Westney Consulting Group

Emera

# Cost and Schedule Risk Assessment Update for the Maritime Link Project

September 9 to September 11, 2013

Issued: January 21, 2014

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# Consultant's Comments – Observations

- Organizational plan for owner's project team is very well done. Individual team members are experienced and strong although they may need some reinforcements. Senior leadership is very knowledgeable and has considerable years of construction experience.
- Contracting execution plan is very sound with plans to employ high capability contractors. EPC lump sum contracting will be employed for the majority of the total project budget. Extensive bidding completed which allows good cost estimating. Cost estimating methodology which employs actual contractor proposal information and comparative industry cost data where proposals do not exist is a best practice. The ability to leverage the Nalcor existing contractors is a way to mitigate project risk.
- Use of strong stage gate project management system in an organization that has not used this previously is impressive.
- Quality commercial project controls software systems have been procured and installed. Project control system architecture is robust. Will need to augment project controls staffing in next phase.
- Impressed with the completeness and extensiveness of database in the cost estimating and cost control areas.
- High degree of completeness in overall design with improvements in the Transmission tower foundations and throughout the Converter station scope recently achieved.
- Plans to follow existing right-of-way in transmission scope where possible are low risk.
- IBEW agreement on labor provisions is well founded.
- Permitting plans, organization and work to date well executed.

# Consultant's Comments – Major Risks

- Owner is acting as the Project Management contractor is a positive. However, a project of this complexity is an extension to Emera's project management experience. Risk has been mitigated by the team with added personnel that are experienced in major projects, but it is still a corporate learning exercise to engrain the processes and rigor. To date the planning and execution activities are proceeding well.
- Project control systems being utilized are new to the corporation and, while the selected systems are excellent and initial staff is experienced, this also represents a corporate learning exercise. Current staffing plan for project controls appears to be inadequate.
- EPC resources continue to be in extremely high demand. High volume of work in Canada and N. America.
- Cable manufacturers have extensive order back log but shop space and time slot now reserved.
- Geotech unknowns in HDD will remain a risk through execution but is likely manageable.
- Access to land will be a process with some risk remaining for several months. Most private land owners favor the project but there will be a few holdouts. Right of land expropriation is now in place through legislation which assures ultimate acquisition. While there are time implications due to the long process, there is likely no schedule impact.
- Federal Loan Guarantee requires all land access to be assured; achieving this will likely be a complex and time-consuming process which this is now progressing well and according to DG3 schedule.
- Trenching of the submarine cable is a scope risk. It has been well accounted for in the project budget.
- Significant effort, along with the associated costs, could be expended to minimize delays to the project schedule which are likely to arise during execution. Consultant's database for projects of this size and complexity supports the likelihood of this risk. Emera recognizes this exposure and has employed mitigation strategies [redacted]

# Summary Findings - Cost

| | | |
|---|---|---|
| **Tactical** | The tactical risk assessment indicates a P25 value of $1,433 MM and a P75 value of $1,590 MM. | The scope of the project used for estimating represents design development and information availability consistent with the requirements for a project at owner sanction stage. The estimating process, quantification, productivity and price development are well advanced. The contingency required to achieve a P50 value equates to 7% of the estimate, which is reasonable for the level of estimating information and the major EPC contracts in place. |
| **Strategic** | The strategic risk assessment indicates a P25 value of $41 MM and a P75 value of $144 MM. | The strategic risk exposure is in addition to the assessed tactical risk. The most significant strategic risk is due to project remedial costs to cope with project delays which may occur. The level of strategic risk is reasonable for this type and size of project, and management should be aware of this exposure when sanctioning the project. |
| **Total Cost** | The total cost risk assessment indicates a P25 value of $1,510 MM and a P75 value of $1,705 MM. | Total cost risk exposure is determined by modeling the Strategic Risk exposure with the Tactical Risk assessment. The P50 total cost of $1,601 MM is 14% above the estimate (without contingency) while the P75 total cost is 22% above the estimate. |

# Summary Findings - Time

| | | |
|---|---|---|
| **Time** | The time risk assessment indicates a high likelihood of completion within 3 months of schedule, with a low likelihood of a 4 to 12 month delay. | The plan has adequate flexibility and float with few constraints between scope elements. There is potential time risk exposure beyond the plan due to the weather, skilled worker shortages, delayed equipment / materials, and unknowns in the global market for subsea cable, the cable lay vessel and difficulties in HDD scope. The current schedule assumes reasonable performance and only a small section of the transmission line having unknown soil conditions. It is assumed that construction of the AC Lines NL (Bottom Brook to Granite Canal) is not required for the project to be ready for commissioning. |

# Risk Adjusted Capital Costs (2013 Cdn$)

Tactical Cost (P50 Value): $1,506 MM

| | |
|---|---|
| Estimate | $1,403 MM |
| Estimating Contingency | $103 MM |
| Tactical Cost (P50 value) | $1,506 MM |

**Strategic Risk Exposure - $ Millions**
(Mean Impacts of Strategic Risks)

| Risk | Impact |
|---|---|
| ≈ Delay Mitigation/Management | 64 |
| ≈ Major Contractor Default | 9 |
| ≈ Project Delays | 6 |
| ≈ Cable Protection Remobilization | 5 |
| ≈ Additional Cable Protection | 4 |
| ≈ Excessive Problems during Drilling | 3 |
| ≈ Other | 7 |
| **Total of Mean Values:** | **98** |

