Westney Consulting Group

Emera

Final Report

Cost and Schedule Risk Assessment for the Maritime Link Project

October 15 to October 19, 2012

Updated 21st December 2012

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Report Summary

Supporting Materials

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 organisation 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.

Terminology

Risk Resolution® – Westney's Risk Resolution® process is comprised of three main steps:

1) Discovery which focuses on identifying and characterizing all tactical and strategic risks that could have a material impact on the project;
2) Assessment which focuses on probabilistically modeling the full range of possible impacts of risks and risk mitigations using Monte Carlo simulations; and
3) Analysis and Reporting which focuses on key issues and findings.

Further descriptions are found on the first page of each section in the Supporting Materials for this report.

Consultant's Comments

The Maritime Link Project, if sanctioned Q3 2013, will be executed in a period of high volume construction activity planned in Canada / North America. The project involves multiple construction projects at seven sites linked by three High Voltage AC & DC Transmission Lines, Grounding Lines, and subsea cables with limited inter-project dependencies. Although the project is in the early stages, the project scope definition and planning is very advanced.

The current estimate was developed using conservative factors appropriate for this stage of definition. The process followed good estimating practice and produced a reasonable indication of the project's tactical costs.

The current schedule is optimistic, given the market unknowns around cable and equipment manufacturing, labour (skilled trades and supervision) availability, and marine equipment availability. The project team has planned activities to develop further clarity in the definition and mitigation of the risks prior to DG3.

Construction productivity has been on a steady decline for twenty-five years. A key element of this is the availability of front-line supervision. This project likely has significant performance risk exposure which may be compounded by global competition for equipment and material. On the positive side, there has been significant effort to secure a Project Labor Agreement (PLA) covering both the Maritime Link and Nalcor's Muskrat Falls project that could lessen exposure to labor excesses. Negotiations are positive but not complete. Additionally, joint planning sessions are planned with Nalcor to improve coordination and communication between the teams that should further reduce project risks and improve potential benefits for both organisations.

Summary Findings

Tactical

The tactical risk assessment indicates a P25 value of $1,153 MM and a P75 value of $1,423 MM.

The scope of the project used for estimating represents design development and information availability better than the requirements for an early project stage estimate. The estimating process, quantification, productivity and price development are also reasonably advanced. The contingency required to reach a P50 value (Tactical Contingency) equates to 9% of the estimate, which seems reasonable for the level of estimating information.

Strategic

The strategic risk assessment indicates an unmitigated strategic risk exposure of between P25 $114 MM and P75 $250 MM; this exposure can be reduced through mitigations.

The level of unmitigated strategic risk is reasonable for this type and size of project at this stage of development. Planned mitigations by the project team will significantly reduce the levels of strategic risk before DG3. An informal assessment by Westney in consultation with Emera project management indicates a Mitigated Strategic Risk Range of P25 $76 MM and P75 $183 MM.

Total Cost

The total cost risk assessment indicates the expected total cost to be between P25 $1,272 MM and P75 $1,567 MM.

Total cost risk exposure is determined by modeling the Mitigated Strategic Risk exposure with the Tactical Risk assessment. The P50 total cost of $1,411 MM is 20% above the estimate (without contingency & escalation) while the P75 total cost is 34% above the estimate. Total cost risk exposure may be further reduced through mitigations currently planned before DG-3.

Summary Findings

Time Risk

The time risk assessment indicates potential for a 6 to 15 month delay in Ready for Full Power.

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 and the cable lay vessel. The current schedule assumes reasonable performance and only a small section of the transmission line is challenging.

An intermediate milestone, Ready for Available Power, was inserted in the model. Defined as "System continuity for bi-directional HVDC power between the Bottom Brook and Woodbine sites", simulation indicates a predictive range of completion dates between P25-14 April 2017 and P75-22 December 2017.

Risk Adjusted Capital Costs with Impacts of Mitigations (2012 Cdn$)

Tactical Cost (P50 Value): $1,277 MM

Estimate	$1,172 MM
Tactical Contingency	$105 MM
Tactical Cost (P50 value)	$1,277 MM

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

Risk	Unmitigated Impact	Mitigated Impact (including cost)
≈ Global Competition for Resources	53	53
≈ Other NLH System Upgrades	31	27
≈ Bundle/Unbundle Subsea Cable	28	0
≈ Skilled Labour Shortage	27	27
≈ Excessive Change Orders	21	21
≈ Metallic Return Requirements	11	0
≈ VAR Stability Compensation	10	0
≈ Other	5	5
Total of Mean Values:	**186**	**133**

Total Risk Adjusted Capital Cost From Monte Carlo Simulation

P25 to P75 ($ Millions)	Unmitigated	Mitigated
	1,321 - 1,629	1,272 - 1,567

Risk Adjusted Schedule Suggests a 6 to 15 Month Delay for Full Power

Maritime Link Project Base Schedule – Ready for Full Power:
29 Dec 2016

Approximate Impact of Key Activities
(Estimated Mean Values - Months)

Risk	Impact
≈ Construction AC Lines NL (BB to GC)	3.5 mo.
≈ Converter Detail Design & Manufacturing	3.0 mo.
≈ Converter Tech. Constr. – Del. & Inst.	0.5 mo.
≈ Construction DC Lines NL (BB to CR)	0.5 mo.
≈ Cable Installation	0.5 mo.
≈ Converter Strategy/RFP	0.5 mo.
≈ Other Activities*	3.0 mo.
Total of Mean Values:	**11.5 mo.**

*Includes 1.0-month impact from weather window.

