	Metallic return may be required if monopole operation is restricted or not approved. There is potential to need to relocate grounding site(s) for various reasons.	1 Rare	5 Very High	Yellow
ENG	153		Misunderstanding of EMF and grounding effects	Misunderstanding of EMF and grounding effects may lead to community resistance which would than hamper public acceptance. This may even delay the regulatory approval and EA acceptance of the technology	3 Possible	4 High	
EXR	154		More residents participating in recreation activities	We must be vigilant regarding public safety around any construction sites.			
ENG	155		More severe weather than normal	More severe weather than normal or expected may occur. This would signifcantly slow down construction work or even stop it. Thus, the 'window of opportunity' would be lost	2 Unlikely	4 High	
CSH	156		NL is not a member of NERC	NL is not a member of NERC are NERC costs in scope of project			
CD	157		NL reliability standards	NL is not a member of NERC. The ML Project technical design team will address the specifications and requirements with NLH . However, the reliability of the ML must be addressed with the UARB filing.	2 Unlikely	2 Low	Green
CSH	158		NL western region slide slopes and residences	NL western region has an increasing number of slide slopes and more residences increasing the difficulty for construction an dinterference from the population.			
CD	159		NL western region substantial number of slide slopes and more residences	The western region of NL is more mountainous and has more population resulting in more slide slopes and more residences. This will challenge both the design of the ML and the construction especially as materials need to be installed in areas of aggressive side slopes.			
ENG	160		NSP/NLH may not be available	NSP/NLH may not be available for the required services	2 Unlikely	3 Moderate	Yellow
CD	161		NSPI ROW	The ROW associated with 7015 currently held by NSPI "for its own undertaking". Wording of easement does not extend to Project			
ENG	162	No	Not be able to benchmark	We will not be able to benchmark which exposes the project to unrealistic estimates (too high or too low)	3 Possible	2 Low	Green
CD	163	No	Other stakeholder agreement costs	Other stakeholder agreement costs	2 Unlikely	2 Low	Green
ENG	164		Outage periods may not coincide with construction periods	Outage periods may not coincide with construction periods	2 Unlikely	3 Moderate	
ENG	165		Overdesigned or underdesigned componants	The project componants for that area may be overdesigned or underdesigned	2 Unlikely	2 Low	Green
CSH	166	No	Per meter cable price	Per meter cable price is higher than $500/m assumed in estimates – impact of a small per unit change is significant when taken over the full scale of the crossing	3 Possible	4 High	Yellow
ENG	167		periods may not coincide with the outages	Those periods may not coincide with the outages	2 Unlikely	3 Moderate	
ENG	168	No	Poor interface management	Poor interface management could lead to change orders thus increased costs	2 Unlikely	3 Moderate	Green
CD	169		Priority land identified and secured	The potential grounding site is with the Port Harmon Port Authority jurisdiction which requires additional investigation to determine the risks.			
CSH	170		Productivity – worst case 1 hour per day	Productivity – worst case 1 hour per day			
EXR	171		Prohibited periods for construction	There is a period when clearing trees is prohibited due to the bird nesting season (April and August).			
CSH	172		project component added to the EA process	Any project component added will need to be added to the EA process (such as adding another cable)	2 Unlikely	2 Low	Green
INT	173		Project Splitting from LIL and Muskrat Falls	The EA process is predicated on the ML project as a separate project and will follow a distinct approval process independent of the approval processes for the other projects. Without this independence, the chance of approval within the timeline is substantially reduced.	1 Rare	4 High	
CD	174	Yes	Protracted cable installation contract process	Contracting takes longer than planned	3 Possible	4 High	Yellow
EXR	175		Proximity to provincial park	The transition site and other compounds will be close to provincial parks in NL. The ML design activities must consider the access routes into the parks, the scenery and vistas etc. Construction impacts also to be considered.			
CSH	176		recruitment for specialized positions	Project management team - recruitment for specialized positions			
INT	177		Regulatory Approval	As with any capital work order, the UARB may not approve or may defer approval of, or condition, the spend and inclusion of costs in rate base.	1 Rare	1 Very Low	
EXR	178		Remoteness of location	The remoteness of the lines and substations presents many challenges to the project including suitable access for heavy requirement, communications with construction teams, basic everyday living needs etc.			
EXR	179		Restricted ROW access to 209 to S'ville	The existing line 209 ROW is owned by NLH. It is approximately 39Km. The use of this ROW is uncertain and must be investigated.	3 Possible	2 Low	Green
INT	180		Restriction to the use of Transmission Special Protection Systems	Proposed restrictions to the use of System special protection systems may drive transmission upgrade costs into creating an unfavorable financial business case	2 Unlikely	4 High	Yellow

Risk Rev Code	ID	Key Risks	Risk Name	Risk Description	Probability	Risk Impact	PID Rating
ENG	181		Risk transferred from bidder to owner	Cost of Risk transferred from bidder to owner which increases the bid estimate	5 Almost Certain	3 Moderate	
EXR	182		Safety in working in trenching	Undergrounding construction requires adherence to best safety practices such as trench wall re-enforcement. This is key to avoid any risk of injury.			
INT	183		Schedule and UARB filing and approval	The timing of the filing with the UARB is uncertain. Inputs into the filing with the UARB include JD agreements, DG2, clarity of any revised regulations in NS, conditions of the FLG, possibly NL sanction of MF and LIL and/or costs from Nalcor. Six to 10 months are required from filing to approval.			
ENG	184	No	Scope Changes-cost changes	Scope Changes-cost changes	2 Unlikely	2 Low	Green
CSH	185		Scope clarification between NSPI and Nalcor modifications	Scope clarification between NSPI and Nalcor modifications	2 Unlikely	2 Low	Green
INT	186		Scope of Work for Independent Engineers	Need to clarify the scope of work for the Independent Engineer who may act on behalf of the UARB and coordinate with Nalcor. High priority.			
ENG	187		shortage of qualified construction workers	It is possible that there will be a shortage of qualified construction workers	3 Possible	4 High	
CSH	189	No	Significantly higher labor wages	Significantly higher labor wages and site premiums (conduct sensitivity analysis on labor rates)	3 Possible	2 Low	Green
CD	190		Special construction specifications for Grounding Sites	The grounding sites require considerations for the marine environment since break walls and other components may be required. This must be completed without impact to the environment.	3 Possible	3 Moderate	Yellow
CSH	191		Special Protection Systems	Special Protection Systems not being acceptable and more substantial transmission upgrades being required. There is some mitigation work which has been done "show stopper"if transmission build is more than what project can handle	2 Unlikely	4 High	Yellow
CSH	192		Specialized installation equipment failures	Specialized installation equipment failures			
ENG	193		Steel may not be as available	Steel may not be as available than predicted or might be at a higher price	2 Unlikely	4 High	
EXR	194		Storage for spares	Spares requirements include 5,000m of spare cable, jointing kits, etc. which will require a well located, controlled facility for storage.			Yellow
ENG	195		Structures could be overdesigned	Structures could be overdesigned which could cost more than planned	2 Unlikely	2 Low	Green
CSH	196		Sudden Change of Timing	Sudden Change of Timing will result in additional costs (cost of dealing with people)			
CD	197		Outage periods and System integration with NSPI and NLH	Coordinating activities with outage planning with both NLH and NSP during testing and commissioning.	4 Likely	2 Low	Yellow
CD	198		The corrosion might be accelerated	The corrosion might be accelerated due to other weather conditions thus reducing the Transmission line reliability.	2 Unlikely	2 Low	Green
EXR	199		The ML will cross many municipalities with rules / bylaws	The transmission lines will cross many municipalities. Each municipality will have unique bylaws. The bylaws have intended purposes such as protection of habitat, safety, tourism etc. It will be key to understand all bylaws and ensure they are followed.			
CSH	200		Theft	Theft of materials			
CD	201		Theft of materials	The potential theft of materials is always a reality and is increased when materials are stored in remote regions.			
CSH	202		Timing - terms of compensation	Timing – some times of the year are more costly than others in terms of compensation			
INT	203		Timing of decision Process of EMA and ENL Board Approval with those of NL	Risk that timing of Board decisions of EMA and ENL and NL not aligned			
INT	204		Timing of UARB filing with other NSPI Filings	Timing of other NSPI filings with the UARB should be considered and coordinated with the ML filing to ensure clear communication and understanding of process by stakeholders and the public.			
EXR	205		Transition Compound environmental protection	The transition compound requires adequate environmental protection of the elements as the cable transitions from the underground to overhead. The design should also include a feasible size for maintenance requirements.	2 Unlikely	2 Low	Green
EXR	206		Transition Compound is the point of interface with major contractors	The transition compound is the point of interface for major contractors. Without clarity on the responsibilities of the contractors, the specifications, the technology, and the installation activities could be misaligned negatively impacting the project.			
EXR	207		Transition compound is the point of technology interface	The transition compound is the point of interface of technologies supplied by major contractors. Lack of clarity on technical specifications between the interfaces could impede performance of the maritime link.	2 Unlikely	2 Low	Green
CSH	208		Transmission line construction constraints	Transmission line construction constraints (weather, black-out times due to restrictions-nesting, hibernation, migration)			
EXR	209		Transmission lines across over 300 water streams	Transmission lines and the construction of the lines across streams creates additional challenges	3 Possible	2 Low	Green
EXR	210		Trenched landfall risks	Trenched landfall risks include: disruption to inshore fisheries, land-owner concerns in Cape Ray, stakeholders at both landfalls (public access/picnic area at beach in Point Aconi, archaeological sites and proximity to provincial park in Cape Ray), integrity/reinforcement requirements for open cut trench walls.	4 Likely	4 High	Red
CD	211	No	Trenched landfall risks	Trenched landfall risks include: disruption to inshore fisheries, land-owner concerns in Cape Ray, stakeholders at both landfalls (public access/picnic area at beach in Point Aconi, archaeological sites and proximity to provincial park in Cape Ray), integrity/reinforcement requirements for open cut trench walls.	3 Possible	3 Moderate	Yellow

