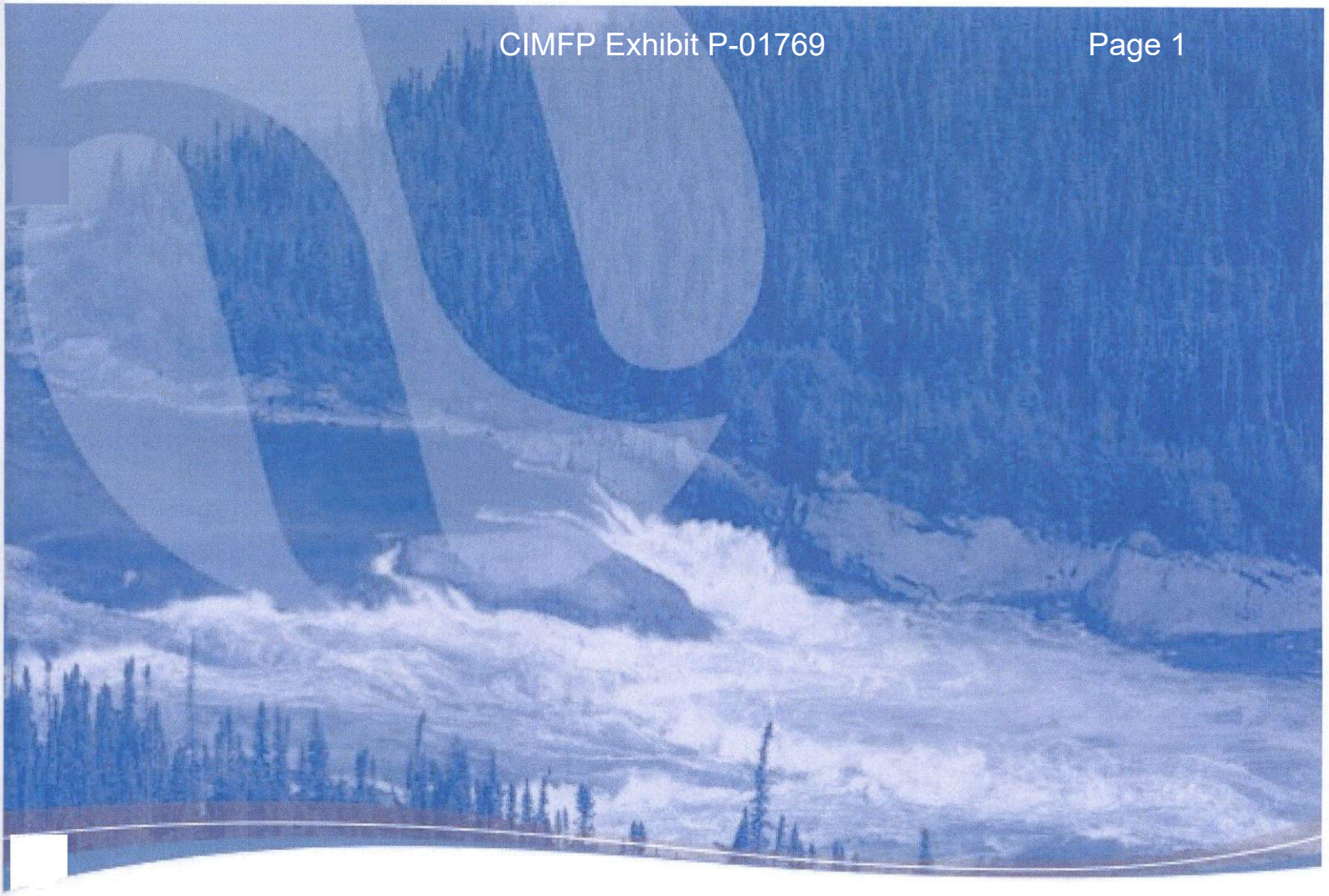

# MUSKRAT FALLS PROJECT
## POST SANCTION

Briefing Note as Requested by Nalcor Legal Counsel McInnes-Cooper

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LOWER CHURCHILL PROJECT

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# POST SANCTION

This briefing document discusses the events that occurred in the years following Project Sanction in December 2012, with the objective of identifying the primary causes that resulted in the Project's cost increasing from a $6.2 B P50 projection to $10.1 B P75 projection of the June 2017 forecast (both projections excluding financing costs).

In this regard, one question expressed publicly and by the Shareholder relates to Nalcor's management of risk and whether it followed best practice, whether it was (is) actively mitigating known risks, and whether Nalcor was being proactive in advising the Nalcor Executive, Board of Directors (BOD) and the Shareholder of the risk exposure. The Lower Churchill Management Corporation (LCMC) implemented and documented a comprehensive Project Risk Management Plan encompassing a specific risk philosophy, supporting strategies, processes and activities that was guided by a third-party consultant, Westney. The implementation of this Plan within the Project was subject to numerous internal and external assurance reviews each confirming that the Risk Management Plan was robust and that its implementation was being followed. Outcomes of risk-adjusted cost and schedule forecasts coming out of the Quantitative Risk Analyses (QRAs) were provided to Nalcor Executive for consideration in establishing the funding levels for the Project and First Power target dates.

This document presents insight into the specific unexpected events and unaccounted for and extreme strategic risks that occurred which were not considered as existing during the risk identification and screening work that occurred between 2006 and Project Sanction in December 2012. This briefing document will endeavour to clarify:

- When was it first realized that the Project was going significantly over budget?
- What were the primary cost growth areas?
- What factors and events caused the situation and were they within Nalcor's control?