Risk Adjusted Schedule
From Monte Carlo Simulation

→ 12 Jul 17 to 09 Apr 18 (P25 to P75)
equates to a 6 to 15 month delay

Supporting Materials

Risk Resolution® Process

Discovery

- Review project documents
- Interview key knowledge holders
- Analyze current cost forecast
- Analyze current schedule
- Analyze current progress system
- Use heuristic metrics to identify gaps in current measures
- Analyze gaps and confirm
- Determine key dependencies in
- schedule
- Develop Time Risk Model
- 
- Determine and quantify work remaining
- Sarbanes-Oxley Compliant

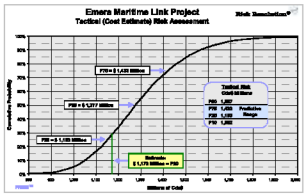
Assessment

Assess tactical risks around current cost estimate

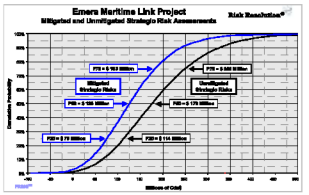
Assess strategic risks, including risks not currently identified

Assess risks around current schedule

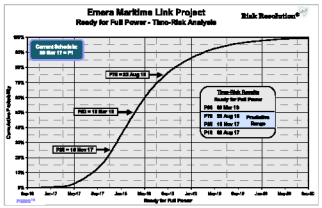
Tactical Risk Assessment



Strategic Risk Assessment



Time Risk Assessment



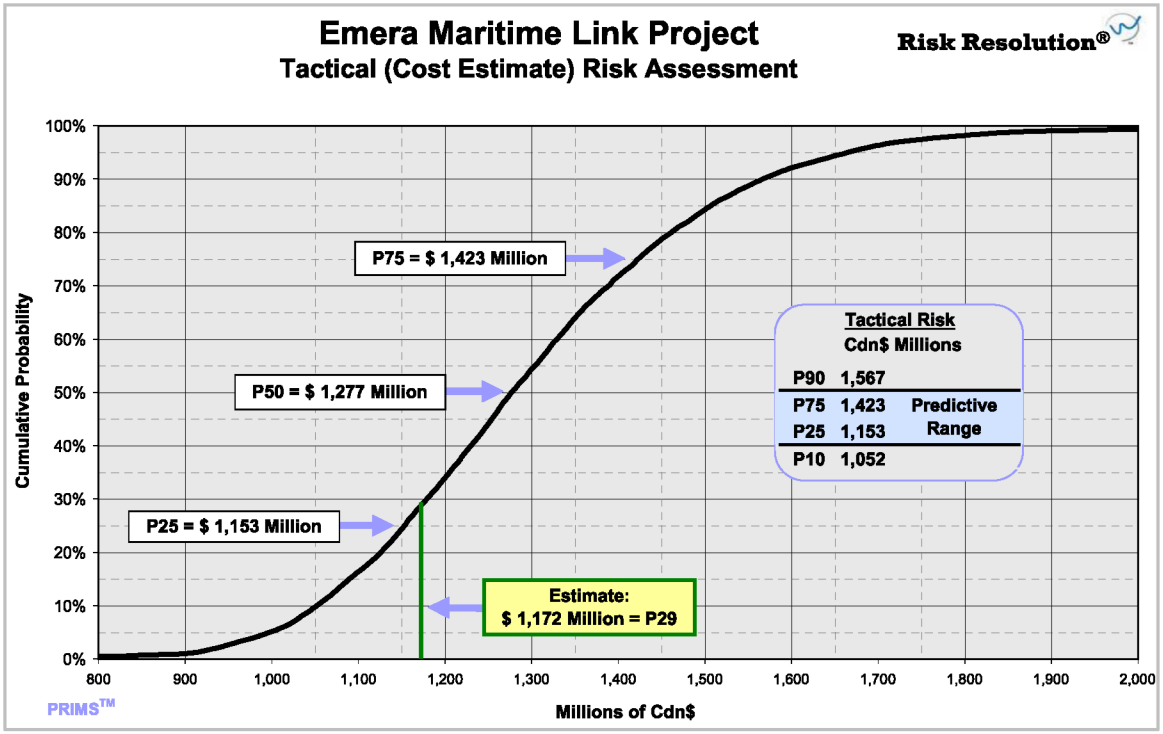
Report and Analysis

Tactical Risk Assessment

- The Tactical Risk evaluation was based on Emera's estimate of $ 1,388 million. Estimate items for contingency ($147million) and escalation ($69 million) were deducted and ranging was applied, at the WBS level, to the Base Cost estimate of $1,172 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 PRIMS™ 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 P29 and an appropriate level of contingency would be $105 million (9%) 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 $1,153 MM - $1,423 MM. At a P50 value, the project 'sTactical Contingency would be $105 million ($1,277 million minus $1,172 million), which equates to 9% of the estimate.



Tactical-risk ranging sheet

Emera Maritime Link Project 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					
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					
Facilities					
230 kV New Switchyard to Granite Canal, NL					
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					

Tactical-risk ranging sheet

Emera Maritime Link Project 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)**
Grounding Site Newfoundland and Labrador	[redacted]				
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					
Telecommunication Links					
Control Centre Data Link					
Improvement of Road Infrastructure (e.g., bridges)					
Facilities, C$ M					
Marine					
Submarine Cable and Terminations	[redacted]				
Landfall HDD Cape Ray, NL					
Landfall HDD Point Aconi, NS					
Marine Total, C$ M					
Project Management Team					
Project Management Team	[redacted]				
Project Management Team Total, C$ M					

Tactical-risk ranging sheet

Emera Maritime Link Project 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)**
Other					
External Project Costs					
Other NLH System Upgrades					
Insurance					
Environmental					
Land Acquisition					
Other Total, C$ M					
Project Total Cost					
Project Total Cost, C$ M					