Risk Rev Code	ID	Key Risks	Risk Name	Risk Description	Probability	Risk Impact	PID Rating
INT	212		TSR 200 / modifications	The risk is loss of the current Transmission Service Study queue position due to NSPI or other proponent's projects that may end up in front of the ML project if we are forced to re-submit / restudy a more refined location.	3 Possible	4 High	Yellow
INT	213		UARB conditions of approval	The UARB may impose conditions for approval.			
CSH	214		Weather (snow /cold) impacting productivity	Weather (snow /cold) impacting productivity worse case we 2-3 "big" storms where we have to shut down for 5-6 days. No allowance for winter conditions			
CSH	215		weather conditions	Worse than expected weather conditions cause unexpected delays to cable installation operations Craig waiting on weather impact			
CSH	216		weather delays	Higher than anticipated waiting on weather delays for the installation campaign (20 – 30% to 40 – 60%)			
EXR	218		Windy climate	This region in NL is notorious for it high winds which may be beyond the normal specifications. This unique feature must be considered in the design and eventual operation of the overhead lines in the region.	2 Unlikely	2 Low	Green
CD	219	No	XPLE design life	Uncertainty over cable design life - esp for XLPE which is a more recent technique.	3 Possible	4 High	Yellow
CD	220	No	XPLE prequal to Cigre TB219	Cigre TB 219 has been updated and not yet clear that suppliers have (testing) evidence needed for compliance. Note that revised std still has gaps in qualification of insulation materials. Type test times could put pressure on schedule.	3 Possible	4 High	Yellow
EXR	221		Zone of Influence of overhead lines, grounding lines - Electric and magnetic fields	More information is required to understand and adequately inform the public. Overhead Ground lines will be very low voltage and current. There are no electrical impacts.	1 Rare	1 Very Low	Green
CD	222		VSC track record	VSC track record - relatively new technology esp when combined with overhead lines.	2 Unlikely	3 Moderate	Green
CD	223		Movement of materials	Movement of materials to and across rivers (esp Victoria)	2 Unlikely	2 Low	Green
CD	224		Uncertainty in Land Ownership	Uncertainty in Land Ownership			
CD	225		geotechnical Risks	Schedule risk associated with planning of geotechnical works (eg access rights and seasonal constraints)	3 Possible	3 Moderate	Yellow
CD	226		Impact of climate change	Impact of climate change on BoD assumptions related to extremes	3 Possible	2 Low	Green
CD	227		VSC vulnerability to lightening strike	VSC vulnerability to lightening strike (need to power down to discharge line and cable)	3 Possible	2 Low	Green
CD	228		High wind extremes	High wind extremes in Wreck House area.	2 Unlikely	2 Low	Green
CD	229		Archaeology	Archaeology - Victoria Lake, nr Cap Ray (Dorset Eskimo)			
CD	230		Vertical transmission line clearances	Vertical transmission line clearances less than predicted and below required standard (with snow & ice loading). Also consider deep valleys where there may be large drifts	1 Rare	1 Very Low	Green
CD	231		grounding station / line outage	Higher than expected grounding station / line outage	1 Rare	2 Low	Green
CD	232		Climate change	Climate change may mean that the 30 C max temp in the current BoD is too low towards the end of life.	2 Unlikely	1 Very Low	Green
CD	233		Commissioning interfaces	Commissioning interfaces - among contractors and 2 controlling authorities	3 Possible	3 Moderate	Yellow
CD	234		Salt contamination	Salt contamination of external elements of enclosed Overhead to Underground transition facility	2 Unlikely	2 Low	Green
CD	235		proximity of switch station	Construction impacts associated with proximity of switch station at Granite Canal to fish habitat			
CD	236		3rd party dark fibre	Risk that 3rd party dark fibre (inc redundancy) across Straight is not available.	2 Unlikely	5 Very High	Yellow
CD	237		Public access to Grounding	Public access to Grounding sites by boat (water side is unfenced)	2 Unlikely	2 Low	Green
CD	238		Risk of non approval for grounding concept.	Risk of non approval for grounding concept.	2 Unlikely	5 Very High	Yellow
CD	239		Towers have long lead time	Towers have long lead time for design and manufacture such that detail design commitment will be pre-sanction.	2 Unlikely	3 Moderate	Yellow
CD	240		Switch yard detail design	Switch yard detail design needs to be in advance of final equipment decision	2 Unlikely	2 Low	Green
CD	241	No	Loss of burial protection	Loss of burial protection associated with seabed mobility (shallow regions - 50m water depth)	3 Possible	2 Low	Green
CD	242	No	Installation loads greater than expected	Installation loads greater than expected (eg 450 m water depth catenary loads)	2 Unlikely	2 Low	Green
CD	243	No	Installation soil conditions	Installation soil conditions not as expected. Boulders in area of relict iceberg gouges.	3 Possible	2 Low	Green
CD	244	No	Failure to locate crossed cable	Failure to locate crossed cable during installation	3 Possible	3 Moderate	Yellow
CD	245	No	Formation of new pockmarks	Formation of new pockmarks (significant likelihood of one occurring during life of cable)	2 Unlikely	3 Moderate	Yellow
CD	247		Impacts (perceived impacts) of emf	Impacts (perceived impacts) of emf on fish migration			
CD	248		lobster fisheries	Heating impacts on lobster fisheries			
CD	249	No	Trenching issues	Trenching issues with bundled cable	2 Unlikely	2 Low	Green
CD	250	No	Relatively shallow exit depth for HDD	Relatively shallow exit depth for HDD	3 Possible	3 Moderate	Yellow
CD	251	Yes	Relatively long HDD & high pulling loads	Relatively long HDD & high pulling loads	3 Possible	3 Moderate	Yellow
CD	252	No	HDD through coal seams	HDD through coal seams	2 Unlikely	2 Low	Green
CD	253		Weather vulnerability of helicopters.	Weather vulnerability of helicopters. Bird incidents Multiple timing constraints ?			
CD	254		Land Assets schedule slip	Land Assets schedule slip due to aggregated risks (labour, converter, cable supply)			
CD	255		Nuisance to Local community	Nuisance to Local community associated with worker numbers (40 crews)			
CD	256		Temporary Camps - seasonal constraints	Temporary Camps - seasonal constraints			

Risk Rev Code	ID	Key Risks	Risk Name	Risk Description	Probability	Risk Impact	PID Rating
CD	257		Environmental constraints on construction (bird nesting + AC))	Environmental constraints on construction (bird nesting + AC))			
CD	258		Availability of accommodation to 3rd parties	Availability of accommodation to 3rd parties during construction			
CD	259		Env impacts associated with River crossings	Env impacts associated with River crossings			
CD	260		Early access requirement for geotech investigation drilling rigs	Early access requirement for geotech investigation drilling rigs	2 Unlikely	2 Low	Green
CD	261	No	Interface Risk	Interface Risk leading to schedule slip and substantive/multiple contractor claims	3 Possible	2 Low	Green
CD	262		Aboriginal concerns	Aboriginal concerns			
CD	263	Yes	Interface risk across season between HDD and Cable.	Interface risk across season between HDD and Cable.	2 Unlikely	2 Low	Green
CD	264	No	Potential subsea positioning uncertainty	Potential subsea positioning uncertainty due to temp inversion impacts during touch down survey	3 Possible	2 Low	Green
CD	265	No	Damage to marine cable (eg load out)	Damage to marine cable (eg load out)	2 Unlikely	3 Moderate	Yellow
CD	266	No	Cable free spans associated with relict ice gouging	Cable free spans associated with relict ice gouging	3 Possible	4 High	Yellow
FIN	267		Insurance plan available resources	resource availability to work on the insurance effort (PM, engineering, financial)			
FIN	268		Insurance not available	insurers not available for necessary insurance (i.e. market availability)			
FIN	269		Inaccurate financial estimates due to unknowns	Financial estimates not accurate due to timing of phase, market commodity fluctuations, interest rate changes and major procurement cost differences			
FIN	270		Timing of insuarnce	concerns around timing to get the insurance plan ready and insured prior to first site work			
FIN	271		Equity Financing – confidence of marketplace erodes	Equity Financing – confidence of marketplace erodes			
FIN	272		Debt Financing – inability to raise funds for project	Debt Financing – inability to raise funds for project			
FIN	273		Counterparty, major supplier / contractor risk	Counterparty, major supplier / contractor risk			
FIN	274		FX and commodity impacts	FX and commodity impacts			
FIN	275		Delays in MF power – costs associated with delayed revenue streams	Delays in MF power – costs associated with delayed revenue streams			

Emera
Newfoundland & Labrador

Maritime Link Project

Project Execution Risk Plan

MLP Document # 4011	Total Pages: 23

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B0	Apr 5/12	Issued for Approval	P. Murray Project Engineer	D. Berringer Engineering Team Lead	G. Brennan Project Manager		
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Proprietary Notice

This content of this document is confidential and under the ownership of Emera Newfoundland and Labrador (ENL). It was prepared for the intended purpose of the planning and execution of the Maritime Link project. It will not be shared in whole or in part without the appropriate written consent of ENL.