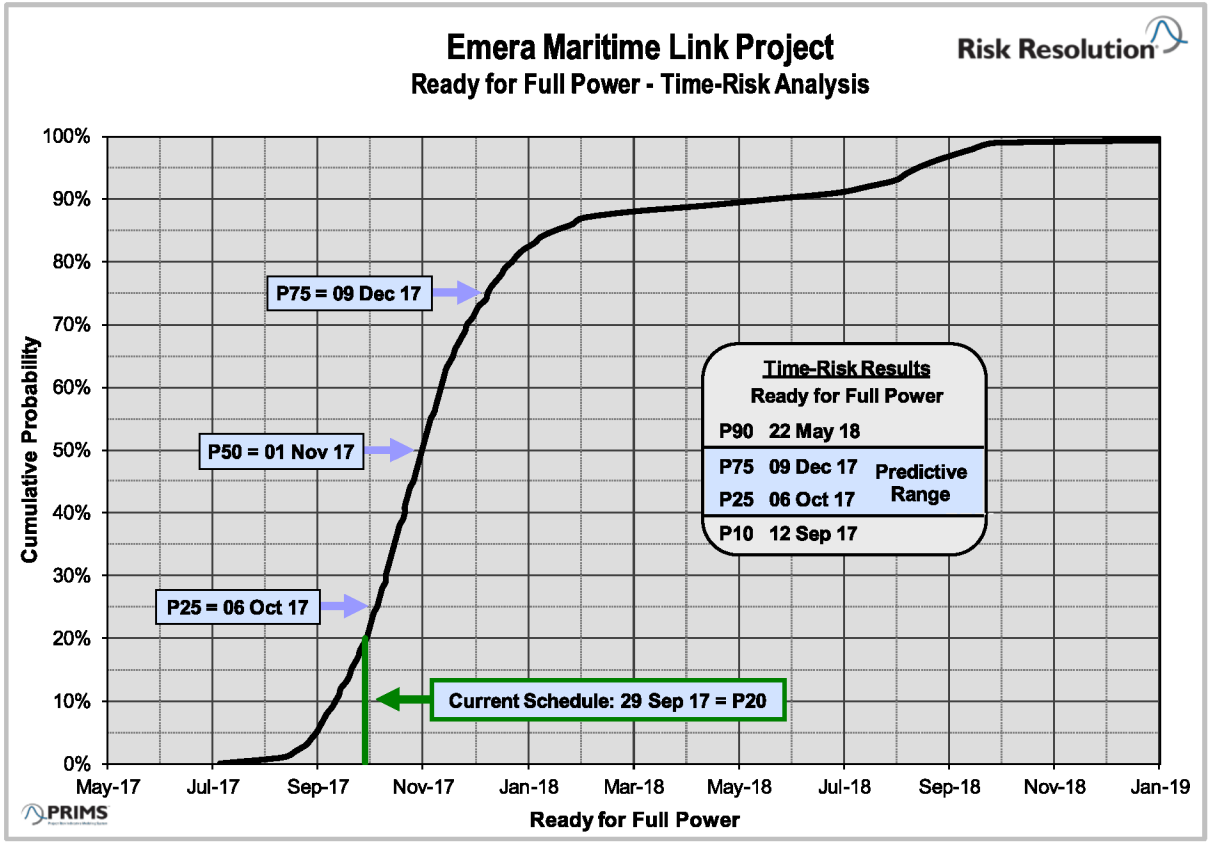
**Total Risk Adjusted Capital Cost From Monte Carlo Simulation** → (P25 to P75) = $1,510 MM - $1,705 MM

# Risk Adjusted Schedule Suggests Low Likelihood of 4 – 12 Month Delay

***The probabilistic critical path travels through the EPC1 (subsea cables) tasks over 85% of the time.***

***Key activities on probabilistic critical path:***

- ***Cable Manufacturing / Load Out***
- ***Cable Transportation and Mobilization***
- ***Cable Lay (seasonal)***
- ***Trenching / Rock Dumping***
- ***Subsea Cable Testing***



# Supporting Documents

# Terminology

**Percentile** – the percent of a distribution that is equal to or below a variable's specific value.

Example: A probability distribution is developed for equipment cost; the 10th percentile value is $5 million. This means that 10 percent of the values in the probability distribution are equal to or below $5 million; similarly, 90 percent of the values in this distribution are greater than or equal to $5 million. The 10th percentile value may be written as P10, so, in this example, the P10 = $5 million.

Percentile values are also used in this manner when referring to cumulative probability distributions for the results of Westney's Cost-Risk and Time-Risk analyses.

**Predictive Range** - the term predictive range is used throughout this report when describing the results of Monte Carlo simulations for all types of risk assessments. Specifically, the predictive range refers to the P25 to P75 band of results for a given assessment.

**Tactical Risks** - the uncertainties identified by a detailed evaluation of the current project estimate values and schedule durations. Tactical risks are typically related to project definition and contractor performance, and managed by the project team.

**Strategic Risks** - any other uncertainties that might affect project costs that may not be addressed or fully considered in the current project estimate or schedule. Some of these risks may have been ignored, limited by assumptions, or excluded in the current estimate. These risks are categorized as outside the project team's and estimator's "vision". Strategic risks are typically related to organization capability, scope and technology concerns, location & logistics issues, and/or market conditions. They often require management-level attention and require funding provisions beyond the project's budget.

# The Risk Resolution® Process

## Discovery

***Understand the project and identify the risks***

- Understand:
  - ✓ Project scope
  - ✓ Cost estimate
  - ✓ Schedule
  - ✓ Calculated contingency
  - ✓ Calculated risk reserve
- Discuss risk framing findings with client to ensure validity of facts and hypotheses

## Framing & Assessment

***Frame identified risks for understanding and independently range and value the risks in a straw-man***

- Frame risks outside the estimate and contingency (consider impact of time extension)
- Develop time-risk model
- Prepare risk ranges for:
  - ✓ Durations / Finish Dates
  - ✓ Estimate Contingency
  - ✓ Engineering & construction work-hours

## Alignment & Mitigation

***Conduct alignment workshops, using the straw-man to initiate discussion to align on the risk and mitigation values and ranges for modeling***

- Discuss Risk Frames with stakeholders
- Evaluate independently developed Time, Work-hour, and Cost risk ranges
- Alignment on risk range input for model
- Develop and value mitigations and de-risking actions inclusive of cost of mitigations / actions

## Predictive Analytics

***Using the agreed values, network, and Westney analytics, model and report risk adjusted cost, work-hours, and schedule***

- Model Time and Cost using Westney PRIMS™
  - ✓ Time Risk
  - ✓ Estimate Contingency or accept P50 model
  - ✓ Cost Risks Outside Estimate
  - ✓ Mitigations net of cost of mitigations
- Report Analytics
  - ✓ Risk-Adjusted Schedule
  - ✓ Risk-Adjusted Work-Hours
  - ✓ Risk-Adjusted Capital Cost
- Work with Client to develop Risk Adjusted IRR or NPV

The entire Risk Resolution® process normally takes a couple of weeks.