## EVENTS SHAPING THE POST SANCTION PERIOD

Despite the implementation of what Independent Project Analysis (IPA) characterized in their fall 2015 review[1] as "*best-in-class*" project management practices, structures and process, and execution plans and having previously assessed the project as having a high-degree of front-end loading (FEL)[2], the envisioned plans did not unfold post Sanction entirely as had been expected. While LCMC understood that there were risks that could negatively impact the planned course, the sheer number of expected events that affected the execution of the Project was beyond the scope considered by either LCMC or any external reviewers.

[1] Independent Project Analysts, commonly referred to as "IPA," are a Virginia, USA based think-tank who specialize in project benchmarking and metrics. According to their marketing material, "*IPA examines the functioning of capital projects and project systems around the world to help our customers create and use capital assets more efficiently*". IPA completed a mid-execution review on the Muskrat Falls Project in November 2015, with a final report issued in December that would validate the positive work done by LCMC.

[2] Reference IPA Mid-Execution Assessment completed in December 2015.

In the years following sanction, the Muskrat Falls (MF) Project experienced a significant number of unexpected risks, each of which had varying consequences. The net result was that the manifestation of these risks resulted in increasing the cost to complete the Project. Contrary to many mega-projects, the cost growth realized up to mid-2016 was not a result of late engineering or scope change, or the change in leadership/management within the Project Team, rather it was significantly influenced by the realization of many unanticipated events, which are referred to as strategic risks and which were beyond the control of the Project Team.

Figure 1 presents a timeline illustrating the unexpected events that occurred since Project Sanction that triggered cost growth. Figure 2 highlights the prominent news headlines regarding both Nalcor Energy and the Muskrat Falls Project during the post-sanction period. These events are further discussed throughout this document.

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**Figure 1: Muskrat Falls Project – Triggering Events for Cost Growth During Construction**