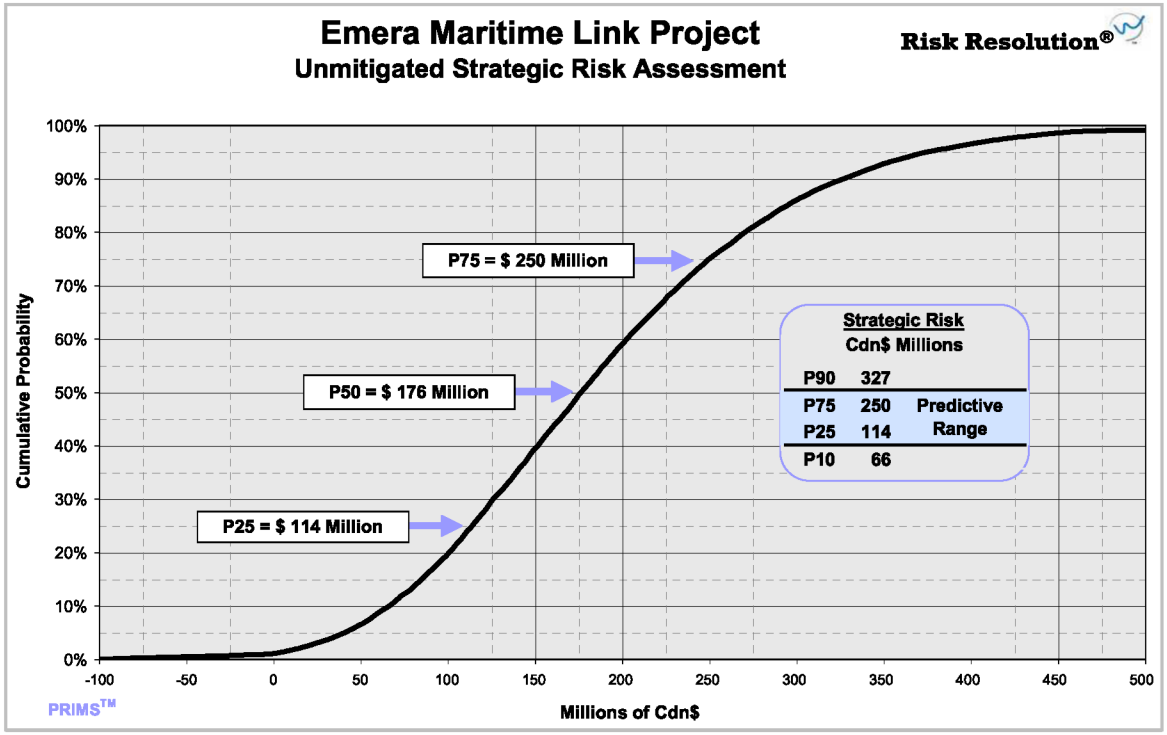
Strategic Risk and Total Cost Risk

- 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.
- 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 shown as the Unmitigated Strategic Risks.
- The Strategic Risks identified and shown in this report are in excess of the considerations in the Base Cost estimate and the P50 Tactical Risk contingency. They represent a risk exposure for the project which is unlikely to be fully mitigated. The predictive range of the Unmitigated risk exposure is P25 $114 MM to P75 $250 MM.
- All Strategic Risks are actively being addressed by the project team and many will be mitigated to reduced risk levels or eliminated as risks before DG3. These Mitigated Risks were modeled accordingly to provide a view of a potential reduced risk exposure. The predictive range of this risk exposure is P25 $76 MM to P75 $183 MM.
- The Total Cost-Risk assessment evaluates all (Tactical and Mitigated Strategic) Risks. It indicates that the Project Base estimate of $1,172 MM is a P11. while the Tactical P50 is a P26. 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 estimate. The specific amount used will depend upon the organisation's tolerance for risk.

Unmitigated Strategic Risk Exposure

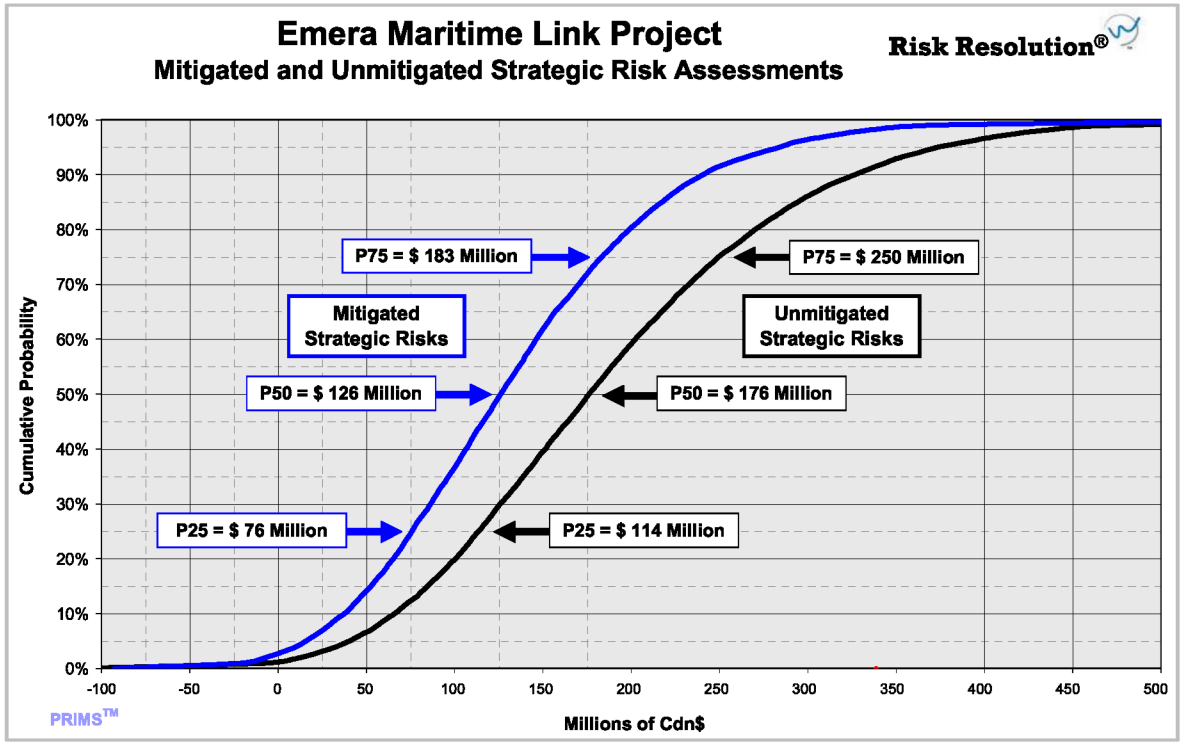
The Predictive Range (P25 – P75) for the Unmitigated Strategic Risk Exposure beyond the Estimate Contingency is $114 MM - $250 MM. These results are mostly influenced by the following risks:

- *Completeness – Metallic Return*
- *Completeness – Subsea Cable Bundling and Protection*
- *Completeness – VAR Stability*
- *Enterprise – PMT Staffing/Turnover*
- *Interface – NLH System Upgrades*
- *Execution– Global Resource Competition*
- *Execution – Labor Shortages*
- *Execution – Excessive EPC VO's*