REVISION HISTORY

Version	Author/Editor	Comments	Date

RELATED DOCUMENTS

Document Number	Title	Date

TABLE OF CONTENTS

SECTION 1 – INTRODUCTION

1.1 Background

The Maritime Link project was launched in 2011 following partnership discussions between Emera and Nalcor and the Provinces of Nova Scotia and Newfoundland and Labrador. The scope of the project includes the design, construction and commissioning of the Maritime Link with the appropriate Environmental, Regulatory, Aboriginal and other Stakeholders support and appropriate approvals. The objective of the project schedule is to commission the system in preparation for turnover and start up in Q4/2016.

1.2 Document Purpose

The purpose of the document is to describe the Project Execution Risk Plan for the Maritime Link (ML) Project.

The plan outlines the risk assessments and loss prevention activities that will be completed for each phase of the Maritime Link project. The plan also outlines the approach to continuous risk identification, assessment and management.

The document may be subsequently revised to incorporate any changes to the risk assessment activities as the project evolves from conceptual evaluation (Phase 2) and Decision Gate 2 (DG2) on through the define stage of alternatives (Phase 3) in the lead up to Decision Gate 3 (DG3).

1.3 Scope / Requirements

The scope/requirements of this deliverable cover the main design and project execution components of the ML project through to project start-up and describe the plan associated with risk identification, classification and management for the Maritime Link project.

1.4 Out of Scope

The Muskrat Falls (MF) and Labrador Island Link (LIL) projects as part of the Lower Churchill Project (LCP) are outside the scope of this document and managed by Nalcor.

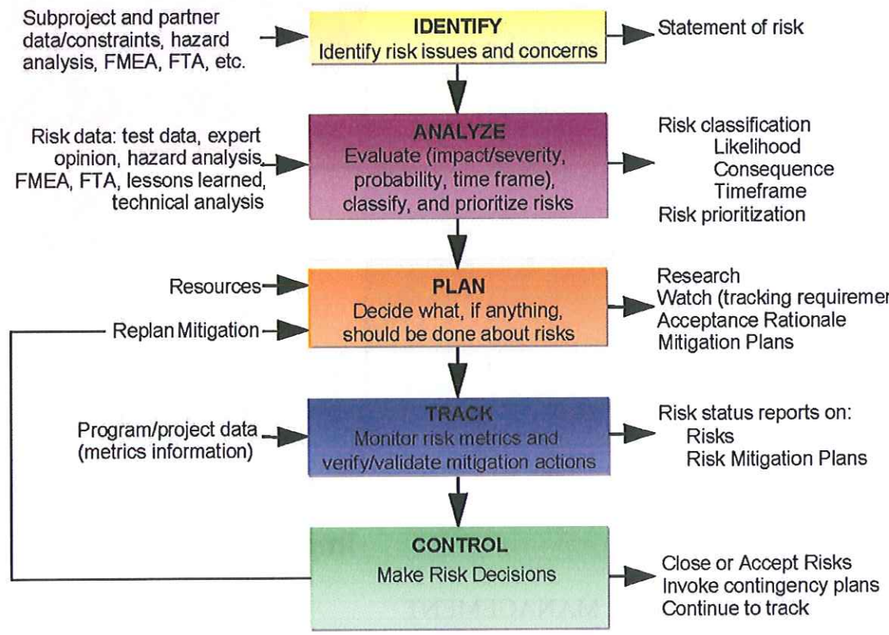
1.5 Acceptance Process

This deliverable will be subject to the review and approval by only those names listed on the cover page title block and the authorization page as required.

SECTION 2 – CONTINUOUS RISK MANAGEMENT PROCESS

ENL utilizes a Continuous Risk Management (CRM) process as illustrated in Figure 1. The CRM process is a continuous, iterative process that identifies, analyzes, plans, tracks, controls, communicates, and documents risk through all life cycle phases of project development.

Figure 1 – Continuous Risk Management (CRM) Process



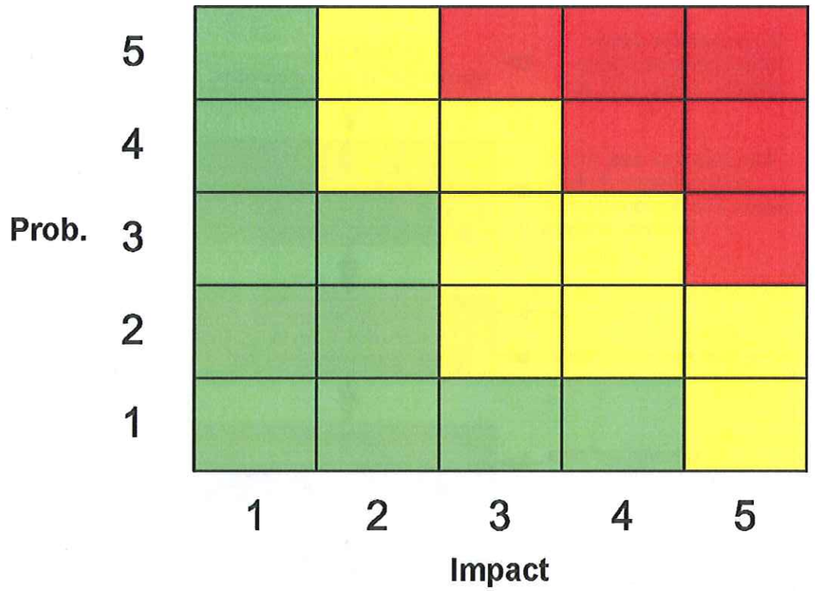
FMEA – Failure Modes and Effects Analysis
FTA – Fault Tree Analysis

SECTION 3 – RISK ASSESSMENT AND SCORING

Risks are characterized primarily by Risk ID Number, Risk Title, Risk Owner and the Risk Condition & Consequence (i.e., risk statement). The structure of the risk statement is, "Given that <a specific condition exists> there is a possibility that <a specific consequence may occur>". Consequences are scored against four "Impact Categories" related to the project: cost, schedule, performance, and safety/environment/security.

All risks are assessed using a 5x5 Probability–Impact Diagram (PID), shown in Figure 2. Red risks are termed "High", are considered unacceptable and in all cases require further mitigation to reduce the probability and/or severity. Yellow are "Moderate", and Green are "Low". A probability (P) of between 1 and 5 and an impact (I) of between 1 and 5 maps to a risk score in the PID. Detailed criteria for scoring both probability and impact are provided in Appendix A and Appendix B.

Figure 2 – 5x5 Probability-Impact Diagram (PID)



SECTION 4 – RISK MANAGEMENT

Once a risk has been identified, analyzed, and characterized as described previously, a plan is developed to manage that risk to a level that is as low as reasonably practicable. The management phase includes planning, monitoring, and controlling elements. The management phase requires assignment of responsibility for overall management of each risk and a determination of approach.

The management of identified risks will fall into one of the following status categories after identification and assessment activities:

- **Closed** – this category is only applied when activities associated with the risk are completed with no chance of risk recurrence for the remaining duration of the project. An example would be the completion of a contract for a very specific scope

of work that will not be repeated throughout the remainder of the project. The risk is therefore removed from the ongoing CRM process.

- **No further action** – assignment of this category means that no further action needs to be taken to manage the risk. This is only applicable to assessments that fall in the green sections of the PID, where existing controls minimize probability and/or potential impact is minimal. It does not necessarily mean that all risks that fall in the green sections of the PID need no further action. Risks in this category are still re-evaluated throughout the project as part of the CRM process.
- **Monitor** – assignment of this category means that some measure of additional monitoring is required to confirm either the scores assigned for probability and impact or to better assess the risk management plan. Once monitoring is complete and scores are confirmed or updated, the risk status is reassessed and updated accordingly. This category is generally applied to risks that fall in the yellow sections of the PID but may also be used for risks that fall in the green sections, where there are some uncertain or potentially changing conditions associated with those risks.
- **Mitigate** – assignment of this category indicates that measures need to be taken to further manage high risks, through the use of controls to either reduce the probability or the impact of the risk. This category should be considered for any risks that fall in the yellow sections of the PID and, in all cases, must be applied to any risks that fall in the red sections of the PID.