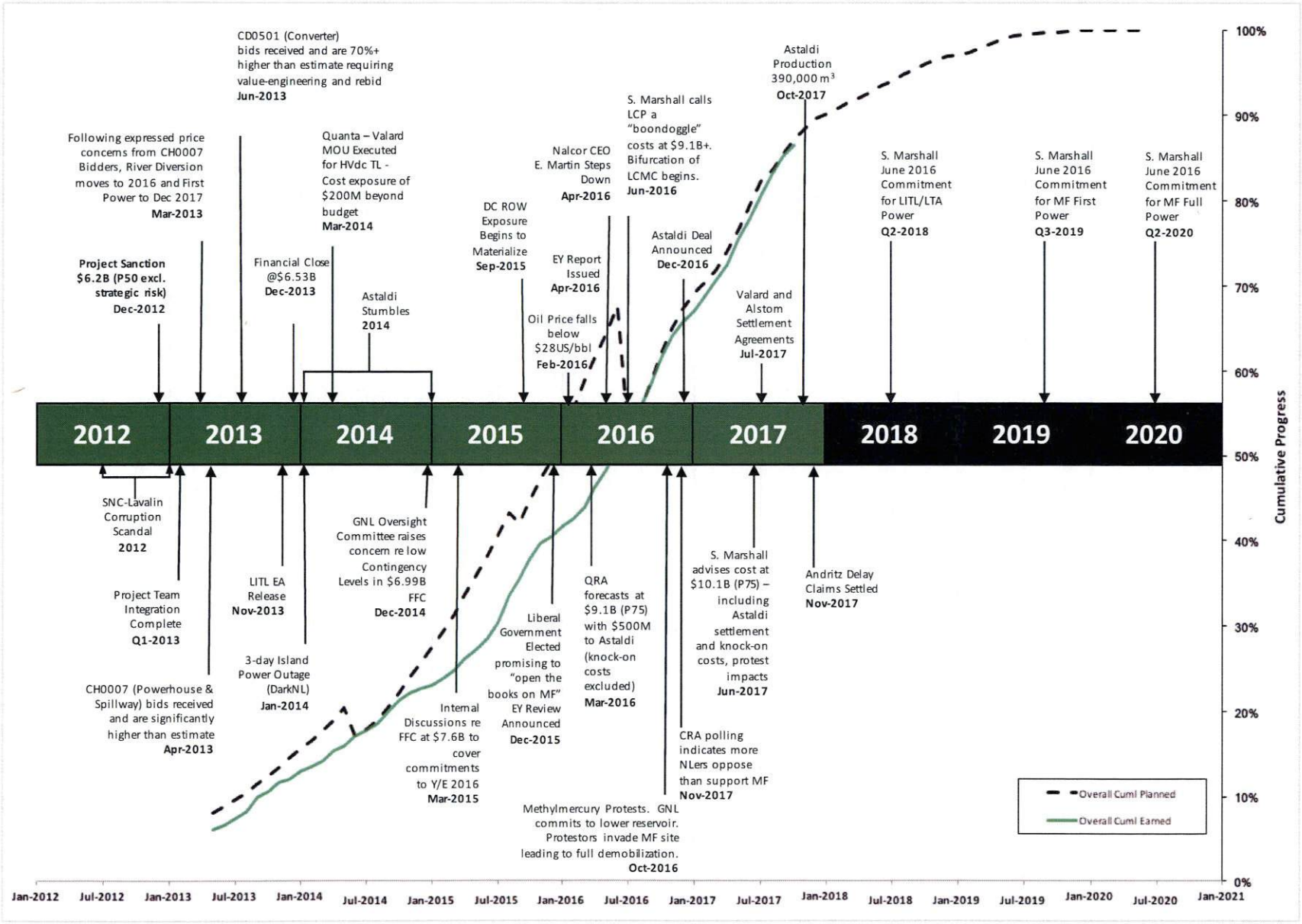


**Figure 2: Nalcor Energy & Muskrat Falls Project – Prominent News Headlines (2010 – 2017)** [3]

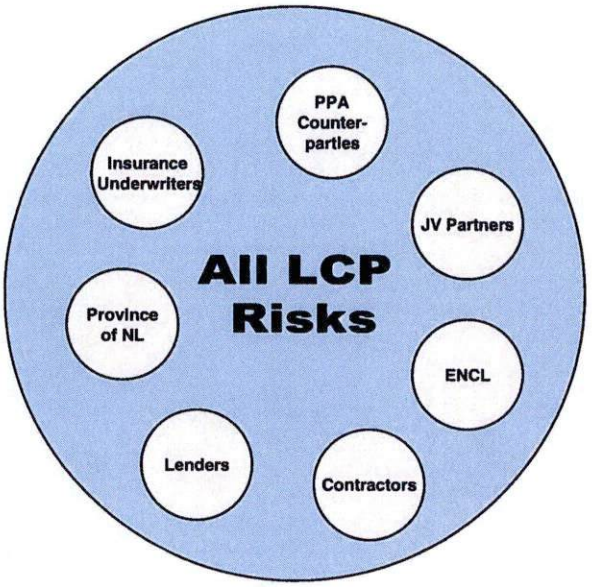

[3] Extracted from Nalcor presentation Reputation & Roadmap Plan June 2017 – Draft.

Having adopted a staged-gate project delivery model (i.e. Nalcor's Gateway Process), in an effort to enable risk-informed decision making, Nalcor placed an early focus on risk management activities. As early as 2006 Nalcor had implemented risk management practices early within the planning phases of the Project, with active engagement of the team members in identifying, screening and prioritizing risks that the Project may face as the Project evolved.

With Westney's assistance and their knowledge of large complex energy projects, a project risk philosophy was developed to fit the unique attributes of the Project.[4] This risk philosophy was designed in consideration of the lessons learned and past practices for large construction projects that were developed using non-recourse funding. At its core, the Project's risk management philosophy sought to leverage Nalcor's governance structures and mechanisms as a means to help mitigate potential risk exposure. Nalcor's mandate as the Province's newly formed energy company, presented both opportunities and challenges in terms of executing a mega-project. Acknowledging the risks that accompanied executing the Project as a crown corporation, having a committed Shareholder, who happened to be both the provincial regulator and holder of legislative powers, were seen as enablers to de-risk the Project and thereby contributed significantly to the Project's risk philosophy and eventual risk management strategies. Strategically the risk philosophy was premised upon the allocation and sharing of risk with the key stakeholders of the Project, including the Province of Newfoundland and Labrador (NL) (as shareholder), Financiers, power off takers, and contractors as is illustrated in Figure 3. Nalcor recognized that in order to maximize benefits to the Shareholder, risk allocation strategies must be adopted that would target the lowest overall capital expenditure. In other words, the Lower Churchill Project (LCP) was a cost-driven project and execution decisions and strategies had to consider capital cost first and foremost.

[4] Reference document Lower Churchill Project - Risk Management Philosophy, Nalcor document no. LCP-PT-MD-0000-RI-PH-0001-01, Rev B1. Note that this document was originally issued for use in April 2008 under document no. MSD-RI-004.

Figure 3: LCP Risk Allocation Philosophy (Q1-2008) [5]




From 2008 onward the Project's risk terminology was broadened by Westney to include a greater focus on what Westney characterized as strategic risks. According to Westney, the occurrence of strategic risks creates significant and unpredictable chaos for project teams because they need to minimize their impact on the project, however they typically come with little advance notice and management's ability to influence their realization is limited. That being said, project teams must acknowledge that strategic risks exist and are critical in shaping the outcome of any project. Based upon industry experience, it is typically a small number of key risks, including the occurrence of any external events that have the most significant influence on a project. Despite significant effort in risk planning, the execution of the Muskrat Falls Project's would similarly be influenced by the occurrence of both expected and unexpected external events.

Westney sub-divides strategic risks into two (2) categories:

1. **Background (external) Risks** – These are typically associated with factors external to the Project and include changes in: scope, market conditions, location factors, commercial or partner requirements and behaviors of external parties.

2. **Organization (internal) Risks** – These risks are typically associated with an asymmetry between size and complexity of projects and the broader organization's ability to deliver.

Forming a Risk Resolution Team[6], guided by Westney's expertise, Nalcor set out to identify and characterize the strategic risks that could affect the lower Churchill River development (both Gull Island

[5] Ibid, Figure 4-3.

(GI) and Muskrat Falls). A review of the Decision Gate 2 (DG2) Project Risk Analysis report demonstrates how the Risk Resolution Team both identified strategic risks and assessed their potential for cost exposure to the Project, pre-and post-mitigation (where mitigation was possible and/or practical).