Mitigated Strategic Risk Exposure

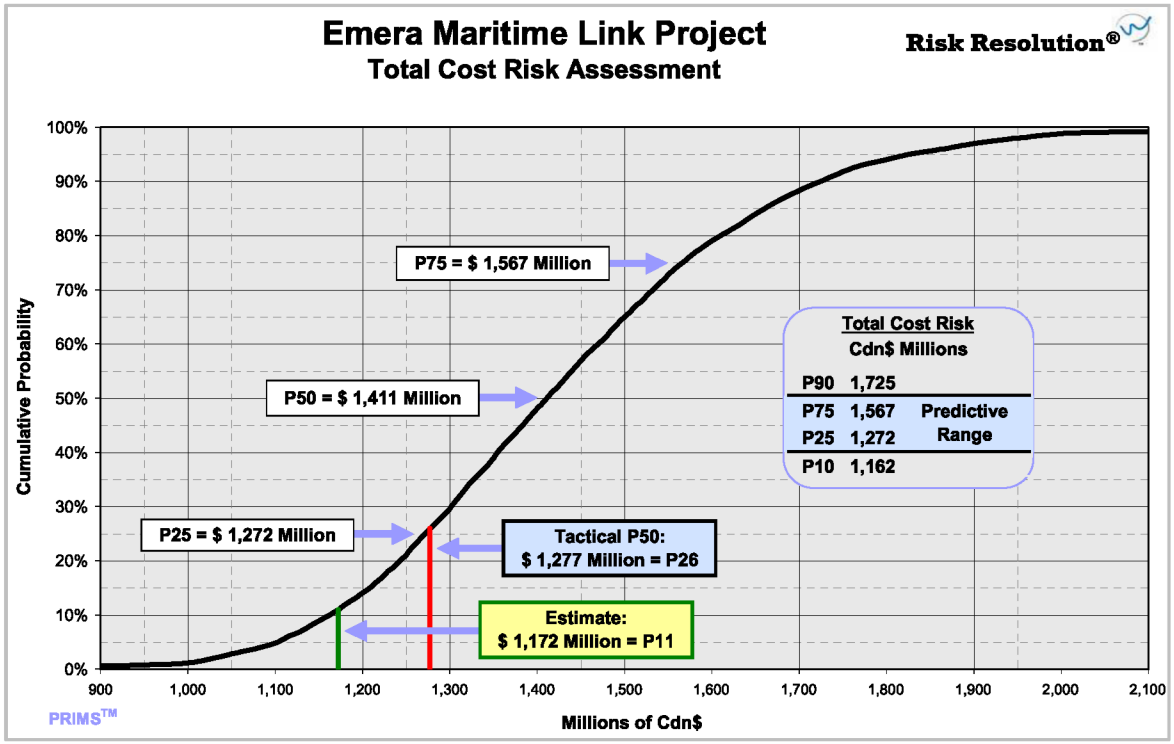
The Predictive Range (P25 – P75) for the Mitigated Strategic Risk Exposure beyond the Estimate Contingency is $76 MM - $183 MM. The mitigated values were estimated by Westney and Emera Project Management for illustrative purposes. Mitigation activities currently planned by the team should significantly reduce the level of Strategic Risk before DG3.



Total Cost Risk Exposure

The Predictive Range (P25 – P75) of the Total Cost Risk for the Maritime Link Project is $1,272 MM - $1,567 MM. These results reflect the full impact of both the Tactical Risk Assessment and the Mitigated 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.



Potential Strategic Risk Exposure – Completeness Risks

Description	Likelihood	Unmitigated (millions)	Mitigated (millions)	Cost of Mitigation (millions)
[redacted]	Low	$ 0 to $ 106	$ 0	
Subsea Cable Bundling and Protection Current project scope assumes a bundled cable installation and normal impact protection using rock cutting, trenching and jetting. The risk of an unbundled cable installation and additional protection costs exists. This risk will be largely mitigated by geotech surveys of the cable-lay corridor, a firm commitment for cable manufacturing slots, and a commitment for the cable-lay vessel before DG-3.	Medium	$ 0 to $ 71	$ 0	

Potential Strategic Risk Exposure – Completeness Risks

Description	Likelihood	Unmitigated (millions)	Mitigated (millions)	Cost of Mitigation (millions)
VAR Stability Compensation Current project scope has been defined using VSC converter technology and adequate VAR support at the Granite Canal switchyard. It also assumes that Special Protection Systems proposed for the project will negate additional transmission lines in Nova Scotia. There is however the risk that additional equipment will be needed to support system stability. This should be largely mitigated before DG-3	Low	$ 0 to $ 100	$ 0	

Potential Strategic Risk Exposure – Enterprise Risks

Description	Unmitigated (millions)	Mitigated (millions)	Cost of Mitigation (millions)
PMT Staffing and Turnover Increased global demand and an ageing workforce will put pressure on Emera's ability to find and retain experienced Project Management personnel. The use of inexperienced personnel and high team turnovers typically cause huge productivity declines in the experienced team members and significantly impact the PMT's effectiveness.	$ 0 to $ 10	$ 0 to $ 10	

Potential Strategic Risk Exposure – Execution Risks

Description	Unmitigated (millions)	Mitigated (millions)	Cost of Mitigation (millions)
[redacted]	$ 0 to $ 40	$ 0 to $ 40	

Potential Strategic Risk Exposure – Interface Risks

Description	Unmitigated (millions)	Mitigated (millions)	Cost of Mitigation (millions)
NLH System Upgrades Current project scope assumes certain work required to the NL Hydro System to accommodate the Maritime Link Project. It is not definitive but should be defined and agreed before DG-3	$ 0 o $ 60	$ 0 to $ 60	

Potential Strategic Risk Exposure – Execution Risks

Description	Unmitigated (millions)	Mitigated (millions)	Cost of Mitigation (millions)
[redacted]	$ 0 to $ 100	$ 0 to $ 100	
Labour Shortages Emera recognizes the inevitable impact from labour and skills shortages on the project and is making a concerted effort to mitigate both the likelihood and impacts. However, experienced front-line supervision, a key to performance, is now a world market and will likely experience high demand during this project. Other projects in Canada are currently experiencing impacts from shortages and turn-over. This will be a significant issue during the project.	$ 0 to $ 50	$ 0 to $ 50	