Risk ownership is assigned to the person best able to define and implement mitigation efforts. Risk ownership must always be assigned to ENL PMT members, even when the risk may primarily involve contractors or other external parties. It is the responsibility of the risk owner to ensure that the risk probability and impact are monitored throughout the project for any changes, that any identified mitigation measures are completed as planned, and that closure of the mitigation plans occur within the agreed timeframes.

The goal of risk mitigation is to reduce risks to a level that is as low as reasonably practicable within the allocated resources. When choosing to mitigate a risk, some common criteria should be considered as the mitigation plan is developed, including:

- Cost
  - Is the mitigation plan within the current funded budget?
  - How much does each mitigating option cost?
  - Is the mitigation going to cost more than the actual cost of the risk impact?
- Schedule
  - Does the mitigating option fit into current schedules?
  - What is the impact to the schedule for each mitigation option?
  - Does the risk affect the critical path?
- Confidence of successful completion
  - What is the confidence level for completion of each mitigation option?
- Amount of risk reduced
  - What is the remaining risk level at the completion of the mitigation plan (residual risk)?

Risk identification, assessment and mitigation sessions are completed collaboratively and regularly, are aligned with Project Decision Gate requirements and are completed on an 'as needed' basis but no less than once per quarter throughout the duration of the project. Risk assessment will also be performed prior to mobilization and regularly in the field by contractors and consultants for specific tasks associated with their assigned work (a daily risk assessment for routine activities and prior to execution of any unique or 'one-time' activities). In all cases, ENL personnel will be involved in those third party risk assessments and will ensure that risks identified are incorporated into the ENL CRM process.

SECTION 5 – RISK MANAGEMENT ROLES AND RESPONSIBILITIES

It is the responsibility of all ENL project team members, contractors and consultants to continuously identify, assess, mitigate and reassess risks throughout project development.

Specific responsibilities exist within the ENL CRM process as follows.

The ENL Project Manager is responsible for:

- Ensuring that the Project Execution Risk Plan is developed and communicated throughout the organization.
- Approval of the EPC contractors' Risk Management Systems, Risk Assessment Plans and close out of mitigation/prevention items.
- Ensuring findings from all risk assessments are reconciled appropriately prior to completion of the Project Risk Assessment Plan and Project Turnover.
- Ensuring that regular (no less than quarterly) risk reviews are completed for all aspects of the project and that those risk reviews are aligned with Project Decision Gate objectives, collaborative and include appropriate representation from all project teams.
- Final signatory on risk close-out forms.

ENL Team Leads are responsible for:

- Ensuring that the Project Execution Risk Plan is communicated and understood among team members, contractors and consultants involved in their areas of work.
- Identifying items requiring risk assessment or hazard studies for incorporation into the Risk Assessment Plan.
- Reviewing contractors' Risk Management Systems, Risk Assessment Plans and close out of mitigation/prevention items.
- Ensuring that the risk assessments for specific activities are resourced and completed internally or by responsible third parties with input from ENL project team members.
- Ensuring that results of those risk assessments are incorporated into the ENL CRM process and assigned to team members to address and close out per agreed timelines.
- Monitoring status of action items in the risk resolution plan.

The reviews will be identified and conducted for each phase of the project and reflect the level of design maturity available for project components as well as execution definition for both on land construction and offshore implementation activities.

The Project Phases are as follows:

- Phase 2: Planning, Evaluation and Select Concept
- Phase 3: Define for Detailed Design
- Phase 4: Execute (Project Sanction)
- Phase 5: Operate

The scope of the reviews will also align to the approved Contracting Work Breakdown Structure for the project contract strategy. The main contracts envisaged for the project are as follows:

- EPC1: Subsea Cables (engineer, manufacture and install)
- EPC2: DC Converter Station (engineer, manufacture, construct and install)
- PC3: Transmission Lines (AC/DC/Ground - procure and construct)
- PC4: Transition Compound / Sub-Stations / Grounding Sites

The types of risk assessments for project design that will be used on the project will include but not be limited to the following:

- Hazard Identification Studies (HAZID) / Safety Health & Environment (SHE) Reviews
- Hazard and Operability Analyses (HAZOPs)
- Safety System Review (including logic diagrams)
- Loss Prevention Studies
- Specific Issues Risk Assessments (as required)
- Hazardous Area Classification Review
- Single Line Diagrams
- Global Interface HAZOP (with NS and NL systems)

Activity based reviews include but are not limited to:

- Onshore Construction Execution Vulnerabilities
- Offshore Installation Execution Vulnerabilities
- Landfall Construction / Cable Installation Vulnerabilities
- Loadout / Transportation Risk Assessment
- Onshore Construction Risk Assessments
- Offshore Installation Risk Assessments
- Start-up Risks
- Pre Start-up Safety Reviews

Activities implemented by the Project Management Team (PMT) will be complimentary to similar deliverables provided by our consultants and contractors.

- Endorsing plans to manage identified risks and recommend closure when completed by the assigned project team member.

ENL Risk Owners are responsible for:

- Ensuring that risk mitigation plans are developed and completed as identified and planned.
- Ensuring that all assigned risks are continuously monitored, reassessed and updated per the CRM process.
- Preparation of close out forms and submittal for approval to close risk items.

ENL Legal team members are responsible for:

- Reviewing risk assessment terms of reference and reports.

ENL contractors are responsible for:

- Evaluating their scope of work and identifying appropriate risk assessments and other safety studies applicable to their work.
- Submitting for approval a risk management plan incorporating the minimum requirements plus additional studies they have identified as being appropriate.
- Submitting for approval a risk management system defining process for managing risk over the term of the project.
- Submitting for approval a terms of reference defining the scope, methodology, process, agenda, sponsor, facilitator, list of attendees and deliverables.

SECTION 6 – RISK ASSESSMENT RECORDS AND COMMUNICATION

Records of risk assessment and loss prevention activities are living documents that are continually updated throughout project development. Documents are stored centrally and are accessible electronically for reference by PMT members. A template for standardized recording of risk assessment activities (including examples of hypothetical project risks) is shown in Appendix C.

While various risk assessments will take place under execution plans for specific third party contracts, all unique risks identified during those third party risk assessments will be captured in ENL risk assessment records. The risk assessment records will be updated following the regular project risk reviews or as needed throughout project development.

SECTION 7 – RISK ASSESSMENT AND LOSS PREVENTION ACTIVITIES

The Project Execution Risk Plan will include activities that address the full breadth of the project (i.e. global issues or the integrated system) as well as specific discipline-based risk assessment / loss prevention activity.

Table 7-1 – Phase 2: Concept Planning, Evaluation and Selection (Prior to DG2)

Risk Assessment

Item	Sponsor/ Owner	Scope	Level
Conceptual Design Risk Assessment	Project Manager	Evaluate high level risks associated with the proposed design concept including: • transmission lines • ground sites • landfalls • converter stations • transition compounds • submarine cable • SIMOPS • construction and installation issues • operability issues	Global
Stakeholder Communications and Relations Risk Assessment	Project Manager	Evaluate high level stakeholder communications and relations risks related to the proposed design concept.	Global

Loss Prevention

Item	Sponsor/ Owner	Scope	Level
Early Loss Prevention Philosophy	Project Manager/ PMT	The objective of the philosophy is: • Provide a basis for the design to prevent / mitigate loss due to facility hazards (i.e. loss prevention standards). • Provide direction to the PMT and engineering contractors concerning loss prevention work. • Align to Emera corporate health, safety, security and environment standards, policies and procedures.	Global

Table 7-2 – Phase 3: Concept Definition and Optimization (Prior to DG3)

Risk Assessment

Item	Sponsor/ Owner	Scope	Level
Transmission System Hazard Evaluation	Project Manager/ Sr. Technical Specialist	Evaluate risks that could potentially occur during project execution or over the operating life of the asset. Ensure that the appropriate high level risk reduction measures are addressed in the EPC contracts.	Discipline Specific
Submarine Cable Design and Preliminary Risk Assessment	Project Manager/ Sr. Technical Specialist	Evaluate risks that could potentially occur during project execution or over the operating life of the asset. Ensure that the appropriate high level risk reduction measures are addressed in the EPC contracts.	Discipline Specific
Landfall Design and Preliminary Risk Assessment	PMT/ Marine Lead	Evaluate risks that could potentially occur during project execution. Ensure that the appropriate high level risk reduction measures are addressed in the EPC contracts.	Discipline Specific
HAZID / SHE Review	PMT	Review of the hazards inherent to operating the system and associated facilities.	Global
Preliminary HAZOP (incl. interfaces with NS & NL systems)	PMT	Review of the project (SLD's, etc) at the end of early design to identify hazards and operability issues of the full system that could potentially occur over the operating life of the assets.	Global
Preliminary Safety System Review	PMT	Review of the function and specifications for the Special Protection Systems.	Discipline Specific