The list of strategic risks assembled prior to DG2 was largely the basis for guiding the risk management strategies, and to a large part the execution strategies, adopted on the Project going forward within the staged-gate project delivery model being followed. While risks were both added to and retired from this list, the assembled list was a visible management tool used by the senior management and executive leadership teams. Key risk themes evident in the DG2 strategic risk list included:

- Project Governance
- Structural Risks as an Entity of the Crown
- Contractor Availability and Market Conditions
- Construction Labor Availability and Productivity
- Project Financing – Constraints of Non-Recourse
- Federal Loan Guarantee (FLG)
- Foreign Exchange
- Power Sales and Market Access Options
- Protests from Aboriginal Groups or Non-Governmental Organizations (NGOs)
- Environmental Assessment Timelines
- Design Change due to Environmental Assessment (EA) Outcomes
- Crossing the Strait of Belle Isle (SOBI)
- Contractors Creditworthiness
- Availability of Skilled and Semi-Skilled Labour
- Availability of Qualified Supervision
- Construction Productivity and Location Factors

For each of these risks, extensive management plans were developed. In some instances, significant resources were allocated and spent in order to implement the management plans to either reduce the de-stabilizing impact the risk would have on the Project should it materialize, or to turn the risk into an opportunity where such an option was identified as possible (e.g. the risk associated with the supply of semi-skilled labor was partially mitigated through Nalcor's participation in the creation of the Labrador Aboriginal Training Partnership (LATP) which eventually provided occupational training to over 500 Labradorians). The *Decision Gate 3 Project Cost and Schedule Risk Analysis Report* [7] provides further insight into the status on each of these strategic or key project shaping risks.

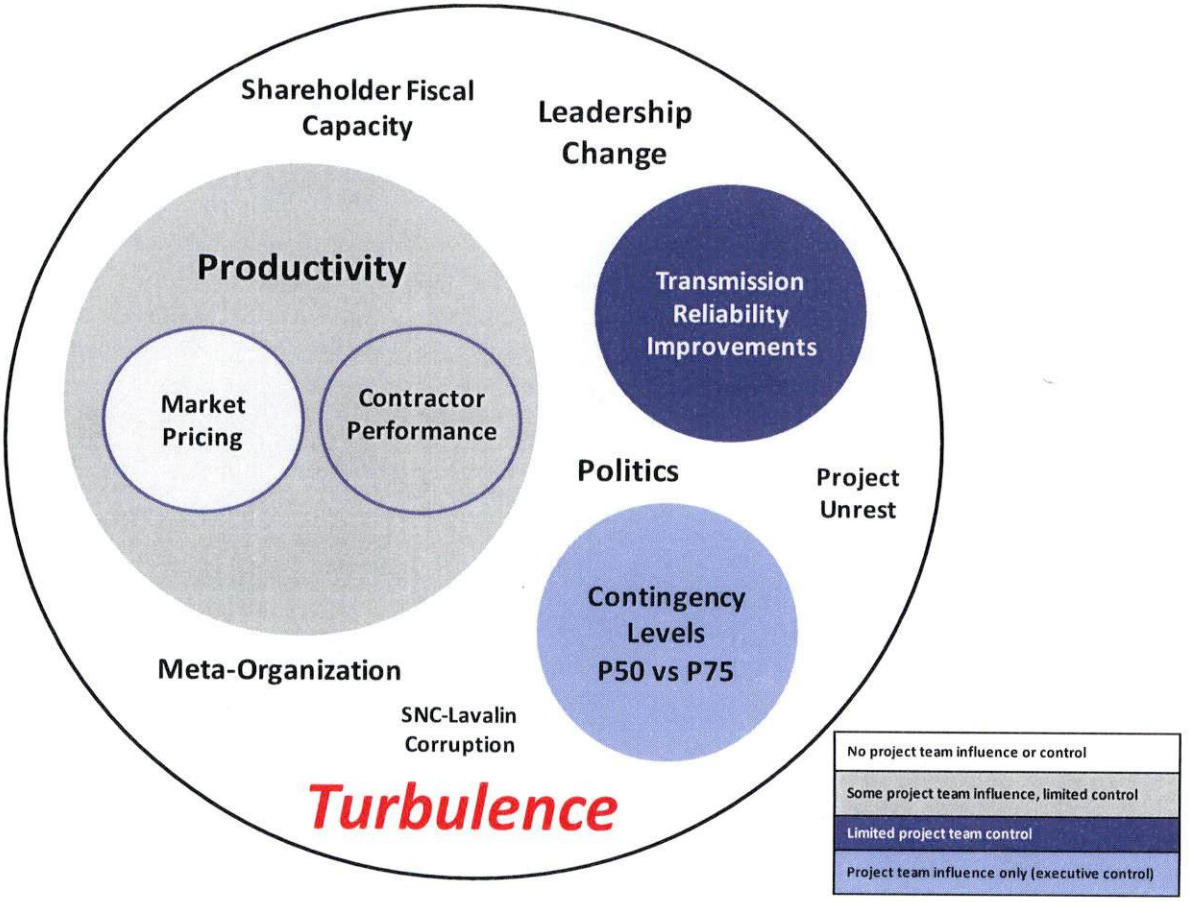
[6] The concept of a "Risk Resolution Team" is explained within Sections 5 and 7 of the Project Risk Management Plan, Nalcor document no. LCP-PT-MD-RI-PL-001-01, Rev B1.

[7] Decision Gate 3 Project Cost and Schedule Risk Analysis Report, Nalcor document no. LCP-PT-ED-0000-RI-RP-0002-01, Rev. B1, dated 1-Oct-2012.

Despite the inability to directly control many of these strategic risks, Nalcor made significant efforts during the pre-sanction period of 2008 to 2012 to manage the Project so as to minimize the impact of these risks should they be realized. Residual risk exposure was defined, quantified and presented to Nalcor Executive to facilitate risk-informed decision making regarding total capital cost of the Project and the schedule, which in turn fed into Nalcor's Investment Evaluation's Cumulative Present Worth (CPW) modelling. The pre-Decision Gate 3 (DG3) details of the quantification of these risks are contained within the DG3 project risk analysis and the contingency recommendations. It is evident that the valuation of the residual risk exposure that the Project Team developed, challenged by Westney's review, had significantly decreased from the $2+ billion identified in 2008.