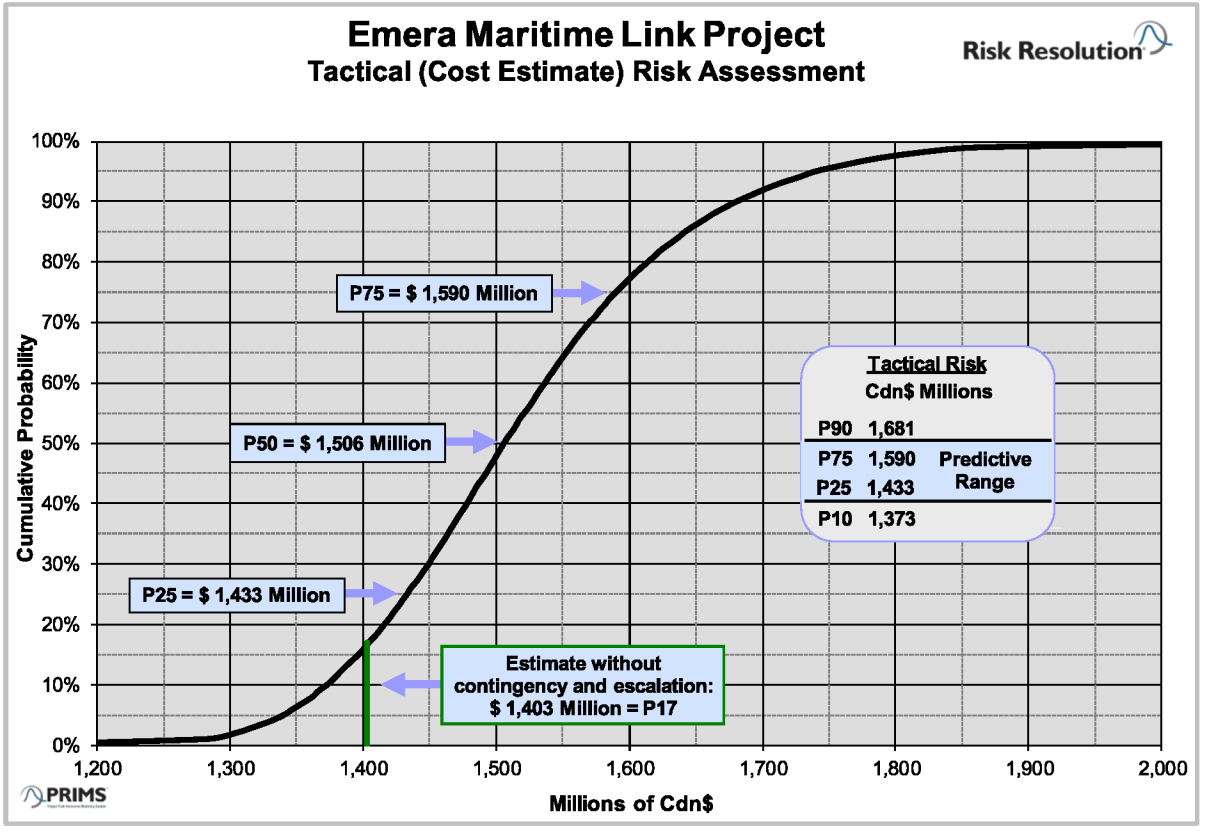
* **PRIMS™**: Westney's proprietary ***P**roject **R**isk **I**ndicative **M**odeling **S**ystem*

# Tactical Risk Assessment

- The Tactical Risk evaluation was based on Emera's total estimate of $1,577 million. Estimate items for contingency ($139 million) and escalation ($35 million) were deducted and ranging was applied, at the WBS level, to the Base Cost estimate of $1,403 million.
- In a session with key members of the Project Team, the Best / Worst values for each item in the estimate were discussed and set by the key Project Team members with facilitation by Westney. The agreed upon values were input to the PRIMSTM model and used in a Monte Carlo simulation using Crystal Ball software. The result is shown as the Tactical Risk Assessment.
- The probabilistic Tactical Risk profile can be used to quantify the appropriate level of contingency for a P50 estimate. Ideally this is the appropriate estimate value for Project Team accountability, with equal likelihood for under-run or over-run.
- The analysis shows that in this context the Base Cost estimate is a P17 and an appropriate level of contingency would be $103 million (7%) to cover the Tactical Risks.

# Tactical-Risk Assessment Results

***The Predictive Range (P25 – P75) of the Tactical Risk Assessment for the Maritime Link Project is $1,433 MM - $1,590 MM. At a P50 value, the project's Tactical Contingency would be $103 million ($1,506 million minus $1,403 million), which equates to 7% of the estimate.***



# Tactical-Risk Ranging Sheet

| Emera Maritime Link Project (2013 Cdn$)<br>Tactical Cost Ranging Sheet | | Risk Range | | | |
|---|---|---|---|---|---|
| Cost Category | Cost to be Risked (C$ M) | Best - What % Less Could It Cost? (enter as negative) | Worst - What % More Could It Cost? | Best Cost (C$ M) | Worst Cost (C$ M) |
| **Transmission Lines** | | | | | |
| 230 kV AC TL - Granite Canal to Bottom Brook | [redacted] | | | | |
| 200 kV HVDC OH TL - Bottom Brook to Cape Ray | | | | | |
| 200 kV HVDC OH TL - Pt. Aconi to Woodbine CS | | | | | |
| Grounding Line from Bottom Brook to NL ES #2A | | | | | |
| Grounding Line from Woodbine CS to NS GS #11 | | | | | |
| **Transmission Lines Total, C$ M** | | | | | |

# Tactical-Risk Ranging Sheet

| Emera Maritime Link Project (2013 Cdn$)<br>Tactical Cost Ranging Sheet | | Risk Range | | | |
|---|---|---|---|---|---|
| **Cost Category** | **Cost to be Risked (C$ M)** | **Best - What % Less Could It Cost? (enter as negative)** | **Worst - What % More Could It Cost?** | **Best Cost (C$ M)** | **Worst Cost (C$ M)** |
| **Facilities** | | | | | |
| 230 kV New Switchyard at Granite Canal, NL | [redacted] | | | | |
| Mod. for P&C, Comm. & Duct Banks - Gran. Canal | | | | | |
| 230 kV Switchyard at Bottom Brook, NL | | | | | |
| Power Supply to Customers during Outages, NL | | | | | |
| Connect Woodbine 345 kV Sub. to Conv. Stat., NS | | | | | |
| Extension of 345 kV Substation at Woodbine, NS | | | | | |
| NSPI Control Centre Modifications, NS | | | | | |
| NLH Control Centre Modifications, NL | | | | | |
| Grounding Site Newfoundland and Labrador | | | | | |
| Grounding Site Nova Scotia | | | | | |
| 200 kV HVDC Bottom Brook Converter Station, NL | | | | | |
| 200 kV HVDC Woodbine Converter Station, NS | | | | | |
| Overhead-Underground Transition at Cape Ray, NL | | | | | |
| Overhead-Underground Transition at Pt. Aconi, NS | | | | | |
| Overhead-Underground Transition at Woodbine, NS | | | | | |
| Telecommunication Links | | | | | |
| Control Centre Data Link | | | | | |
| Improvement of Road Infrastructure (e.g., bridges) | | | | | |
| **Facilities, C$ M** | | | | | |

# Tactical-Risk Ranging Sheet

| Emera Maritime Link Project (2013 Cdn$)<br>Tactical Cost Ranging Sheet | | Risk Range | | | |
|---|---|---|---|---|---|
| **Cost Category** | **Cost to be Risked (C$ M)** | **Best - What % Less Could It Cost? (enter as negative)** | **Worst - What % More Could It Cost?** | **Best Cost (C$ M)** | **Worst Cost (C$ M)** |
| **Marine** | | | | | |
| Submarine Cable and Terminations | [redacted] | | | | |
| Landfall HDD Point Aconi, NS | | | | | |
| Landfall HDD Cape Ray, NL | | | | | |
| Marine Engineering Services | | | | | |
| **Marine Total, C$ M** | | | | | |
| **Project Management Team** | | | | | |
| Project Management Team Costs | [redacted] | | | | |
| **Project Management Team Total, C$ M** | | | | | |
| **Other** | | | | | |
| External Project Costs | [redacted] | | | | |
| Other NLH System Upgrades | | | | | |
| Insurance | | | | | |
| Environmental | | | | | |
| Land Acquisition | | | | | |
| **Other Total, C$ M** | | | | | |
| **Project Total Cost** | | | | | |
| **Project Total Cost, C$ M** | [redacted] | | | | |