Loss Prevention

Item	Sponsor/ Owner	Scope	Level
Intermediate Human Factors	PMT	Review of the layout design to identify accessibility and maintainability issues to be resolved.	Discipline Specific
Loss Prevention Studies	PMT	Identify any stand-alone loss prevention studies applicable to the project scope of work (in this or subsequent phases of the project).	Global

Table 7-3 – Phase 4: Detailed Design (After DG3)

Risk Assessment

Item	Sponsor/ Owner	Scope	Level
Global Interface HAZOP	PMT	Review the design early in detailed design to identify hazards and operability issues that could potentially occur over the operating life of the assets between major scope elements and existing utility systems.	Global
Final Safety System Review	PMT	Final review of the Special Protection Systems.	Discipline Specific
Transmission Construction Execution Vulnerabilities	Sr. Technical Specialist	Review during early execution planning to identify potential execution vulnerabilities for land scope. This will be used as input for pre-construction risk assessments.	Discipline Specific
Cable Installation/Protection Execution Vulnerabilities	Marine Lead	Review during early execution planning to identify potential execution vulnerabilities. This will be used as input for pre-construction risk assessments.	Discipline Specific
Landfall Construction Execution Vulnerabilities	Marine Lead	Review during early execution planning to identify potential execution vulnerabilities. This will be used as input for pre-construction risk assessments.	Discipline Specific
Substation Construction Execution Vulnerabilities	Sr. Technical Specialist	Review during early execution planning to identify potential execution vulnerabilities. This will be used as input for pre-construction risk assessments.	Discipline Specific
Specific Issues Risk Assessment(s)	PMT	After contract award risk assessments will be performed by EPC's to support their risk plan. Potential for other ENL specific issue assessments.	Discipline Specific
Startup Plan Risk Assessment	Operations Advisor	Review and risk assessment of the startup plan for the project and associated sub-systems. Identifies critical dependencies, key interfaces and risks associated with the final commissioning and startup of facilities. Establishes the framework and basis for risk mitigation action plans and detailed startup work packages to ensure a safe and smooth startup of the Maritime Link.	Global

Early Works Pre-Construction Risk Assessment	Sr. Technical Specialist	Review prior to the start of any onshore early work programs in advance of the main program after sanction. E.g. pinch points in NS or ROW clearing, etc. This review will identify and assess any onshore construction risks with plans to mitigate before work starts.	Global

Loss Prevention

Item	Sponsor/ Owner	Scope	Level
Hazardous Area Classification	Sr. Technical Specialist	Review the hazardous area classification of the land based facilities.	Discipline Specific
Alarm Management Review	Sr. Technical Specialist	Perform a review of the alarm protocol.	Discipline Specific

Table 7-4 – Phase 4: Execution Phase Preparations (After DG3)

Risk Assessment

Item	Sponsor/ Owner	Scope	Level
Transmission Pre-Construction Risk	Sr. Technical Specialist	Identify and assess the specific risks associated with all onshore scope elements including EPC2. Appropriate risk reduction measures are identified and implemented early in the execution phase once contractor execution plans are developed. Identify if additional specific risks are required.	Discipline Specific
Cable Pre-Installation/Protection Risk Assessment (Onshore and Offshore)	Marine Lead	Identify and assess the specific risks associated with all EPC1 scope elements. Appropriate risk reduction measures are identified and implemented early in the execution phase once contractor execution plans are developed. Identify if additional specific risks are required.	Discipline Specific

Landfall Pre-Construction Risk Assessment	Marine Lead	Identify and assess the specific risks associated with landfall installation. Appropriate risk reduction measures are identified and implemented early in the execution phase once contractor execution plans are developed. Identify if additional specific risks are required.	Discipline Specific
Specific Construction Risk Assessments	PMT	From the previous three risk assessments, these follow-on risk assessments shall address the major hazards associated with onshore or offshore construction. Number of reviews TBA.	Discipline Specific
Final HAZOP	PMT	Review of project design at end of detailed engineering (i.e. design freeze) to identify hazards and operability issues that could potentially occur over the life of the operating life of the assets. Inputs include all vendor package data.	Global
SIMOPS Risk Assessment	Sr. Technical Specialist	Review to identify any simultaneous activities that may occur during construction within operating facilities (e.g. NSP, NLH assets).	Discipline Specific
Marine SIMOPS Risk Assessment	Marine Lead	Review of risks associated with marine SIMOPS during cable installation, protection and landfall installation activities.	Discipline Specific
Factory Acceptance Testing (FAT) Risk Assessment	PMT	Review of risks associated with conducting any FAT activities at the manufacturer's works.	Discipline Specific
System Integration Testing (SIT) Risk Assessment	Sr. Technical Specialist	Review of risks associated with conducting any SIT activities at the manufacturer's works.	Discipline Specific

Loss Prevention

Item	Sponsor/ Owner	Scope	Level
Update Early Engineering Studies	PMT	Update earlier studies based on the final design and operations.	Global

Table 7-5 – Phase 4: Execution Phase – Main Campaigns (Prior to DG4)

Risk Assessment

Item	Sponsor/ Owner	Scope	Level
Cable Manufacturing Risk Assessment	Marine Lead	Review and address risks associated with the quality control, process control and other aspects of the cable manufacture.	Discipline Specific
Loadout / Transportation Risk Assessment	Marine Lead	Address risks associated with loadout or transportation of major marine components to the field location.	Discipline Specific
Cable Installation Risk Assessment	Marine Lead	Review of all risks associated with offshore installation activities including protection.	Discipline Specific
Landfall Construction Risk Assessment	Marine Lead	Review of all risks associated with constructing the landfall addressing both the land and marine components. Review will be tailored to the technology chosen (HDD vs trenched).	Discipline Specific
Cable Pull In Risk Assessment	Marine Lead	Review risks associated with pulling the cables (and fiber optic cable) through the land fall conductors through to the transition compound anchor structure.	Discipline Specific
Converter Station Construction Risk Assessment	Sr. Technical Specialist	Review of all risks associated with constructing the converter station and installation of equipment.	Discipline Specific
Grounding Sites Construction Risk Assessment	Sr. Technical Specialist	Review of all risks associated with constructing the grounding site and associated marine activities.	Discipline Specific
Transmission Line Construction Risk Assessment	Sr. Technical Specialist	Review all risks associated with constructing AC and DC transmission lines.	Discipline Specific
Substation Construction Risk Assessment	Sr. Technical Specialist	Review all risks associated with expanding existing AC substations.	Discipline Specific
Grounding Line Construction Risk Assessment	Sr. Technical Specialist	Review all risks associated with constructing grounding lines.	Discipline Specific

Table 7-6 – Phase 4: Start-Up Phase – (Prior to DG4)

Risk Assessment

Item	Sponsor/ Owner	Scope	Level
Pre-Start Up Safety Review	Operations	Review conducted by Operations prior to start of commissioning activities.	Global

APPENDIX

The following Appendices form part of this document:

A. Probability Scoring Criteria
B. Impact Scoring Criteria
C. Project Execution Risk, Assessment and Mitigation Log (with examples)

Appendix A - Risk Probability Scoring Table

Probability Rating	Scoring Value	Description
Rare	1	**Qualitative:** An event that is very unlikely to occur, additional management not required in most cases. Strong controls in place. **Quantitative:** Probability of occurrence (P): P < 2%.
Unlikely	2	**Qualitative:** An event that is unlikely to occur, management not required in all cases. Controls have minor limitations/uncertainties. **Quantitative:** 2% < P < 10%.
Possible	3	**Qualitative:** An event that may occur, management required in some cases. Controls exist with some uncertainties. **Quantitative:** 10% < P < 50%.
Likely	4	**Qualitative:** An event that is likely to occur frequently, most cases require management attention. Controls have significant uncertainties. **Quantitative:** 50% < P < 80%.
Almost Certain	5	**Qualitative:** An event that is nearly certain to occur and reoccur, requires immediate management attention. Controls have little or no effect. **Quantitative:** P > 80%.