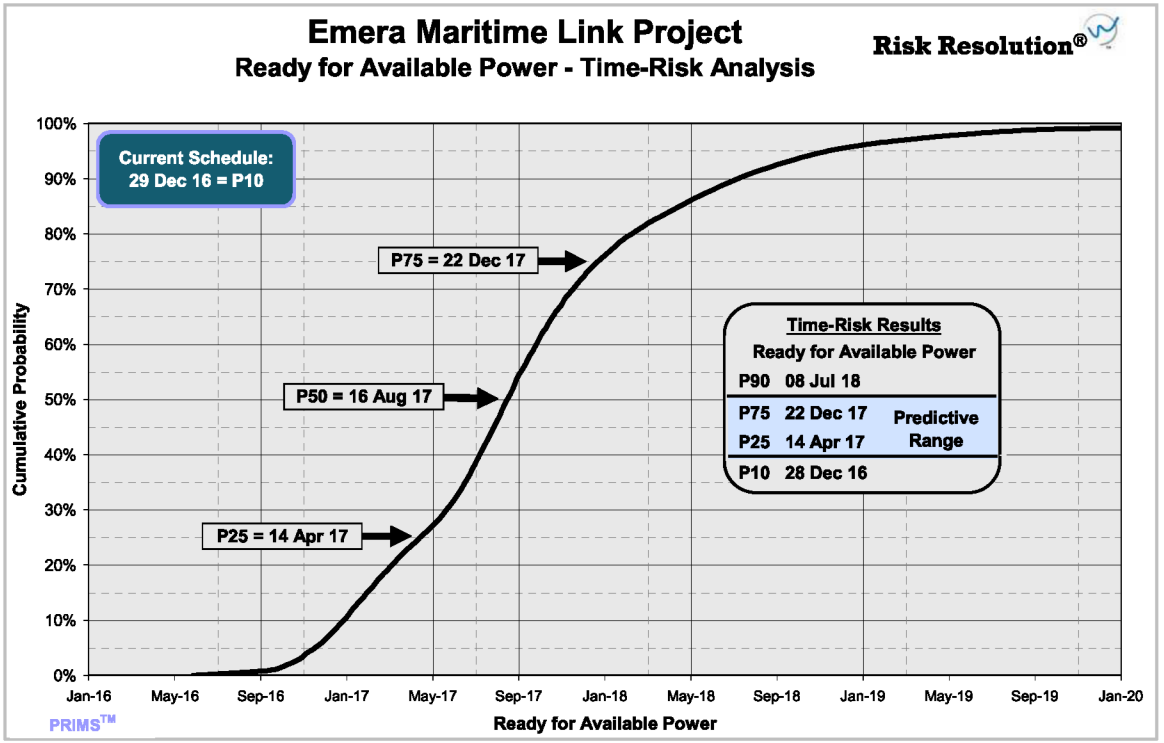
Time Risk

- 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 three project milestones:
  - **Ready for Available Power** – System continuity for bi-directional HVDC power between the Bottom Brook site and the Woodbine site.
  - **Ready for Full Power -** Full system continuity from the Granite Canal site to the Woodbine site.
  - **System Commissioning Complete** – System at full power and all Warranty/Performance Testing is complete. This corresponds to the project completion date of 29 March 2017 in Emera's project schedule

Ready for Available Power Milestone Completion Range

Major risks for this Milestone are:

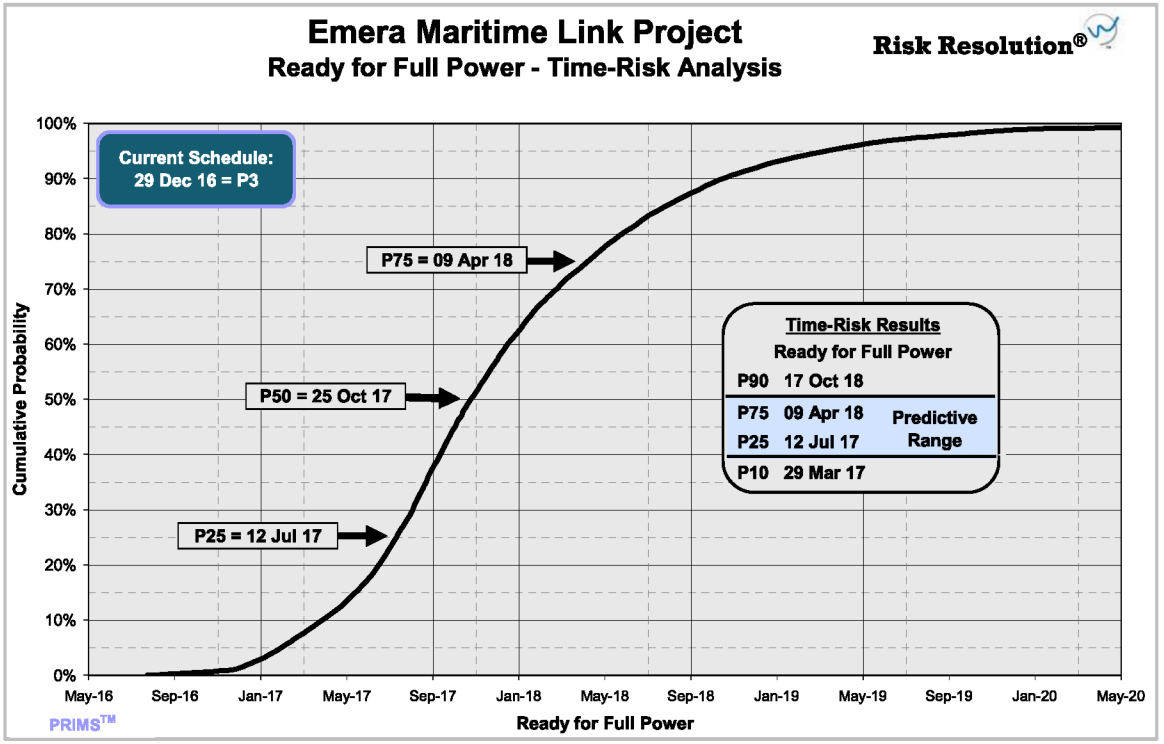
- ***Converter detail design & manufacturing***
- ***Converter station construction***
- ***Construction DC Lines NL (BB to CR)***
- ***Cable Installation***
- ***Converter Strategy/RFP***