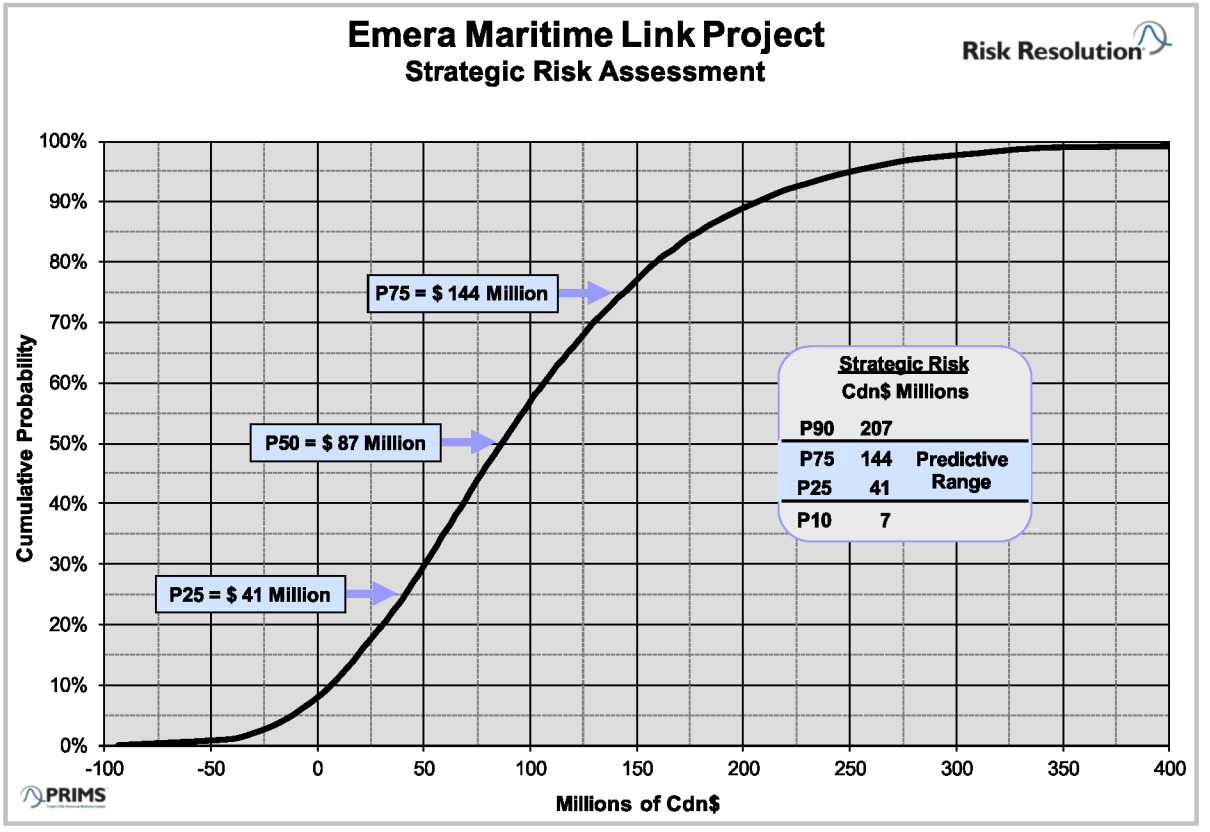
# Strategic Risk and Total Cost Risk

- During the Risk Discovery Process, risks that might affect the project but were not identified or were undervalued in the Base Cost estimate were identified by Westney. (i.e. delay mitigation, project delays, etc.)
- In a session with key members of the Project Team, the Strategic Risks identified by Westney were validated, additional risks were identified, and the Best / Worst values were discussed and set by the key Team members with facilitation by Westney. The agreed upon values were input to the PRIMS™ model and simulated. The result is the Strategic Risk exposure.
- The Strategic Risks identified and shown in this report are in excess of the considerations in the Base Cost estimate and Tactical Risk assessment. The predictive range of the strategic risk exposure is P25 $41 MM to P75 $144 MM.
- The Total Cost-Risk assessment evaluates all risks (Tactical and Strategic Risk together). It indicates that the Project Base estimate of $1,403 MM is a P6 while the Tactical P50 is a P24. Typically, the Total Cost Curve can be used to establish a Management Reserve above the Tactical P50 amount to cover project risks not addressed in the contingency. The specific amount used will depend upon the organization's tolerance for risk.

# Strategic Cost Risk Exposure

***The Predictive Range (P25 – P75) of the Strategic Risk for the Maritime Link Project is $41 MM - $144 MM.***

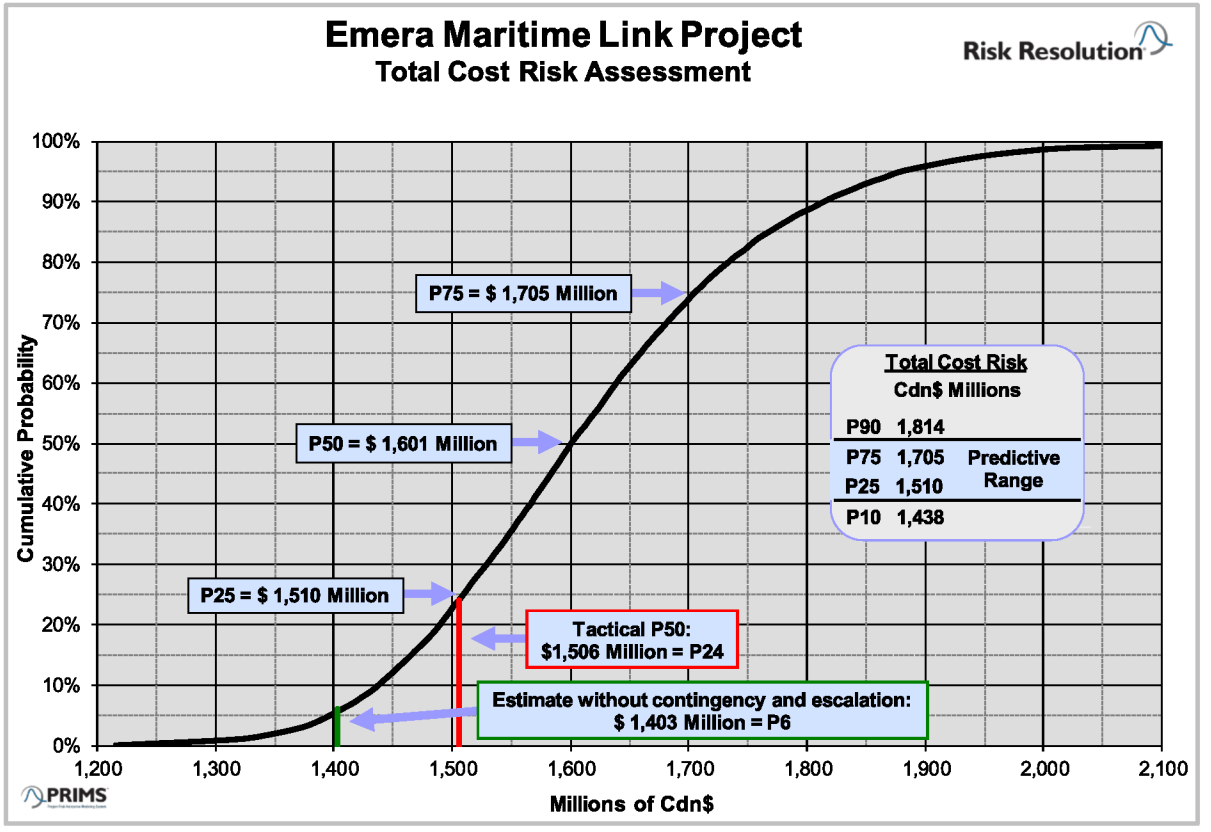
***This result is driven by potential costs associated with actions to minimize project delays.***