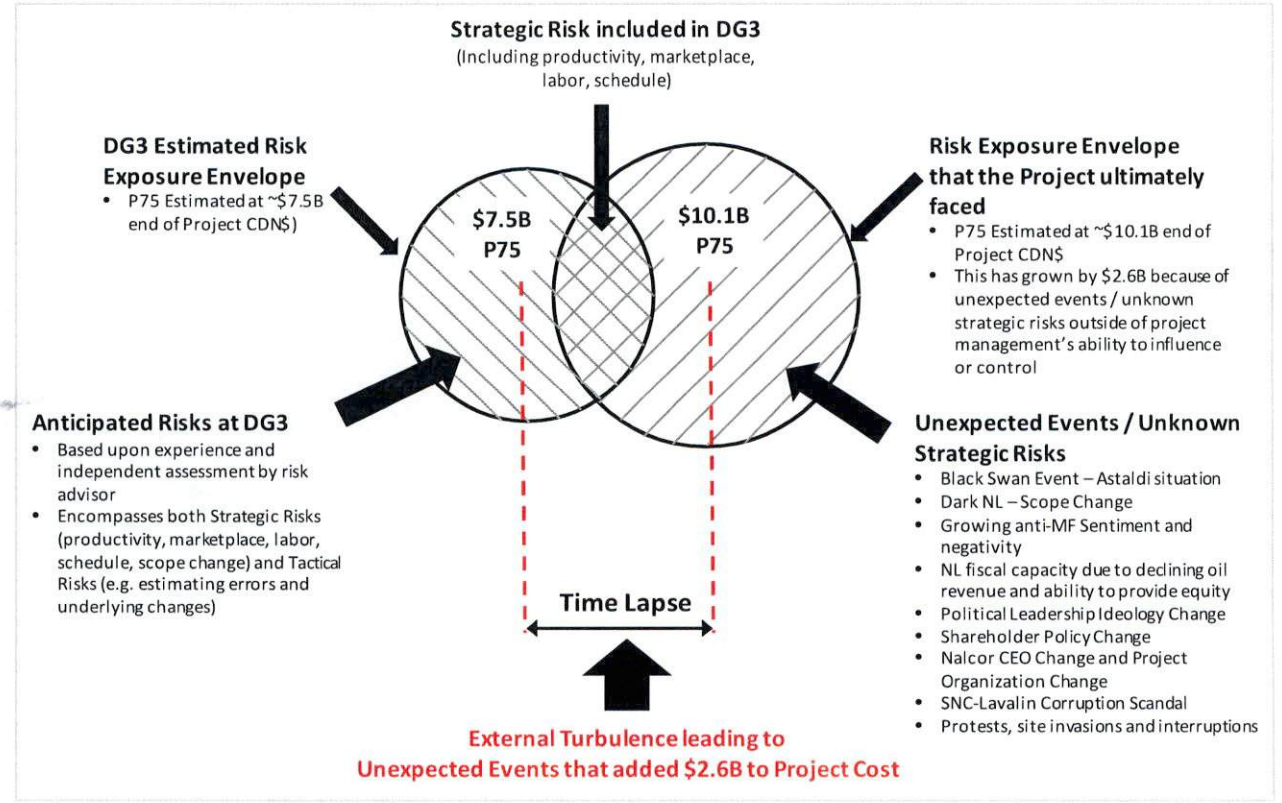
With the passage of time, events and circumstances have transpired that have resulted in the materialization of new risks, resulting in the growth of the residual risk exposure for risks where extensive management plans were implemented. With a project duration of ~14 years (Decision Gate 1 in 2006 to Full Power forecasted for 2020), the probability of turbulence occurring increased and ultimately has materialized, leading to the occurrence of unanticipated events occurring.

**Figure 4: Spectrum of Unanticipated Events that Negatively Influenced the Muskrat Falls Project**



This concept of turbulence is illustrated in Figures 4 and 5. There have been several scholarly publications on the concept of turbulence with respect to large capital projects and its linkage to the realization of unanticipated events.[8] Research into large and complex projects, similar to the Muskrat Falls Project, has shown that when faced with such turbulence and in the absence of strong governance systems, projects sometimes can experience extreme situations outside the project management team's ability to influence or control. In the case of the Muskrat Falls Project, its governance systems had been initially built with strong linkages and unity-in-purpose between Nalcor, the BOD, and the Shareholder (who as the Crown filled many diverse roles from equity provider, regulator, legislator, aboriginal relations, land owner, etc.). The Energy Plan is an example of this unity in purpose and alignment of objectives. Over time and with a change in Government and Nalcor Executive, there was an attenuation of these relationships and unity-in-purpose as time progressed and the Project faced many unexpected challenges and risks that were either caused, exacerbated or enabled by the lack of unity.

**Figure 5: Concept of Turbulence and its Impact on Realization of Risk Events Within the Muskrat Falls Project** [9]




The net result of the factors that were affected to one degree or another by this turbulence was a $2.6 B increase in the capital cost of the Project, from $7.5 B (P75) projected in May-2012 to $10.1 B (P75)

[8] Miller, R. and Lessand, D. R. (2000). The Strategic Management of Large Engineering Projects – Sharping Institutions, Risks, and Governance (Massachusetts: MIT, 2000), Chapter 5.

[9] Ibid, adapted from Figure 5.1.

project in June-2017. This means that the turbulence impacts over two thirds of the growth from the DG3 public number of $6.2 B (P50), while the balance of $1.3 B represents the quantified value of risk between the P50 and P75 values at DG3 that was not included in the DG3 capital costs.