Risk Adjusted Schedule Suggests Potential for a 6 to 15 Month Delay for Full Power

Major risks for this Milestone are:

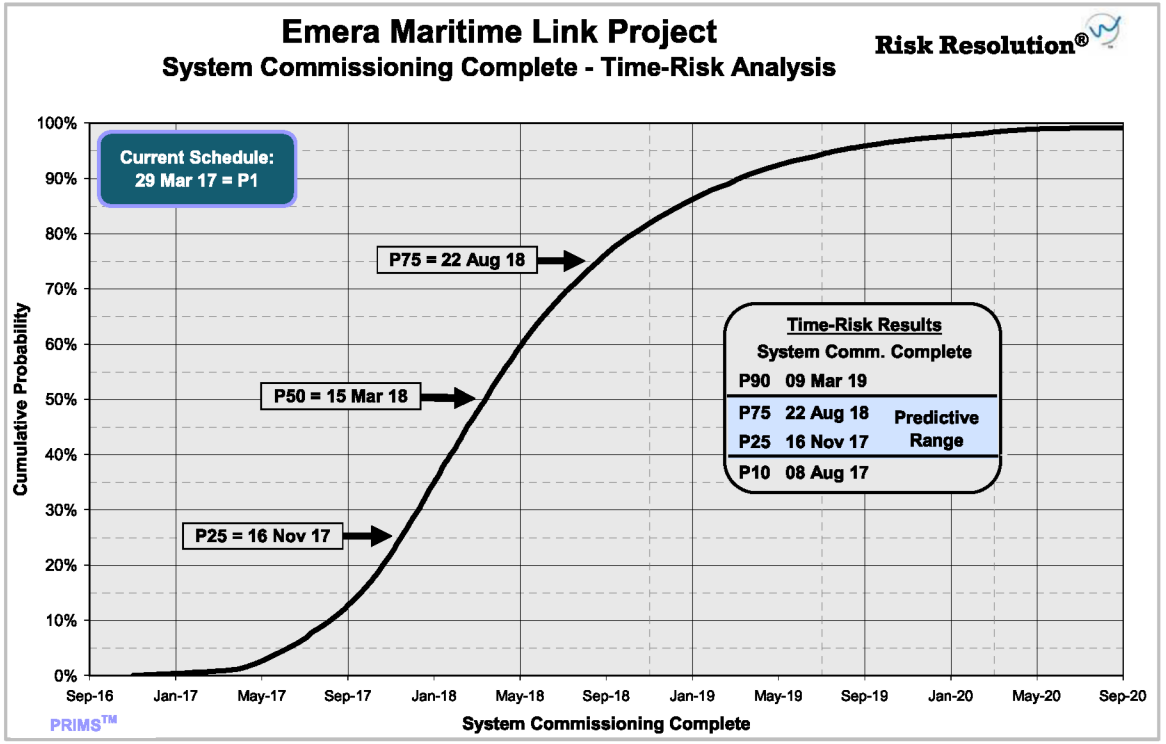
- ***Construction of the (BB to GC) AC Lines***
- ***Converter detail design & manufacturing***
- ***Converter station construction***
- ***Construction DC Lines NL (BB to CR)***
- ***Cable Installation***
- ***Converter Strategy/RFP***



System Completion Milestone Range

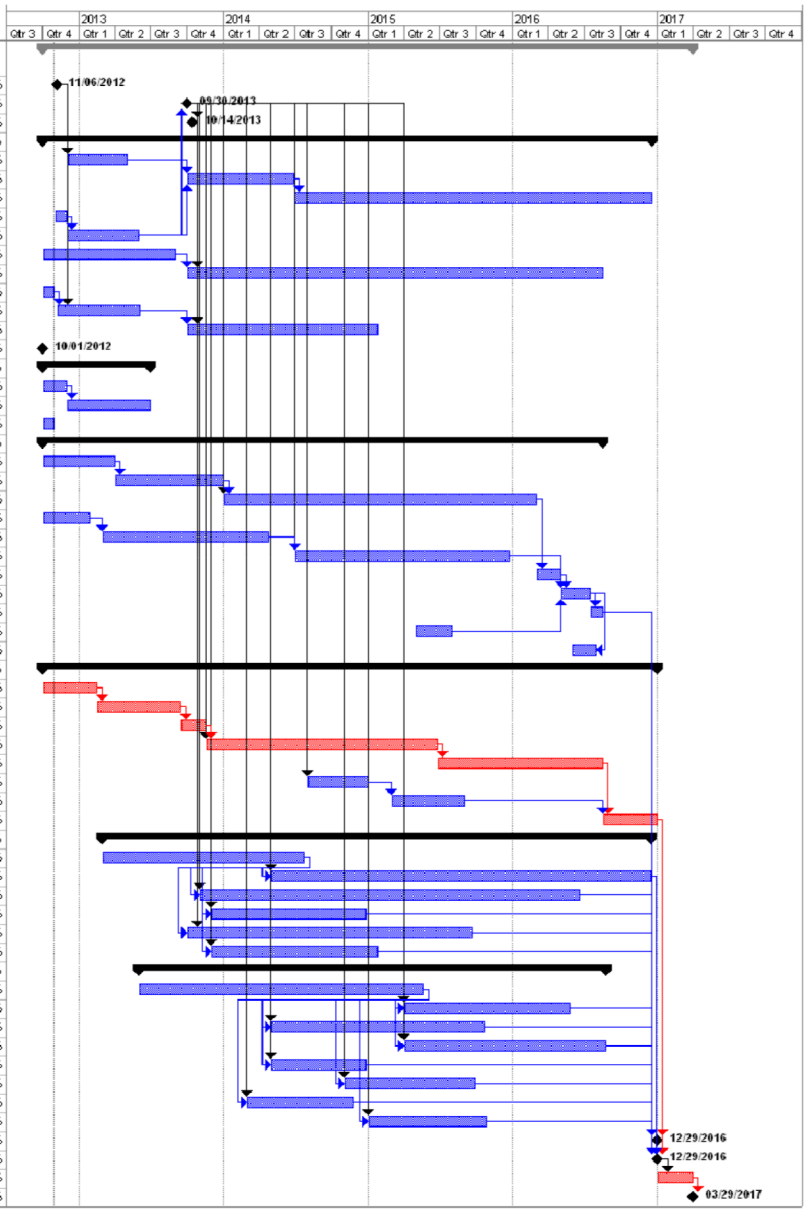
Major risks for this Milestone are:

- ***Construction of the (BB to GC) AC Lines***
- ***Converter detail design & manufacturing***
- ***System commissioning –Warranty & Performance testing***
- ***Converter station construction***
- ***Construction DC Lines NL (BB to CR)***
- ***Cable Installation***
- ***Converter Strategy/RFP***



Time-risk Model

ID	Name	Duration	Start	Finish	Critical Index
0	**Emera Maritime Link Project**	**1641 d**	**10/01/12**	**03/29/17**	
1	DG 2	0 d	11/06/12	11/06/12	0.00%
2	DG 3	0 d	09/30/13	09/30/13	1.05%
3	Full Funding	0 d	10/14/13	10/14/13	0.00%
4	**Emera Commercial Activities**	**1538 d**	**10/01/12**	**12/16/16**	**0.00%**
5	Screening - EA Rel.	151 d	12/03/12	05/02/13	0.38%
6	EA Permits	270 d	09/30/13	06/26/14	0.00%
7	EA Monitoring Program	904 d	06/27/14	12/16/16	0.00%
8	NS Regulatory Application - Prep File	30 d	11/01/12	11/30/12	0.06%
9	UARB Review and Approval	181 d	12/01/12	05/30/13	0.06%
10	Land Access Agreements	335 d	10/01/12	08/31/13	0.00%
11	Properties / Perfected	1051 d	09/30/13	08/15/16	0.00%
12	Federal Loan Guarantee	30 d	10/01/12	10/30/12	0.00%
13	Funding Strategy	210 d	11/06/12	06/03/13	0.00%
14	Funding Execution	481 d	09/30/13	01/23/15	0.00%
15	Joint Development Agreements	0 mons	10/01/12	10/01/12	0.00%
16	**Emera Engineering Activities**	**271 d**	**10/01/12**	**06/28/13**	**0.00%**
17	Eng. Services - Initl/CBOD/FBOD/Surv./RFP-DD	60 d	10/01/12	11/29/12	0.00%
18	Eng. Services - Detail Design to Support Sanction	211 d	11/30/12	06/28/13	0.00%
19	Prepare EPC and other Contracts Strategy/Imp. Plan	30 d	10/01/12	10/30/12	0.00%
20	**EPC1 - Subsea Cables (Marine)**	**1415 d**	**10/01/12**	**08/15/16**	**12.41%**
21	Cable RFP/Eval/Select/Negotiate	182 d	10/01/12	03/31/13	12.17%
22	Cable Detail Engineering	275 d	04/01/13	12/31/13	12.17%
23	Cable Manufacturing/Load Out	791 d	01/01/14	03/01/16	12.19%
24	HDD Procurement (Geotech)	120 d	10/01/12	01/28/13	0.24%
25	HDD Geotech Study/Design	420 d	03/01/13	04/24/14	1.50%
26	NS and NL HDD Construction	540 d	07/01/14	12/22/15	2.05%
27	Cable Transportation	60 d	03/02/16	04/30/16	12.19%
28	Cable Installation (seasonal)	76 d	05/01/16	07/15/16	18.46%
29	Pre-Commissioning (Continuity Check)	31 d	07/16/16	08/15/16	18.46%
30	Rock Trenching	92 d	05/01/15	07/31/15	0.00%
31	Subsea Protection	61 d	06/01/16	07/31/16	0.00%
32	**EPC2 - DC Converter Stations**	**1551 d**	**10/01/12**	**12/29/16**	**37.36%**
33	Converter Strategy/RFP	138 d	10/01/12	02/15/13	36.46%
34	Converter Eval/Select/Neg	212 d	02/16/13	09/15/13	36.46%
35	Approval	61 d	09/16/13	11/15/13	36.46%
36	Converter Detail Design and Manufacturing	585 d	11/16/13	06/23/15	37.36%
37	Converter Tech. Constr. - Delivery and Install	420 d	06/24/15	08/16/16	37.36%
38	NS and NL Converter Station Site Prep	153 d	08/01/14	12/31/14	0.00%
39	NS and NL Converter Station Constr. (Bldg & Svcs)	185 d	03/01/15	09/01/15	0.00%
40	Commissioning	135 d	08/17/16	12/29/16	37.36%
41	**Construction Contractor - Transmission Lines**	**1386 d**	**03/01/13**	**12/15/16**	**42.08%**
42	Procurement/Contract Award/BoM Procurement	510 d	03/01/13	07/23/14	41.95%
43	Construction AC Lines NL (BB to GC)	980 d	05/01/14	12/15/16	36.08%
44	Construction DC Lines NL (BB to CR)	960 d	11/01/13	06/17/16	5.97%
45	Construction G - Line NL (BB to S'ville)	390 d	12/01/13	12/25/14	0.00%
46	Construction DC Lines NS (PA to WB)	720 d	10/01/13	09/20/15	0.03%
47	Construction G - Line NS	420 d	12/01/13	01/24/15	0.00%
48	**Construction Contractor - Compounds / Other**	**1179 d**	**06/01/13**	**08/22/16**	**2.10%**
49	Procurement/Contract Award/BoM Procurement	720 d	06/01/13	05/21/15	2.10%
50	Switch Yard - Woodbine	420 d	04/01/15	05/24/16	0.56%
51	Switch Yard - Bottom Brook	540 d	05/01/14	10/22/15	0.09%
52	Switch Yard - Granite Canal	510 d	04/01/15	08/22/16	1.45%
53	Transition Compound - Point Aconi	240 d	05/01/14	12/26/14	0.00%
54	Transition Compound - Cape Ray	330 d	11/01/14	09/26/15	0.00%
55	Grounding Site NL (S'ville)	270 d	03/01/14	11/25/14	0.00%
56	Grounding Site NS (Galbarus)	300 d	01/01/15	10/27/15	0.00%
57	Ready for Available Power	0 d	12/29/16	12/29/16	0.00%
58	Ready for Full Power	0 d	12/29/16	12/29/16	100.00%
59	Commission System - Warranty/Performance Test	90 d	12/30/16	03/29/17	100.00%
60	System Commissioning Complete	0 d	03/29/17	03/29/17	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**	**6-Nov-12**	**6-Nov-12**		
02	**DG 3**	**0 d**	**30-Sep-13**	**30-Sep-13**		
03	**Full Funding**	**0 d**	**14-Oct-13**	**14-Oct-13**		
04	**Emera Commercial Activities**	**1538 d**	**1-Oct-12**	**16-Dec-16**		
05	Screening - EA Rel.	151 d	3-Dec-12	2-May-13	0	3
06	EA Permits	270 d	30-Sep-13	26-Jun-14		
07	EA Monitoring Program	904 d	27-Jun-14	16-Dec-16		
08	NS Regulatory Application - Prep File	30 d	1-Nov-12	30-Nov-12	0	2
09	UARB Review and Approval	181 d	1-Dec-12	30-May-13		
10	Land Access Agreements	335 d	1-Oct-12	31-Aug-13	0	3
11	Properties / Perfected	1051 d	30-Sep-13	15-Aug-16		
12	Federal Loan Guarantee	30 d	1-Oct-12	30-Oct-12	0	3
13	Funding Strategy	210 d	6-Nov-12	3-Jun-13	0	2
14	Funding Execution	481 d	30-Sep-13	23-Jan-15		
15	Joint Development Agreements	0 d	1-Oct-12	1-Oct-12		
16	**Emera Engineering Activities**	**271 d**	**1-Oct-12**	**28-Jun-13**		
17	Eng. Services - Initi/CBOD/FBOD/Surv./RFP-DD	60 d	1-Oct-12	29-Nov-12	0	1
18	Eng. Services - Detail Design to Support Sanction	211 d	30-Nov-12	28-Jun-13	0	3
19	Prepare EPC and other Contracts Strategy/Imp. Plan	30 d	1-Oct-12	30-Oct-12		