# Total Cost Risk Exposure

***The Predictive Range (P25 – P75) of the Total Cost Risk for the Maritime Link Project is $1,510 MM - $1,705 MM. These results reflect the full impact of both the Tactical Risk Assessment and the Strategic Risk Exposure.***

***Please note that, due to the nature of probabilistic analyses, the Tactical Risk Assessment results and the potential Strategic Risk Exposure are not directly additive to the Total Cost Risk Exposure.***



# Strategic Risk Exposure

| Description | Likelihood | Impact (millions) |
|---|---|---|
| ***Delay Mitigation/Management*** Significant effort could be expended to minimize delays that arise during project execution. | High | $0 - $120 |
| ***Project Delays*** Potential project delays due to many scenarios. | High | $0 - $24 |
| ***Engineering*** Extend the schedule and scope of the Detail Design Contract with Hatch due to delays in geotechnical reports, surveys and input from other contracts. | High | $0 - $3 |

# Strategic Risk Exposure

| Description | Likelihood | Impact (millions) |
|---|---|---|
| ***Regulatory***<br>Re-filing of a new UARB case where plan extends significantly beyond current conditions. | Very Low | $3 |
| ***Legal***<br>Court challenge from stakeholders and / or private landowners which changes the view of rights and / or title in NS or NL. | Low | $5 |
| ***Environmental***<br>A new EA Process could be triggered for various conditions associated with certain permitting activities resulting in a need for remedial actions. | Medium | $0 - $2.5 |

# Strategic Risk Exposure

| Description | Likelihood | Impact (millions) |
|---|---|---|
| ***Marine***<br>Additional cable protection (rock dumping) due to insufficient trenching depth may be required. Estimated additional 20 km beyond the current 26 km. | High | $0 - $7.8 |
| ***Marine***<br>Equitable relief due to weather, installation after Sept 1; additional 2 weeks of vessel time at $250K per day for 14 days. | High | $0 - $3.5 |
| ***Marine***<br>Unplanned cable joint due to severe weather for second cable. 7 days of vessel work. | Low | $2 |

# Strategic Risk Exposure

| Description | Likelihood | Impact (millions) |
|---|---|---|
| ***Marine***<br>Cable protection remobilization including fisheries impact and compensation. | High | $0 - $10 |
| ***Marine***<br>Excessive problems during drilling causing extended period beyond the assumptions; cost of drilling a full bore hole. | High | $0 - $5 |
| ***Contractor***<br>Major Contractor Default (recoup 50% performance bond + 15% letter of credit). | Low | $30 - $60 |

# Time Risk

- A Time Risk Model was developed by Westney that represents the critical dates, durations, and the key dependencies in the current schedule.
- The key activities in the Time Risk Model were each ranged by the project team as Best and Worst durations.
- The input values were modeled using a Monte Carlo simulation with 10,000 iterations.
- The analysis modeled likely completion outcomes for Ready for Full Power (Full system continuity from the Granite Canal site to the Woodbine site).
- It is assumed that construction of the AC Lines NL (Bottom Brook to Granite Canal) are not required for the project to be ready for commissioning.