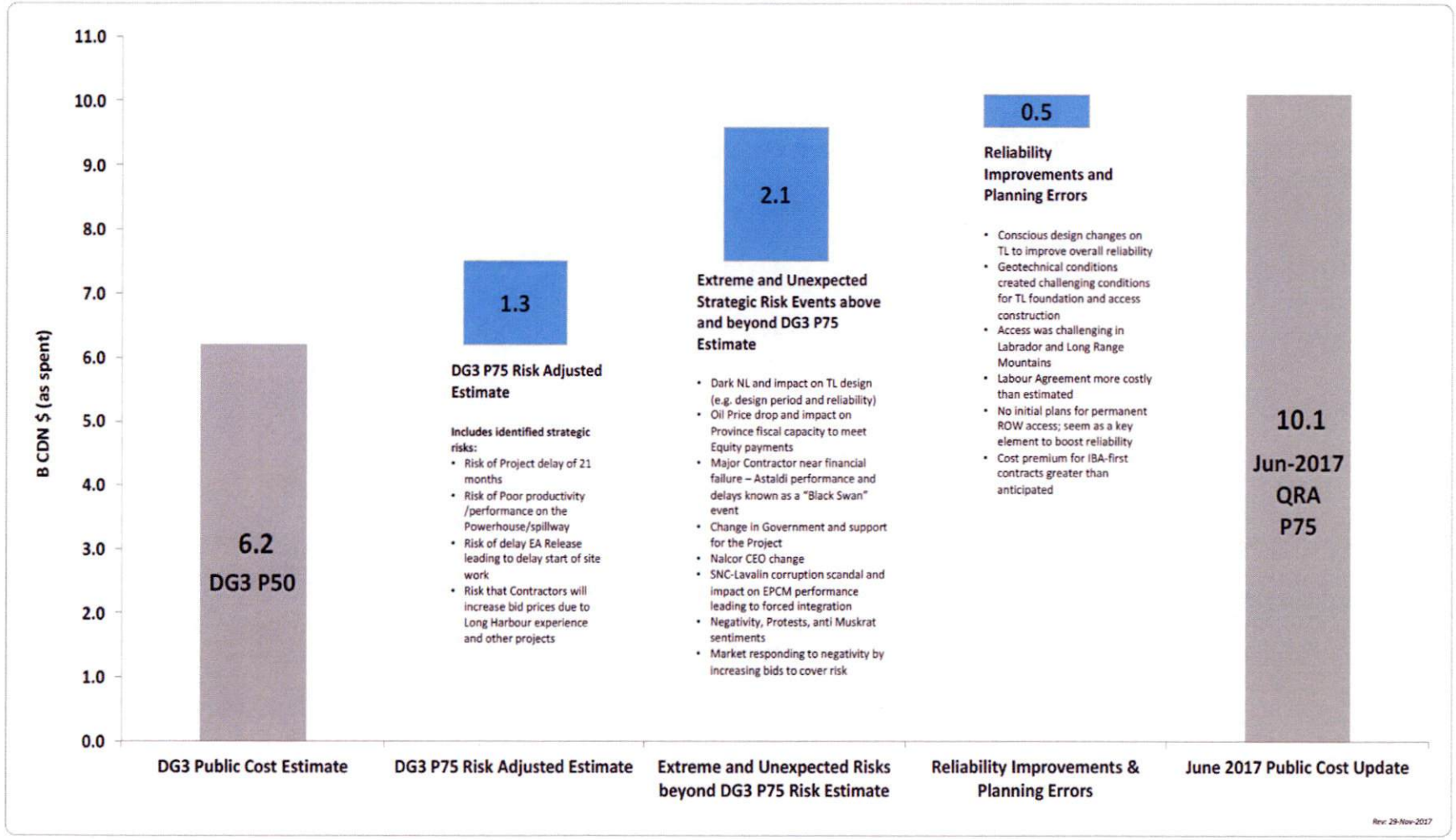
While many of the identified strategic risks did materialize to some extent, the risk mitigation and management plans defined and implemented decreased their impact on the Project. An example of risk mitigation was the effort taken to reduce the labour availability risk. LCMC gave considerable attention to this risk including developing recruitment programs that reduced the impact of this risk.

A review of the Project's $3.9 B cost growth, above the $6.2 B publicly stated cost of the Project at Sanction, provides insight into the contribution of both anticipated and unanticipated risks. As Figure 6 illustrates, the P75 risk-adjusted cost estimate evaluated prior to DG3 indicated that there was a $1.3 B risk exposure for the risks identified prior to Project Sanction.[10] Additionally investments made to improve overall reliability and to respond to challenging, unforeseen geotechnical conditions are estimated at ~$0.5 B, while those other extreme and unexpected strategic risk events account for some ~$2.1 B of the total $3.9 B cost increase. [11]

[10] The $7.5B (P75) value is the 2012 DG3 QRA outcome escalated to the current anticipated end of the Project. In a similar approach at a P95 confidence interval, the total risk-adjusted cost estimate increases to $8.5B. "Risk-adjusted cost estimate" refers to the base cost estimate plus the estimated exposure contribution of the identified risks to the project.