Appendix B - Risk Impact Scoring Table

Impact		1 Very Low	2 Low	3 Moderate	4 High	5 Very High
Safety, Environment and Security	Personnel	Minor injury requiring no treatment	Minor injury requiring minor first aid treatment	Moderate injury, illness or incapacitation that requires medical treatment but is not a CEA reportable injury	CEA reportable medical aid injury, illness or incapacitation	CEA lost-time reportable injury, illness or incapacitation, permanent disabling injury or death
	Facilities, Equipment or Property	Minor damage to non-critical facilities, equipment or property	Major damage to non-critical facilities, equipment or property	Minor damage to critical facilities, equipment or property. Loss of non-critical facilities, equipment or property.	Major damage to critical facilities, equipment or property.	Loss of critical facilities, equipment or property.
	Environment	Negligible environmental hazard - no reporting necessary	Minor environmental incident, cleaned up on site, no more than notification required	Moderate environmental incident reporting required	Moderate environmental incident that requires reporting and some level of site remediation	Major environmental incident
Performance	Basis of Design	Design changes that have negligible impact	Design changes that have a small impact but do not require initiation of change management	Design changes that have a moderate impact but do not require initiation of change management	Design changes that require initiation of change management but have minor effect on the basis of design	Design changes that require initiation of change management and have major effect on the basis of design
	System Reliability	Negligible impact on reliability of non-critical systems	Minor impact on reliability of non-critical systems	Major impact on reliability of non-critical systems	Minor impact on reliability of critical systems	Major impact on reliability of critical systems
	Operations	Negligible impact on future operations	Minor impact on future operations – workarounds available	Moderate impact on future operations – workarounds available	Major impact on future operations – workaround not available	Handover to operations cannot be successfully completed
Cost		≤$100k	>$100k but ≤ $1M	>$1M but ≤$10M	>$10M but ≤$100M	>$100M
Schedule		<2 week delay to major project milestone	2 week to 1 month delay to major project milestone	1-2 month delay to major project milestone	2-6 month delay to major project milestone	>6 month delay to major project milestone

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Appendix C – Risk Identification, Assessment and Mitigation Log

Emera Newfoundland & Labrador

1 = Very Low
2 = Low
3 = Moderate
4 = High
5 = Very High

Maritime Link Project Execution Risk Assessment, Evaluation and Mitigation Log

Risk ID#	Risk Title	Execution Plan Category	Project Phase	Risk Owner	Risk Condition	Risk Consequence	Probability (1-5)	Impact (1-5)	Overall Rating (PID)	Status	Mitigation Plan (if required)	Mitigation Completion Date	Probability After Mitigation (1-5)	Impact After Mitigation (1-5)	Overall Rating After Mitigation	Post Mitigation Status	Notes
1	EXAMPLE - Marine oil spill	Cabot Strait Marine Crossing - Installation	Construction	Marine Construction Manager	On board oil storage containers not properly secured in rough seas	Oil spill to marine environment	3	5	Red	Mitigate	Contract only qualified marine contractors, risk mitigation included in execution plan, pre-sail inspection, use of oil containment on board	Prior to mobilization	1	5	Green	Closed	Requirement included project HSE plan, containment reviewed during vessel inspection
2	EXAMPLE - Weather	Newfoundland AC Transmission	Construction	Land Construction Manager	Worse than expected weather conditions	Delayed productivity - schedule and cost impacts	3	2	Green	Monitor							Additional weather monitoring ongoing prior to start of construction
3	EXAMPLE - Cable raw material prices	Cabot Strait Marine Crossing - Subsea Cable	Procurement	Procurement Manager	Increasing raw materials pricing	Higher than expected subsea cable costs	2	5	Yellow	Monitor							Continued monitoring of raw material market pricing
4																	
5																	
6																	
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Request IR-29:

With respect to Response to Enerco/AHB2000 IR-21:

(a) Is the amount of $147 million mentioned in Response to Enerco/AHB2000 IR-9 (c) the assessment of the overall contingency from probabilistic modeling? If not, please explain how the $147 million was determined.

(b) Please explain the relationship, if any, between the probabilistic modeling used to calculate this overall contingency and the probabilistic distributions used when assessing the risks?

(c) Please, explain the difference between "contingencies" and "risks" as used in the Maritime Link project.

Response IR-29:

(a) No – the $147 million is the contingency estimate using Deterministic cost estimation.

NSPML utilizes two estimating methodologies in its on-going capital cost estimation process. One process is "Deterministic" and the other "Probabilistic". The deterministic approach predicts the expected capital costs for each individual line item and then adds a contingency for potential increases in those costs. In determining contingencies, NSPML's cost estimators made an appropriate determination of the estimate by class based upon the maturity level of project definition and level of risks or uncertainties identified. NSPML's cost estimators applied deterministic contingency percentages to the categories of estimated costs (for example, 15 percent for engineering and materials). For certain items, higher percentage contingencies were applied if warranted at the time of estimate. These percentages typically reduce as engineering is advanced and will narrow from DG2 to DG3.

To summarize, the $1.4 billion deterministic capital cost estimate for the Maritime Link facilities is comprised of the following:

Base capital cost estimate $1.17 billion
Escalation $68 million
Contingency $147 million
Total $1.4 billion

(b) Probabilistic modeling, the second methodology NSPML utilizes, does not include an estimate for contingencies in the same manner as outlined in (a) but rather puts expected ranges around each estimated amount. For example, ranges used in our Probabilistic modeling are referred to as P10 and P90. A P10 identifies a 1 in 10 chance the cost would be lower. A P90 represents a 1 in 10 chance the cost would be higher. A Monte Carlo simulation is then applied to the data set and a range of probable outcomes is produced. When NSPML applied Probabilistic Modeling, it was determined that $1.4 billion was the P50 Probabilistic outcome within a Probabilistic confidence interval (the range of probable costs represented graphically as a confidence interval or distribution of costs and probability of occurrence), There is no contingency identified using this modeling approach as the contingency is inherent in the selected budgetary price if the budget is above or below the base capital cost plus escalation.

(c) In the Maritime Link project “risks” are the events or circumstances which can emerge during the project execution. “Contingency” refers to the dollar value (or percentage of an defined dollar value being assessed) attributable to the combination of the probability and potential outcome if a risk were to occur.

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AACE International Recommended Practice No. 42R-08

RISK ANALYSIS AND CONTINGENCY DETERMINATION USING PARAMETRIC ESTIMATING

TCM Framework: 7.6 – Risk Management

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AACE International Recommended Practice No. 42R-08

RISK ANALYSIS AND CONTINGENCY DETERMINATION USING PARAMETRIC ESTIMATING

TCM Framework: 7.6 – Risk Management

May 26, 2011

INTRODUCTION

Scope

This recommended practice (RP) of AACE International (AACE) defines general practices and considerations for risk analysis and estimating cost and schedule contingency using parametric methods. Parametric methods are commonly associated with estimating cost based on design parameters (e.g., capacity, weight, etc.) or time duration based on costs; in this case, the method is used to estimate contingency based on risk parameters (e.g. level of scope definition, process complexity, etc.). This RP includes practices for developing the parametric methods and models (generally empirically-based). Recommended practice 43R-08 provides example process industry parametric models (including software) [16].

Purpose

This RP is intended to provide guidelines (i.e., not a standard) for contingency estimating that most practitioners would consider to be good practices that can be relied on and that they would recommend be considered for use where applicable. There is a range of useful contingency estimating methodologies; this RP will help guide practitioners in developing or selecting appropriate quantification methods for their situation. This RP does not address management of contingency once it is determined.

While this RP is relatively short, it incorporates a lot of information by reference and it addresses a complex research and empirically based methodology. It is highly recommended that the reader understands the research behind this method to avoid significant misunderstanding of risks and misstatements of contingency.

Background

This RP is based on over 40 years of research, development, and practice. The development and use of parametric risk analysis and contingency estimating methods evolved in parallel with industry's recognition that *poor project scope definition* was often the greatest project cost and schedule risk driver. This recognition led to the development of project scope development processes (e.g., phase-gate processes) and scope definition maturity matrices such as those included in AACE's recommended practice for cost estimate and schedule classification[1,2].

Before the above were accepted as best practices, experts first had to prove their value to project outcomes. They did this by studying actual projects and developing empirically-based p9rametric models that showed how poor scope definition resulted in greater cost growth and wider accuracy ranges. A paper by Hollmann surveys these parametric developments[4] regarding costs and highlights the pioneering work of the late John Hackney, followed by Edward Merrow, *et al.* at the RAND Institute, and Steven Trost, *et al.* for the Construction Industry Institute (CII)[7,9,11]. A paper by Baccarini also provides an extensive survey of these methods[4]. Work by Myers, *et al.* at RAND and Lee *et al.* at CII extent the research to schedule[8,10], These and the other sources referenced in this RP are recommended reading for parametric method practitioners.

It is AACE's recommended practice that whenever the term "*risk*" is used, that the term's meaning be clearly defined for the purposes at hand. The method in this RP quantifies the impact of *uncertainty*, i.e. "*risks + opportunities*".