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
20	**EPC1 - Subsea Cables (Marine)**	**1415 d**	**1-Oct-12**	**15-Aug-16**		
21	Cable RFP/Eval/Select/Negotiate	182 d	1-Oct-12	31-Mar-13	0	3
22	Cable Detail Engineering	275 d	1-Apr-13	31-Dec-13	0	3
23	Cable Manufacturing/Load Out	791 d	1-Jan-14	1-Mar-16	-2	2
24	HDD Procurement (Geotech)	120 d	1-Oct-12	28-Jan-13	0	1
25	HDD Geotech Study/Design	420 d	1-Mar-13	24-Apr-14	-2	6
26	NS and NL HDD Construction	540 d	1-Jul-14	22-Dec-15	-6	3
27	Cable Transportation	60 d	2-Mar-16	30-Apr-16	0	1
28	Cable Installation (seasonal)	76 d	1-May-16	15-Jul-16	-1	3
29	Pre-Commissioning (Continuity Check)	31 d	16-Jul-16	15-Aug-16	-1	1
30	Rock Trenching	92 d	1-May-15	31-Jul-15	-1	3
31	Subsea Protection	61 d	1-Jun-16	31-Jul-16		
32	**EPC2 - DC Converter Stations**	**1551 d**	**1-Oct-12**	**29-Dec-16**		
33	Converter Strategy/RFP	138 d	1-Oct-12	15-Feb-13	0	2
34	Converter Eval/Select/Neg	212 d	16-Feb-13	15-Sep-13	-1	2
35	Approval	61 d	16-Sep-13	15-Nov-13		
36	Converter Detail Design and Manufacturing	585 d	16-Nov-13	23-Jun-15	-5	11
37	Converter Tech. Constr. - Delivery and Install	420 d	24-Jun-15	16-Aug-16	-2	4
38	NS and NL Converter Station Site Prep	153 d	1-Aug-14	31-Dec-14		

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
39	NS and NL Converter Station Constr. (Bldg & Svcs)	185 d	1-Mar-15	1-Sep-15		
40	Commissioning	135 d	17-Aug-16	29-Dec-16	-1	1
41	**Construction Contractor - Transmission Lines**	**1386 d**	**1-Mar-13**	**15-Dec-16**		
42	Procurement/Contract Award/BoM Procurement	510 d	1-Mar-13	23-Jul-14		
43	Construction AC Lines NL (BB to GC)	960 d	1-May-14	15-Dec-16	-2	14
44	Construction DC Lines NL (BB to CR)	960 d	1-Nov-13	17-Jun-16	-4	9
45	Construction G - Line NL (BB to S'ville)	390 d	1-Dec-13	25-Dec-14	-1	2
46	Construction DC Lines NS (PA to WB)	720 d	1-Oct-13	20-Sep-15	-1	5
47	Construction G - Line NS	420 d	1-Dec-13	24-Jan-15	-1	4
48	**Construction Contractor - Compounds / Other**	**1179 d**	**1-Jun-13**	**22-Aug-16**		
49	Procurement/Contract Award/BoM Procurement	720 d	1-Jun-13	21-May-15		
50	Switch Yard - Woodbine	420 d	1-Apr-15	24-May-16	-6	2
51	Switch Yard - Bottom Brook	540 d	1-May-14	22-Oct-15	-6	2
52	Switch Yard - Granite Canal	510 d	1-Apr-15	22-Aug-16	-6	2
53	Transition Compound - Point Aconi	240 d	1-May-14	26-Dec-14	0	4
54	Transition Compound - Cape Ray	330 d	1-Nov-14	26-Sep-15	0	4
55	Grounding Site NL (S'ville)	270 d	1-Mar-14	25-Nov-14	-1	1
56	Grounding Site NS (Gabarus)	300 d	1-Jan-15	27-Oct-15	-2	2

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
57	**Ready for Available Power**	**0 d**	**29-Dec-16**	**29-Dec-16**		
58	**Ready for Full Power**	**0 d**	**29-Dec-16**	**29-Dec-16**		
59	Commission System - Warranty/Performance Test	90 d	30-Dec-16	29-Mar-17	0	3
60	**System Commissioning Complete**	**0 d**	**29-Mar-17**	**29-Mar-17**		
	Last Line					

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.