# Risk Adjusted Schedule Suggests Low Likelihood of 4 – 12 Month Delay

***The probabilistic critical path travels through the EPC1 (subsea cables) tasks over 85% of the time.***

***Key activities on probabilistic critical path:***

- ***Cable Manufacturing / Load Out***
- ***Cable Transportation and Mobilization***
- ***Cable Lay (seasonal)***
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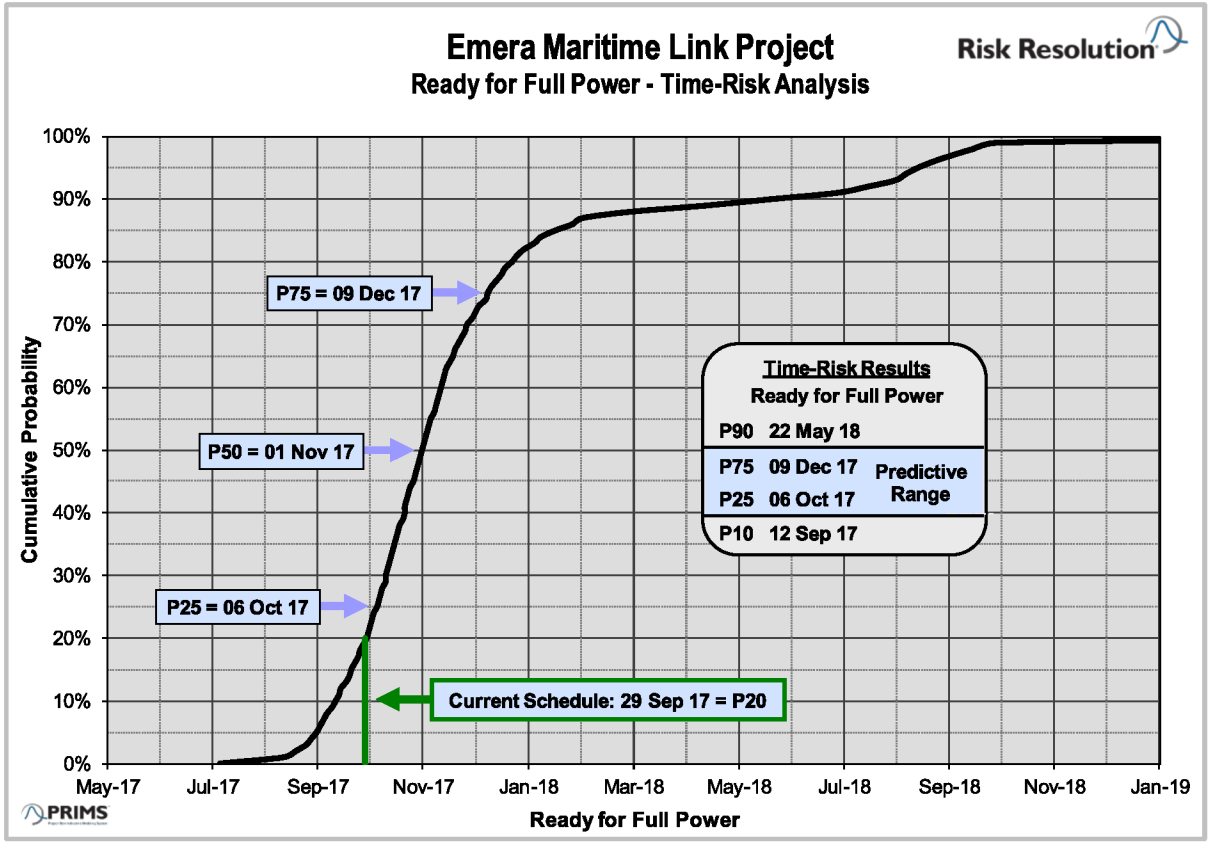
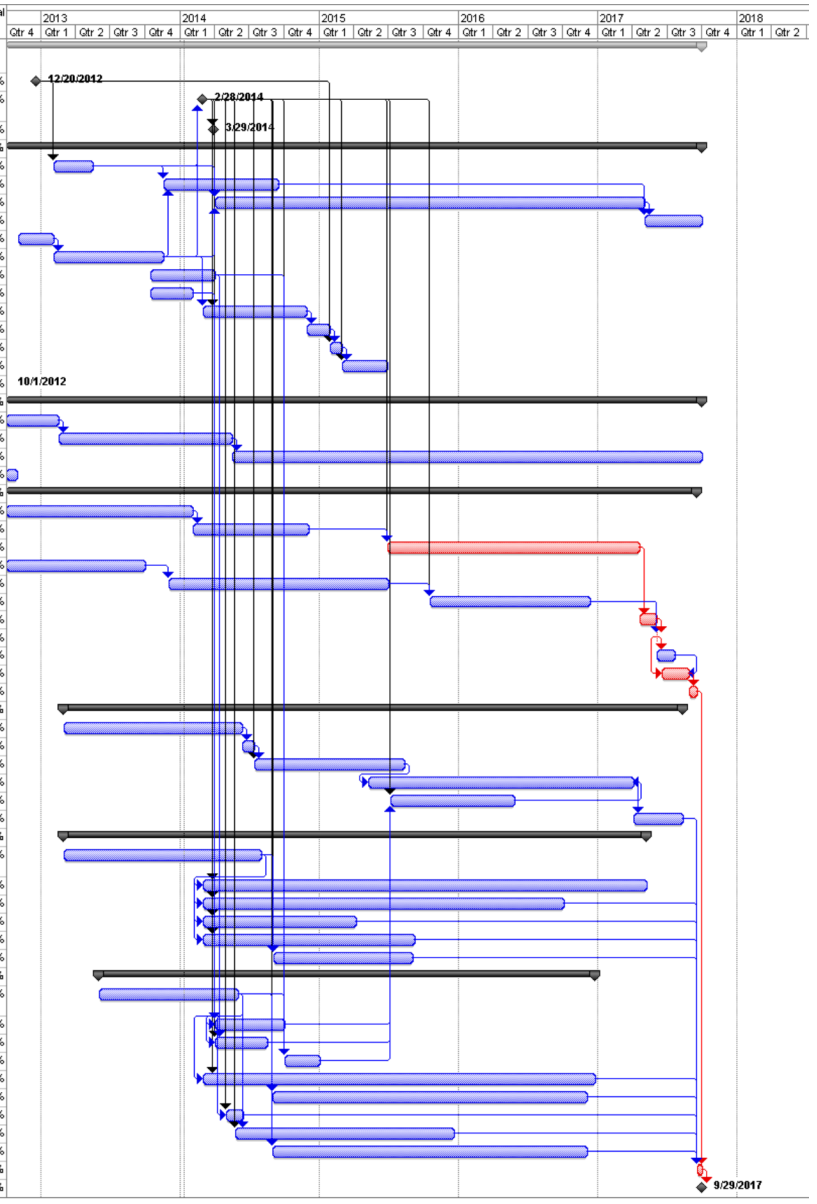