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Background – Parametric Estimating

This is not an RP on parametric estimating, but a basic understanding of it is required. AACE's *Cost Engineering Terminology* defines a parametric estimate as one that has "...estimating algorithms or cost estimating relationships that are highly probabilistic in nature"[12]. Generally, the relationships of the outcome (e.g., cost growth) and the inputs (e.g., risk drivers) are determined by studying empirical data using methods such as multi-variable regression analysis, neural networks, or even trial and error. The following illustrates the typical form of a simple parametric estimating algorithm:

Outcome = Constant + Coefficient 1(Parameter A) + Coefficient 2*(Parameter B) +.....*

The "outcome" in this case may be a measure of cost growth (e.g., contingency percent of base cost) or schedule slip (e.g., contingency percent of base duration), and the parameters are various quantified risk drivers such as a measure of the level of scope definition upon which the estimate or schedule was based. The algorithm can be much more complex employing logarithmic, exponential, and power series.

Advantages of parametric estimating for risk analysis and contingency determination are that it is inherently empirical in nature (based on actual measured experience) and it can directly provide probabilistic information about the distribution of possible outcomes. It is also very quick and simple to apply.

A disadvantage is that parametric estimating is based on empirical methods such as regression analysis and these require that the parameters actually have more or less predictable relationships with the outcomes. This is more important for some risk types than for others. Another disadvantage is that obtaining empirical data and creating models is a challenging effort; increasingly so as one attempts to model cost growth and risk drivers at more detail levels. Therefore, the method is typically limited in use to estimating overall project contingency that results from selected risk types. As will be explained in the next section, this is not a problem for early estimates (i.e., AACE Class 5), but for later estimates (i.e., Class 4 or better) the method is best used in combination with range estimating, expected value analysis or other more definitive methods.

Background – Risk Types

In respect to parametric methods, risk types fall into one of two categories; risks that have systematically predictable relationships to overall project cost and schedule growth outcome and those that don't. These categories have been labeled as "systemic" and "project-specific" risks for contingency estimating purposes (i.e., there will be other ways to categorize risk types for other purposes.)[4]. In order to use the methods properly, it is important to understand the distinctions of these types.

The term *systemic* implies that the risk is an artifact of the project "system", culture, business strategy, process system complexity, technology, and so on. Research by Hackney and others has shown that the impacts of some of these risks are measurable and predictable between projects within a system, and to some extent within an industry as a whole. Measures of these risks are generally known even at the earliest stages of project definition, and furthermore, the impacts of these risks tend to be highly dominant for early estimates. Also, the link between *systemic* risks and cost impacts is stochastic in nature; this means it is very difficult for individuals or teams to understand and to directly estimate the impact of these risks on particular items or activities (for example, the risks of process technology on something like site preparation or concrete foundations may be dramatic, but is not readily apparent). Finally, systemic risks tend to be "owner" risks; i.e., the owner is responsible for early definition, planning, technology, and decisions so these risks cannot be readily transferred to execution contractors. The following are typical *systemic* risks dealt with using parametric methods:

Process Definition

- Basic Design

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- Level of Technology
- Process Complexity
- Material Impurities

Project Definition

- Site/Soils Requirements
- Engineering and Design
- Health, Safety, Security, Environmental
- Planning and Schedule Development

Project Management and Estimating Process

- Estimate Inclusiveness
- Team Experience/Competency
- Cost Information Available
- Estimate Bias

One of the most difficult systemic risks to deal with is "estimate bias". When estimate bias is psychological or political in nature, it is particularly difficult to measure and quantify because it deals with deception, intentional or unintentional. To assess the impact of these types of risks (i.e., optimism bias and strategic misrepresentation), a methodology called *reference class forecasting* (not covered here), a form of estimate validation, has been proposed by Flyvbjerg[5]. Whether and how these systemic psychological and political risks can be better measured, and incorporated in parametric techniques is an area of active research, particularly for government funded (i.e., politically charged) infrastructure mega-projects. In any case, estimate and schedule validation (to detect bias among other objectives) is always a recommended practice in conjunction with risk analysis[3].

The term *project-specific* implies that the risk is, as it says, specific to the project. The impacts of these risks are not highly predictable between projects within a system or within an industry as a whole. For example, rain may have much more impact on one project than another depending on the project characteristics and circumstances. Measures of these risks are generally not known at the earliest stages of project definition (e.g., for Class 5 estimates and schedules, rain cannot be considered because the location of a project, the season of its construction, and other circumstances may not be known). Also, the link between *project-specific* risks and cost impacts is more deterministic in nature; i.e., they are amenable to individual understanding and to estimating the impact of these risks on particular items or activities (for example, the risks of excess rain on something like site preparation or concrete foundations can be estimated). Finally, these types of risks are more negotiable during project contracting strategy as to who will carry them. The following are typical *project-specific* risks (this list is far from inclusive):

- Weather
- Site Subsurface Conditions
- Delivery Delays
- Constructability
- Resource Availability
- Project Team Issues
- Quality Issues (e.g., rework)
- Etc....

This breakdown of risk types indicates why a combination of risk analysis and contingency estimating methods should be used for optimal understanding and quantification of risks of different types. The RP will explain how multiple contingency estimating methods can be used and their results combined. For Class 5, parametric methods can be used alone given the knowledge of the systemic risk factors (and lack of knowledge of project specifics) and the dominance of their impacts at this phase. Project-specific risks become more dominant as scope is better defined (and hence some systemic risks are mitigated), but there are always systemic risks that should be analyzed as thoroughly as practical. Also, systemic risks can increase during project execution if plans, systems, and discipline diminish or break down.

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Practices for parametric risk analysis and contingency estimating methods necessarily focus on *development* of the parametric model(s) because that is the most challenging aspect; *use* of parametric models is relatively simple.

Model Development

Processes Come First

Prior to developing and using any risk analysis or contingency estimating practice, the enterprise's risk management process should be developed in alignment with the appropriate overall asset management and project control processes, which in turn should align with business strategy. Process maps show inputs and outputs of a method which help identify stakeholders in its practice. Example processes are covered in AACE's *Total Cost Management (TCM) Framework*[13]. In particular, if the company has no formal project scope development process, or process or system for project historical database or knowledge management, empirically-based parametric methods will be difficult to develop or maintain (however, implementing parametric methods can put emphasis on the company's need to strengthen these processes).

Determine Requirements

Company processes and stakeholder input will help establish requirements of the scope of the method and scope of the effort to develop, maintain, and use it. Some typical requirements (and constraints) to consider include:

- Classes of estimates and schedules[1,2].: If your company is a contractor that only deals with Class 3 or better estimates, and most systemic risks are carried by the owner, parametric methods offer less value. However, for owner's developing Class 5 estimates, parametric methods are extremely valuable.

- Types of projects and risks: If you estimate and fund projects using new technology, complex processes, complex strategies, and so on, parametric methods increase in value and you will want to be sure to identify and analyze these types of risks (in addition to the level of scope definition).

- Corporate risk management strategies: If you are responsible for analyzing not only cost and schedule risks, but also technical, health and safety or other kinds of risks, this may affect the development process (this RP addresses cost and schedule risks)

- Resources and competencies available: because of the reliance on empirical data analysis, the development of models requires significant resources with special analysis skills (particularly statistical). On the other hand, because the methods are very simple to apply, and because they inherently incorporate empirical learnings, they can be used by project teams with less expert help than other methods.

Historical Data

Having identified requirements in terms of the types of projects and risks to be addressed, the requirements for historical or empirical data can be defined. The list of systemic risks provided previously is a starting point; developers should study the references to this RP for more information on the specific risk drivers to measure and capture. The primary risks are the level of scope definition, the level of new

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technology in the process, and the complexity of the process and the project strategy. How to measure and record these risks quantitatively must then be determined.

Having identified the risks (i.e., parameters of the model), measures of the *outcome* must be determined. In general these include cost growth and schedule slip relative to the base estimate and schedule excluding contingency.

One systemic risk that is a challenge to measure is the competitiveness and quality of the base estimate and schedule. "Fat" base estimates (i.e., hidden contingency above-the-line in the budget or within activities) may result in little need for or usage of additional contingency. Therefore, a process to review and validate the competitiveness and quality of the base estimate and schedule (and total including contingency) becomes an ancillary part of the risk management process.

Having determined the parameters and outcomes to capture, data collection and management procedures need to be established. Ideally, these will be part of your project historical database management process, including project close-out processes.

Reference and External Information

As mentioned, the references to this RP should be studied. The Hackney, Merrow, and Myers references include models that have been developed from industry data, and are still generally applicable. AACE has documented the Hackney and Merrow cost models in RP 43R-08. These models can serve as a starting point or go-bys for internal developments. Other external data on risks and their outcomes from benchmarking sources and other literature [e.g., AACE's technical library and *Professional Practice Guides (PPGs)*] should be obtained.

Data Analysis and Tool Development

Having collected project risk and outcome data including quantitative measures for modeling, it must be cleaned to ensure that the sample to be used for model building or evaluation is free of significant error and is representative (i.e., no extreme outliers that tend to bias analyses). Outcome data must also be normalized for (i.e., corrected for) escalation, currency, and scope change impacts which are not covered by contingency.

Two methods of parametric model building are commonly found in the literature. The most traditional and widely used is *multi-variable linear regression* analysis. Standard spreadsheet software generally has this analytical capability. The model building methods used for risk analysis and contingency estimating tools are the same as those used for general estimating models; the only difference is in the nature of the parameters and outputs.