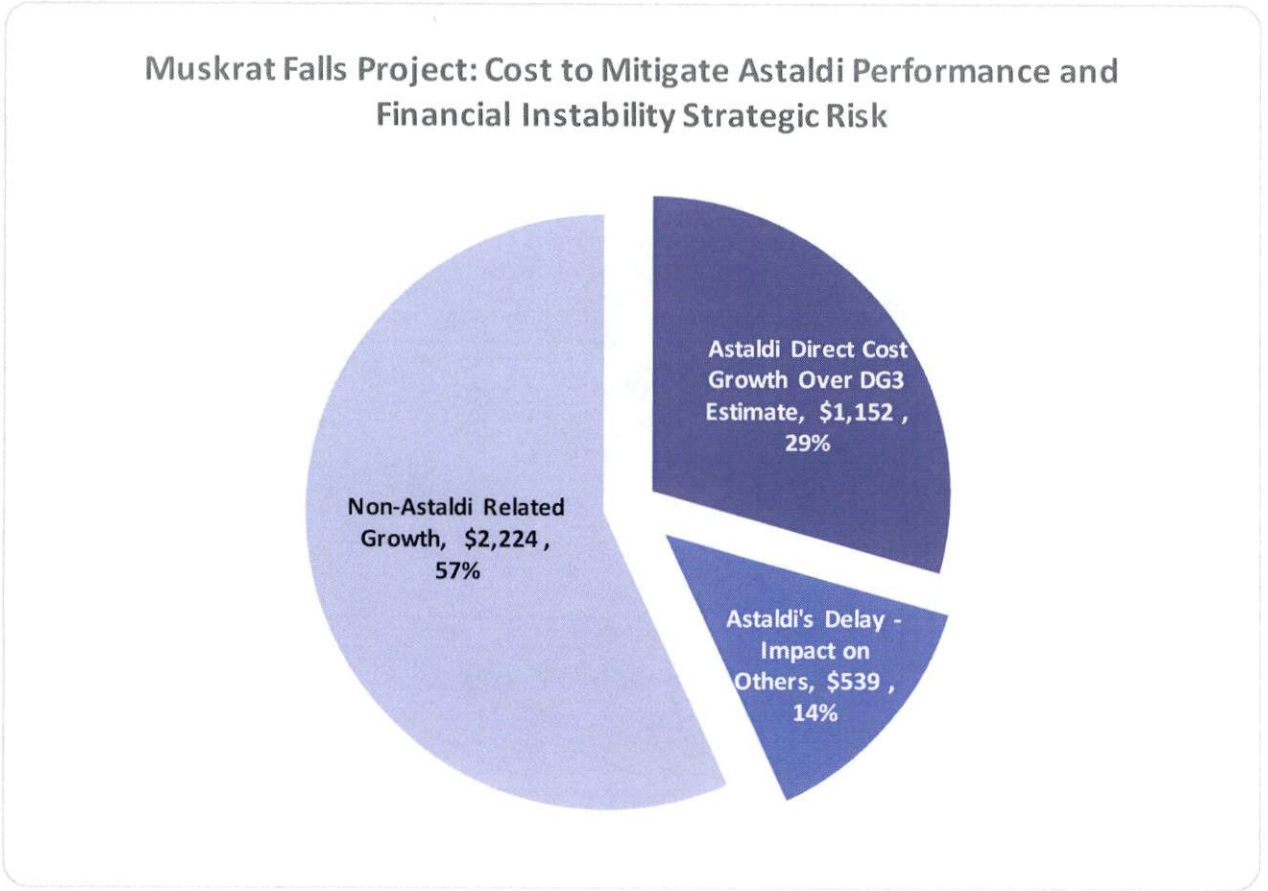
[11] These numbers are preliminary estimates based upon a generally understanding of the events, and as such have an associated degree of accuracy.