# Time-Risk Model

| ID | Name | Duration | Start | Finish | @RISK: Critical Index |
|---|---|---|---|---|---|
| 0 | **Emera Maritime Link Project** | **1825 d** | **10/1/12** | **9/29/17** | |
| 1 | DG 2 | 0 d | 12/20/12 | 12/20/12 | 0.00% |
| 2 | DG 3 | 0 d | 2/28/14 | 2/28/14 | 0.75% |
| 3 | Full Funding | 0 d | 3/29/14 | 3/29/14 | 0.00% |
| 4 | **Emera Commercial Activities** | **1824 d** | **10/1/12** | **9/28/17** | **0.00%** |
| 5 | Screening - EA Rel. | 104 d | 2/1/13 | 5/15/13 | 0.00% |
| 6 | Permits - Land | 303 d | 11/16/13 | 9/14/14 | 0.00% |
| 7 | Permits - Marine | 1127 d | 4/1/14 | 5/1/17 | 0.00% |
| 8 | EA Monitoring Program | 150 d | 5/2/17 | 9/28/17 | 0.00% |
| 9 | NS Regulatory Application - Prep File | 92 d | 11/1/12 | 1/31/13 | 0.00% |
| 10 | UARB Review and Approval | 288 d | 2/1/13 | 11/15/13 | 0.00% |
| 11 | Land Access Agreements - Tree Clearing in NL | 169 d | 10/15/13 | 4/1/14 | 0.00% |
| 12 | Land Access Agreements - Tree Clearing in NS | 110 d | 10/15/13 | 2/1/14 | 0.00% |
| 13 | Ability to Secure Land Title | 274 d | 2/28/14 | 11/28/14 | 0.00% |
| 14 | Federal Loan Guarantee | 61 d | 11/29/14 | 1/28/15 | 0.00% |
| 15 | Funding Strategy | 30 d | 1/29/15 | 2/27/15 | 0.00% |
| 16 | Funding Execution | 120 d | 2/28/15 | 6/27/15 | 0.00% |
| 17 | Joint Development Agreements | 0 d | 10/1/12 | 10/1/12 | 0.00% |
| 18 | **Emera Engineering Activities** | **1824 d** | **10/1/12** | **9/28/17** | **0.00%** |
| 19 | Eng. Services - CBOD/ FBOD | 137 d | 10/1/12 | 2/14/13 | 0.00% |
| 20 | Eng. Services - Detail Design/ Procure L.L. Equip. | 455 d | 2/15/13 | 5/15/14 | 0.00% |
| 21 | Eng. Services - Construction Support | 1232 d | 5/16/14 | 9/28/17 | 0.00% |
| 22 | Prepare EPC and other Contracts Strategy/Imp. Plan | 30 d | 10/1/12 | 10/30/12 | 0.00% |
| 23 | **EPC1 - Subsea Cables (Marine)** | **1811 d** | **10/1/12** | **9/15/17** | **85.20%** |
| 24 | Cable RFP/Eval/Select/Negotiate | 488 d | 10/1/12 | 1/31/14 | 0.00% |
| 25 | Engineering to Approval for Cable Manufacture | 304 d | 2/1/14 | 12/1/14 | 0.00% |
| 26 | Cable Manufacturing/Load Out | 663 d | 6/27/15 | 4/19/17 | 74.30% |
| 27 | HDD Procurement (Geotech) | 365 d | 10/1/12 | 9/30/13 | 0.00% |
| 28 | HDD Geotech/Final Eng./Proc't. | 577 d | 12/1/13 | 6/30/15 | 1.45% |
| 29 | NS and NL HDD Construction | 420 d | 10/16/15 | 12/8/16 | 1.95% |
| 30 | Cable Transportation and Mobilization | 43 d | 4/20/17 | 6/1/17 | 74.30% |
| 31 | Start of Cable Lay | 1 d | 6/2/17 | 6/2/17 | 85.20% |
| 32 | Cable Lay (seasonal) | 46 d | 6/3/17 | 7/18/17 | 56.75% |
| 33 | Trenching/ Rock Dumping | 70 d | 6/17/17 | 8/25/17 | 85.20% |
| 34 | Subsea Cable Testing | 21 d | 8/26/17 | 9/15/17 | 85.20% |
| 35 | **EPC2 - DC Converter Stations** | **1623 d** | **3/1/13** | **8/9/17** | **13.55%** |
| 36 | Negotiate Contract/LNTP to Start Eng. Studies/Design | 468 d | 3/1/13 | 6/11/14 | 13.05% |
| 37 | Mobilization | 31 d | 6/12/14 | 7/12/14 | 13.05% |
| 38 | Converter Detail Design | 394 d | 7/13/14 | 8/10/15 | 13.05% |
| 39 | Converter / SY Manufacturing Delivery and Install | 698 d | 5/7/15 | 4/3/17 | 13.55% |
| 40 | NS and NL Conv. St. Site Prep/Constr. (Bldg & Svcs) | 324 d | 7/6/15 | 5/24/16 | 0.50% |
| 41 | Converter / Switchyard Testing | 128 d | 4/4/17 | 8/9/17 | 13.55% |
| 42 | **Construction Contractor - Transmission Lines** | **1529 d** | **3/1/13** | **5/7/17** | **1.15%** |
| 43 | Procurement/Contract Award/BoM Procurement | 518 d | 3/1/13 | 7/31/14 | 0.45% |
| 44 | Construction AC Lines NL (BB to GC) | 1165 d | 2/28/14 | 5/7/17 | 0.00% |
| 45 | Construction DC Lines NL (BB to CR) | 947 d | 2/28/14 | 10/1/16 | 1.15% |
| 46 | Construction G - Line NL (BB to S'ville) | 402 d | 2/28/14 | 4/5/15 | 0.00% |
| 47 | Construction DC Lines NS (PA to WB) | 556 d | 2/28/14 | 9/6/15 | 0.00% |
| 48 | Construction G - Line NS | 365 d | 9/1/14 | 8/31/15 | 0.00% |
| 49 | **Construction Contractor - Compounds / Other** | **1301 d** | **6/1/13** | **12/22/16** | **0.10%** |
| 50 | Procurement/Contract Award | 365 d | 6/1/13 | 5/31/14 | 0.00% |
| 51 | Switch Yard - Woodbine Site Prep | 183 d | 4/1/14 | 9/30/14 | 0.00% |
| 52 | Switch Yard - Bottom Brook Site Prep | 138 d | 4/2/14 | 8/17/14 | 0.00% |
| 53 | Switch Yard - Granite Canal Site Prep | 92 d | 10/1/14 | 12/31/14 | 0.00% |
| 54 | Transition Compound - Point Aconi | 1029 d | 2/28/14 | 12/22/16 | 0.05% |
| 55 | Transition Compound - Cape Ray | 826 d | 8/30/14 | 12/2/16 | 0.05% |
| 56 | Transition Compound - Woodbine Site Prep | 43 d | 5/1/14 | 6/12/14 | 0.00% |
| 57 | Grounding Site NL (Indian Head) | 575 d | 5/23/14 | 12/18/15 | 0.00% |
| 58 | Grounding Site NS (Big Lorainne) | 826 d | 8/30/14 | 12/2/16 | 0.00% |
| 59 | **Dynamic Commissioning** | **14 d** | **9/16/17** | **9/29/17** | **100.00%** |
| 60 | **Ready for Full Power** | **0 d** | **9/29/17** | **9/29/17** | **100.00%** |