Regression analysis will typically find some sort of relationship between one or more of the parameters and the outcome measure. However, the relationship must be tested and challenged to ensure that it is statistically significant (e.g., using t or F statistics), that it is causal in nature (i.e., there should be a rational hypothesis for why a parameter is impacting the outcome to the extent noted), that the variables are independent and not co-linear, and that the model is not overly biased by outlier data points, and so on.

Once a valid model is obtained, it is usually implemented in a spreadsheet tool wherein the user enters the parameter values and the model generates the predicted contingency value, usually as percentages of the base cost estimate and schedule duration values. The regression output represents the mean contingency which for normally distributed data is equivalent to the p50 value (50 percent of the time the result will be over or under this value).

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After a base model is built, analysts can supplement the base model constants, coefficients, and parameters with various logical assumptions and adjustments that may not have been included in the analytical dataset[14]. For example, if database included a set of projects for which project definition was rated on a scale of 5 to 1 using AACE's scope development maturity matrix (i.e., from RP 18R-97), and later, AACE adds a new risk-driving deliverable to the maturity matrix, the analyst may have to make manual adjustments to their model as appropriate to address how the change may affect the 5 to 1 rating.

Probabilistic Outcomes

The base model generates the mean or p50 result value. However, best practice for risk analysis and contingency estimating is to produce a distribution of possible outcomes so that management can decide how much risk they are willing to accept and therefore how much contingency will be required. The regression analysis will provide some evidence of the probability distribution. In particular, it provides the standard error of the estimate for the regression model dataset. However, the regression dataset may be limited in scope, and cannot always be relied on to fully represent the range of possible outcomes.

There is a simple method, which is consistent with observed industry data (including AACE's RP 18R-97), to generate a reasonably reliable probability distribution for cost contingency. That method is to assume that cost or duration outcomes (after allowing for contingency) are more-or-less normally distributed and to further assume that contingency is equal to the standard deviation of the distribution[15]. With these assumptions, the normal cumulative distribution can be computed using the NORMINV function in MS Excel® [syntax is NORMINV(probability, mean, std. dev)]. The following is an example of such a distribution for cost.

Given:

- Base Estimate (without contingency) = $100
- Contingency from the parametric model = $20
- Total Cost (at p50) = $100 + $20 = $120

Then the Cumulative Probability Distribution is:

p	**Total$** NORMINV (probability,120,20)	**Contingency$** (Total-Base)
10%	$ 94	$ (6)
20%	$ 103	$ 3
30%	$ 110	$ 10
40%	$ 115	$ 15
50%	$ 120	$ 20
60%	$ 125	$ 25
70%	$ 130	$ 30
80%	$ 137	$ 37
90%	$ 146	$ 46

These results can be reported in the tool in tables or charts as desired.

Dealing With a Lack of Company-Specific Historical Data

Unfortunately, good project data is difficult to collect and analyze. Fortunately, systemic risks and their impacts for industry projects have been fairly consistent with time. Therefore, lacking any other method, the parametric models from Hackney, Merrow and Myers can be used with some confidence after validating against your own experience. The Hackney and Merrow cost models have been included in working versions in recommended practice 43R-08[12].

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Risk Analysis and Model Use

Identify and Quantify Systemic Risks

Because the parametric model has pre-determined risks (i.e., the parameters), the risk analysis is simplified. While this is not an RP on how to conduct a risk analysis session or workshop, the typical practice is to hold a meeting of the key team members and other project stakeholders, and to start with identifying risks. In this case, the risk types are identified, so the team concentrates on quantifying the parameters; e.g., rating the level of definition of each key deliverable in the project scope maturity matrix, rating the level of new technology, and so on.

The more difficult challenges are agreeing on subjective systemic risk drivers such as the quality of the base estimating data and the project team's competency. Because these types of risks are in fact "systemic" (i.e., an artifact of the company's culture and capabilities that the project cannot do much about), it is recommended that default ratings be set for these to avoid over-optimism. The ratings can be changed, but the team must provide specific reasons why this project "bucks-the-system".

Estimating Contingency

Once the parameters are quantified, the contingency and probability distribution for systemic risks are estimated by simply plugging the parameter values in the model. The user should make quality checks and validate that the results are reasonable before reporting them to management.

Coordinate with Contingency Estimates for Project-Specific Risks

For Class 5 estimates, parametric methods alone are generally adequate, given the dominance of systemic risk impacts and lack of knowledge of project specifics. For Class 4 or better, other methods such as range estimating or expected value analysis should be used in combination with the parametric analysis. These methods are covered in other RPs.

The most important consideration in combining methods and outcomes is to ensure that risks are not double counted. After risks are identified in a risk analysis session, each risk must be categorized as systemic or project-specific. Each risk is then quantified in their respective analyses and contingency estimates.

Parametric and expected value analysis can be easily combined because , expected value models work by directly estimating the probable cost distribution of the impacts of each risk. In that case, the results of the parametric model (including its probability distribution) are included in the expected value analysis as the first risk. Then other project-specific risks (e.g., heavy rain) are quantified and added to the model. Monte-Carlo simulation can then be applied to the entire combined cost and duration risk models to obtain a combined probability distribution.

If range estimating is used for project-specific risk analysis, the combination cannot be done through a combined Monte Carlo simulation to obtain an overall cost outcome distribution. This is because range estimating does not model the cost impacts of each risk, but the cost range (resulting from many risks) of critical items in the estimate. Another challenge is that range estimating recommends that the team consider the extremes for the minimum and maximum cost of critical items and it is difficult, if not impossible, to parse the impact of any particular risk. For these reasons, it is not the preferred combination of methods. However, if care is take in not double counting the impact of system and project-specific risks, the cost values at the various levels of probability can be added for these two methods.

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Summary

It is hoped that enough information is provided in this RP to help guide practitioners in developing or selecting appropriate methods for their situation. Users are encouraged to study the reference materials provided with this RP. Future revisions of the RP are expected to cover scheduling applications.

REFERENCES

1. AACE International, Recommended Practice No. 18R-97, *Cost Estimate Classification System–As Applied in Engineering, Procurement, and Construction for the Process Industries*, AACE International, Morgantown, WV, (latest revision).
2. AACE International, Recommended Practice No. 27R-03, Schedule Classification System, AACE International, Morgantown, WV, (latest revision).
3. AACE International, Recommended Practice No 31R-03, Reviewing, Validating and Documenting the Estimate, AACE International, WV, (latest revision).
4. Baccarini, David, *The Maturing Concept of Estimating Project Cost Contingency - A Review*, 31st Australasian University Building Educators Association Conference (AUBEA 2006): July, 2006 (http://espace.lis.curtin.edu.au/).
5. Flyvbjerg, B., *From Nobel Prize to Project Management: Getting Risks Right*, Project Management Journal, August 2006.
6. Hollmann, John K., *The Monte-Carlo Challenge: A Better Approach*, AACE International Transactions, AACE International, Morgantown, WV, 2007.
7. Hackney, John W. (Kenneth H. Humphreys, Editor), *Control and Management of Capital Projects, 2nd Edition*, AACE International, 1997.
8. Lee, Sang-Hoon, Stephen R. Thomas, and Richard L. Tucker, *The Relative Impacts of Selected Practices on Project Cost and Schedule*, Construction Management and Economics, June 2005.
9. Merrow, Edward W., Kenneth E. Phillips, and Christopher W. Meyers, *Understanding Cost Growth and Performance Shortfalls in Pioneer Process Plants*, (R-2569-DOE), RAND Corporation, 1981.
10. Myers, Christopher W., and Ralph F. Shangraw, Understanding Process Plant Schedule Slippage and Startup Costs, (R-3215-PSSP/RC), RAND Corporation, 1986.
11. Trost, Steven M. and Garold D. Oberlender, *Predicting Accuracy of Early Cost Estimates Using Factor Analysis and Multivariate Regression*, Journal of Construction Engineering and Management, Volume 129, Issue 2, pp. 198-204 (March/April 2003)
12. AACE International, Recommended Practice No. 10S-90, *Cost Engineering Terminology*, AACE International, Morgantown, WV, (latest revision).
13. Hollmann, John K., Editor, *Total Cost Management Framework: An Integrated Approach to Portfolio, Program, and Project Management,* (Chapter 7.6 Risk Management), AACE International, Morgantown WV, 2006.
14. Whiteside, J.D., *Contingency Modifier Tool*, AACE International Transactions, AACE International, Morgantown, WV, 2007.
15. Rothwell, Dr. Geoffrey, *Cost Contingency as the Standard Deviation of the Cost Estimate*, Cost Engineering, AACE International, Morgantown, WV, July 2005.
16. AACE International Recommended Practice No. 43R-08, *Risk Analysis and Contingency Determination Using Parametric Estimating – Example Models As Applied for the Process Industries*, AACE International, Morgantown, WV, (latest revision)

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