# Time-Risk Ranging Sheet

## Emera Maritime Link Project Time-Risk Assessment
## Ranging Sheet

| | | Time-Risk Model | | | Duration Change (months) | |
|---|---|---|---|---|---|---|
| ID | Task Description | Duration | Start | Finish | Best | Worst |
| 01 | **DG 2** | **0 d** | **20-Dec-12** | **20-Dec-12** | | |
| 02 | **DG 3** | **0 d** | **28-Feb-14** | **28-Feb-14** | | |
| 03 | **Full Funding** | **0 d** | **29-Mar-14** | **29-Mar-14** | | |
| 04 | **Emera Commercial Activities** | **1824 d** | **1-Oct-12** | **28-Sep-17** | | |
| 05 | Screening - EA Rel. | 104 d | 1-Feb-13 | 15-May-13 | | |
| 06 | Permits - Land | 303 d | 16-Nov-13 | 14-Sep-14 | 0 | 6 |
| 07 | Permits - Marine | 1127 d | 1-Apr-14 | 1-May-17 | -2 | 1 |
| 08 | EA Monitoring Program | 150 d | 2-May-17 | 28-Sep-17 | | |
| 09 | NS Regulatory Application - Prep File | 92 d | 1-Nov-12 | 31-Jan-13 | | |
| 10 | UARB Review and Approval | 288 d | 1-Feb-13 | 15-Nov-13 | | |
| 11 | Land Access Agreements - Tree Clearing in NL | 169 d | 15-Oct-13 | 1-Apr-14 | 0 | 3 |
| 12 | Land Access Agreements - Tree Clearing in NS | 110 d | 15-Oct-13 | 1-Feb-14 | 1 | 3 |
| 13 | Ability to Secure Land Title | 274 d | 28-Feb-14 | 28-Nov-14 | | |
| 14 | Federal Loan Guarantee | 61 d | 29-Nov-14 | 28-Jan-15 | | |
| 15 | Funding Strategy | 30 d | 29-Jan-15 | 27-Feb-15 | | |
| 16 | Funding Execution | 120 d | 28-Feb-15 | 27-Jun-15 | | |
| 17 | Joint Development Agreements | 0 d | 1-Oct-12 | 1-Oct-12 | | |
| 18 | **Emera Engineering Activities** | **1824 d** | **1-Oct-12** | **28-Sep-17** | | |
| 19 | Eng. Services - CBOD/ FBOD | 137 d | 1-Oct-12 | 14-Feb-13 | | |
| 20 | Eng. Services - Detail Design/ Procure L.L. Equip. | 455 d | 15-Feb-13 | 15-May-14 | 0 | 2 |
| 21 | Eng. Services - Construction Support | 1232 d | 16-May-14 | 28-Sep-17 | | |
| 22 | Prepare EPC and other Contracts Strategy/Imp. Plan | 30 d | 1-Oct-12 | 30-Oct-12 | | |

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| 23 | **EPC1 - Subsea Cables (Marine)** | **1811 d** | **1-Oct-12** | **15-Sep-17** | | |
| 24 | Cable RFP/Eval/Select/Negotiate | 488 d | 1-Oct-12 | 31-Jan-14 | | |
| 25 | Engineering to Approval for Cable Manufacture | 304 d | 1-Feb-14 | 1-Dec-14 | -2 | 2 |
| 26 | Cable Manufacturing/Load Out | 663 d | 27-Jun-15 | 19-Apr-17 | -1 | 1 |
| 27 | HDD Procurement (Geotech) | 365 d | 1-Oct-12 | 30-Sep-13 | | |
| 28 | HDD Geotech/Final Eng./Proc't. | 577 d | 1-Dec-13 | 30-Jun-15 | -3 | 8 |
| 29 | NS and NL HDD Construction | 420 d | 16-Oct-15 | 8-Dec-16 | -6 | 3 |
| 30 | Cable Transportation and Mobilization | 43 d | 20-Apr-17 | 1-Jun-17 | -0.5 | 1 |
| 31 | Start of Cable Lay | 1 d | 2-Jun-17 | 2-Jun-17 | | |
| 32 | Cable Lay (seasonal) | 46 d | 3-Jun-17 | 18-Jul-17 | -0.5 | 2 |
| 33 | Trenching/ Rock Dumping | 70 d | 17-Jun-17 | 25-Aug-17 | -1 | 1 |
| 34 | Subsea Cable Testing | 21 d | 26-Aug-17 | 15-Sep-17 | -0.5 | 0.5 |
| 35 | **EPC2 - DC Converter Stations** | **1623 d** | **1-Mar-13** | **9-Aug-17** | | |
| 36 | Negotiate Contract/LNTP to Start Eng. Studies/Design | 468 d | 1-Mar-13 | 11-Jun-14 | -1 | 1 |
| 37 | Mobilization | 31 d | 12-Jun-14 | 12-Jul-14 | | |
| 38 | Converter Detail Design | 394 d | 13-Jul-14 | 10-Aug-15 | -3 | 2 |
| 39 | Converter / SY Manufacturing Delivery and Install | 698 d | 7-May-15 | 3-Apr-17 | -2 | 2 |
| 40 | NS and NL Conv. St. Site Prep/Constr. (Bldg & Svcs) | 324 d | 6-Jul-15 | 24-May-16 | -1 | 4 |
| 41 | Converter / Switchyard Testing | 128 d | 4-Apr-17 | 9-Aug-17 | -1 | 1 |

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| 42 | **Construction Contractor - Transmission Lines** | **1529 d** | **1-Mar-13** | **7-May-17** | | |
| 43 | Procurement/Contract Award/BoM Procurement | 518 d | 1-Mar-13 | 31-Jul-14 | -1 | 2 |
| 44 | Construction AC Lines NL (BB to GC) | 1165 d | 28-Feb-14 | 7-May-17 | | |
| 45 | Construction DC Lines NL (BB to CR) | 947 d | 28-Feb-14 | 1-Oct-16 | -4 | 6 |
| 46 | Construction G - Line NL (BB to S'ville) | 402 d | 28-Feb-14 | 5-Apr-15 | -1 | 2 |
| 47 | Construction DC Lines NS (PA to WB) | 556 d | 28-Feb-14 | 6-Sep-15 | -1 | 5 |
| 48 | Construction G - Line NS | 365 d | 1-Sep-14 | 31-Aug-15 | -1 | 4 |
| 49 | **Construction Contractor - Compounds / Other** | **1301 d** | **1-Jun-13** | **22-Dec-16** | | |
| 50 | Procurement/Contract Award | 365 d | 1-Jun-13 | 31-May-14 | -2 | 2 |
| 51 | Switch Yard - Woodbine Site Prep | 183 d | 1-Apr-14 | 30-Sep-14 | 0 | 4 |
| 52 | Switch Yard - Bottom Brook Site Prep | 138 d | 2-Apr-14 | 17-Aug-14 | 0 | 3 |
| 53 | Switch Yard - Granite Canal Site Prep | 92 d | 1-Oct-14 | 31-Dec-14 | 0 | 1 |
| 54 | Transition Compound - Point Aconi | 1029 d | 28-Feb-14 | 22-Dec-16 | -2 | 3 |
| 55 | Transition Compound - Cape Ray | 826 d | 30-Aug-14 | 2-Dec-16 | -2 | 3 |
| 56 | Transition Compound - Woodbine Site Prep | 43 d | 1-May-14 | 12-Jun-14 | 0 | 1 |
| 57 | Grounding Site NL (Indian Head) | 575 d | 23-May-14 | 18-Dec-15 | -3 | 1 |
| 58 | Grounding Site NS (Big Lorainne) | 826 d | 30-Aug-14 | 2-Dec-16 | -4 | 0 |
| 59 | Dynamic Commissioning | 14 d | 16-Sep-17 | 29-Sep-17 | 0.0 | 0.5 |
| 60 | **Ready for Full Power** | **0 d** | **29-Sep-17** | **29-Sep-17** | | |
| | Last Line | | | | | |

# Conditions



It is important to note that the scope of work for Westney Consulting Group was for Westney to guide and facilitate the Risk Resolution® Process, using the consultants' experience to ask the right questions and, where appropriate, challenge the Emera participant's thinking. This resulted in an outcome of the analysis that represented the best thinking and efforts of both the Emera participants and the consultants from Westney.