Figure 6: Cost Growth Contribution by Each Risk Category



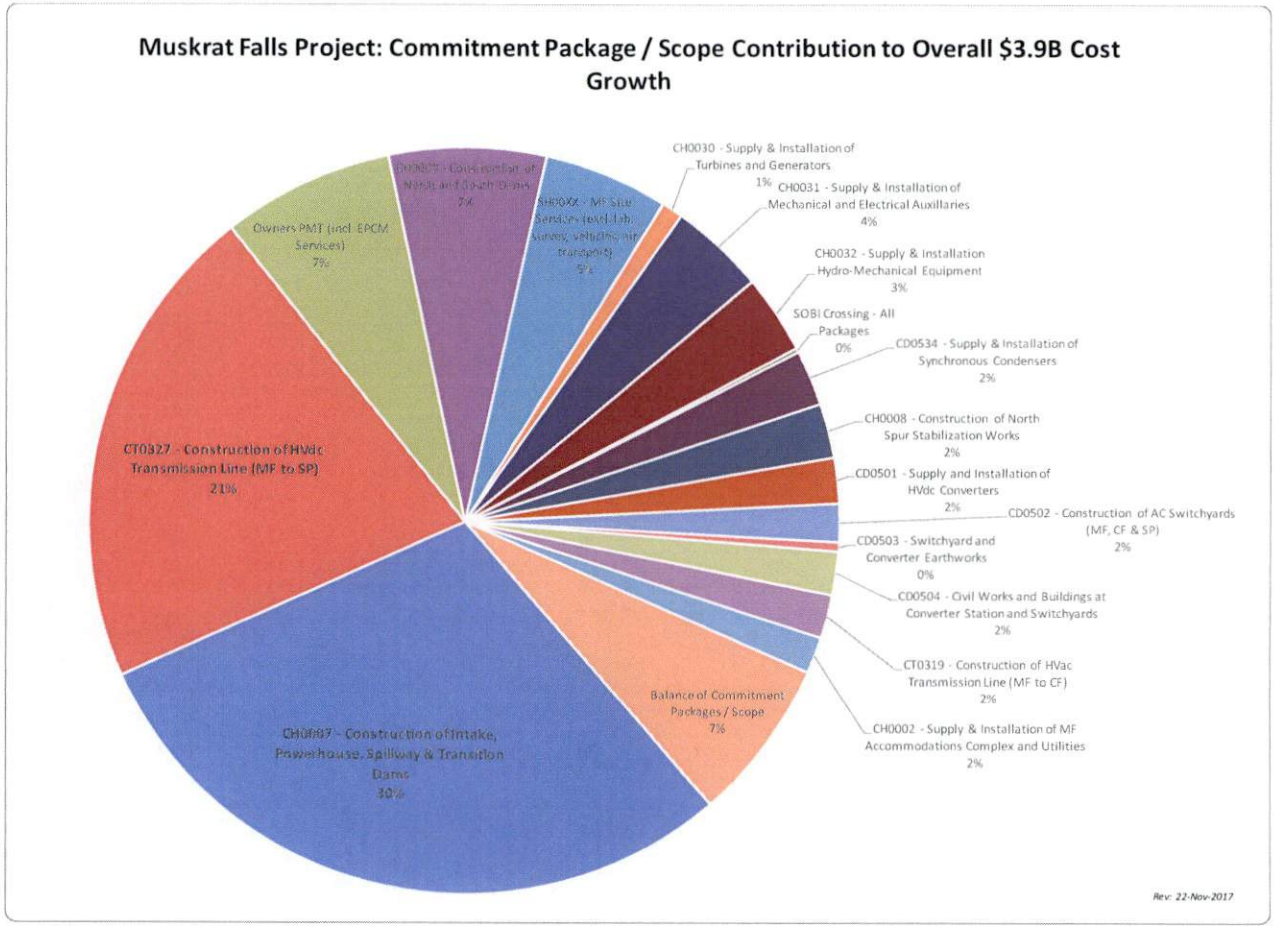
While it is generally well-known that Astaldi's performance was a significant contributor to the $3.9 B cost increase, Figure 7 reveals that in total the cost growth from DG3 to the June 2017 forecast attributable to Astaldi equates to some $1.6B or 43% of the total cost growth. Some $300 M of this amount was acknowledged at contract award due to the difference between the value of the budget and the bid with the transfer of production risk to Astaldi which had been included in the estimated, but unfunded, $1.3 B DG3 P75 risk estimate exposure. Additionally, the two-year schedule delay was considered a real risk at DG3 and was carried in the P75 Risk Estimate at a value of ~$400 M due to the cost of carrying the Project. What was unforeseen, and is considered an extreme and unexpected risk event beyond the DG3 P75 Risk Estimate, was Astaldi's financial instability and its effect on their general inability to complete the work, given the difference between their bid basis and actual productivity achieved. This resulted in a sizeable risk that was too large for Astaldi to financially absorb (i.e. highly probable to have precipitated the default of the parent), hence contributing up to $750 M to the overall cost overrun.

**Figure 7: Contribution of Astaldi Risk Mitigation to Overall Cost Growth**



A summary of the cost growth across all contracts is presented in Figure 8. This analysis indicates that in excess of 20% or $800M of the total cost growth was a result of the High Voltage Direct Current (HVdc) transmission line (TL) construction (inclusive of right-of-way clearing and access works). Beyond the HVdc transmission line and Astaldi, the balance of the cost growth is largely spread across all contract packages. Further analysis of the growth within the overland transmission lines scope is discussed later.

**Figure 8: Cost Growth Realization within Commitment Packages**



## PROJECT COST UPDATES

Another issue that has garnered a lot of attention is how the Project Costs were announced publicly and why they were announced in increments. The reasoning for this should be considered in a context of how the Authorization for Expenditures (AFEs) were publicly announced, which occurred annually from 2014 onwards as follows:

- **AFE at Sanction December 2012:** A P50 projection of $6.2 B based on the DG3 estimate and known tactical risks at the time.

- **AFE Rev 1 June 2014**: A P50 projection of $6.99 B, primarily based on the executed contracts and purchase orders up to that point in time was required as a condition of the Financing Agreement which states that the Project Costs needed to be formally updated to Canada and the Financiers when firm costs were known that could result in a cost overrun (i.e. above $6.5B).

- **AFE Rev 2 September 2015:** A P50 projection of $7.65 B was primarily based on the executed contracts and purchase orders up to that point in time. As Astaldi faltered, it was becoming apparent that the other contractors viewed the Project as a high-risk proposition and were unwilling to take on labour risk without a considerable premium. It was also a period when the SNC-Lavalin (SLI) corruption scandals occurred and forced LCMC to change from the Engineering, Procurement and Construction Management (EP+CM) model to an integrated team. As a condition of the financing agreements, the Project was obligated to formally notify Canada and the Financiers prior to the anniversary of Financial close of any cost overrun which the Province would be required to pay a Pre-Funded Equity amount into a special account.

- **AFE Rev 3 June 2016:** A P50 projection of $9.1 B was primarily based on the 2016 Astaldi Bridging Agreement payment and increased Owners costs as a result of the schedule delay caused by Astaldi's delays. The Project was obligated to formally notify Canada and the Financiers prior to the anniversary of Financial close of any cost overrun which the Province would be required to pay the Pre-Funded Equity into a special account.

- **AFE Rev 4 December 2016:** A P50 projection of $9.426 B was primarily based on the full 2016 Astaldi contract amendment agreement and the impact of the revised schedule would have on the other Contractors as well as the emerging known costs increases from the transmission and HVdc contracts. The Project was obligated to formally notify Canada and the Financiers prior to the anniversary of Financial close of any cost overrun for which the Province would be required to pay the Pre-Funded Equity into a special account. The amount required from the Shareholder was offset to a degree by the Federal Loan Guarantee #2 (FLG2), which reset the cost overrun threshold from which pre-funded equity payments would be required thereby reducing the financial impact on the Province.

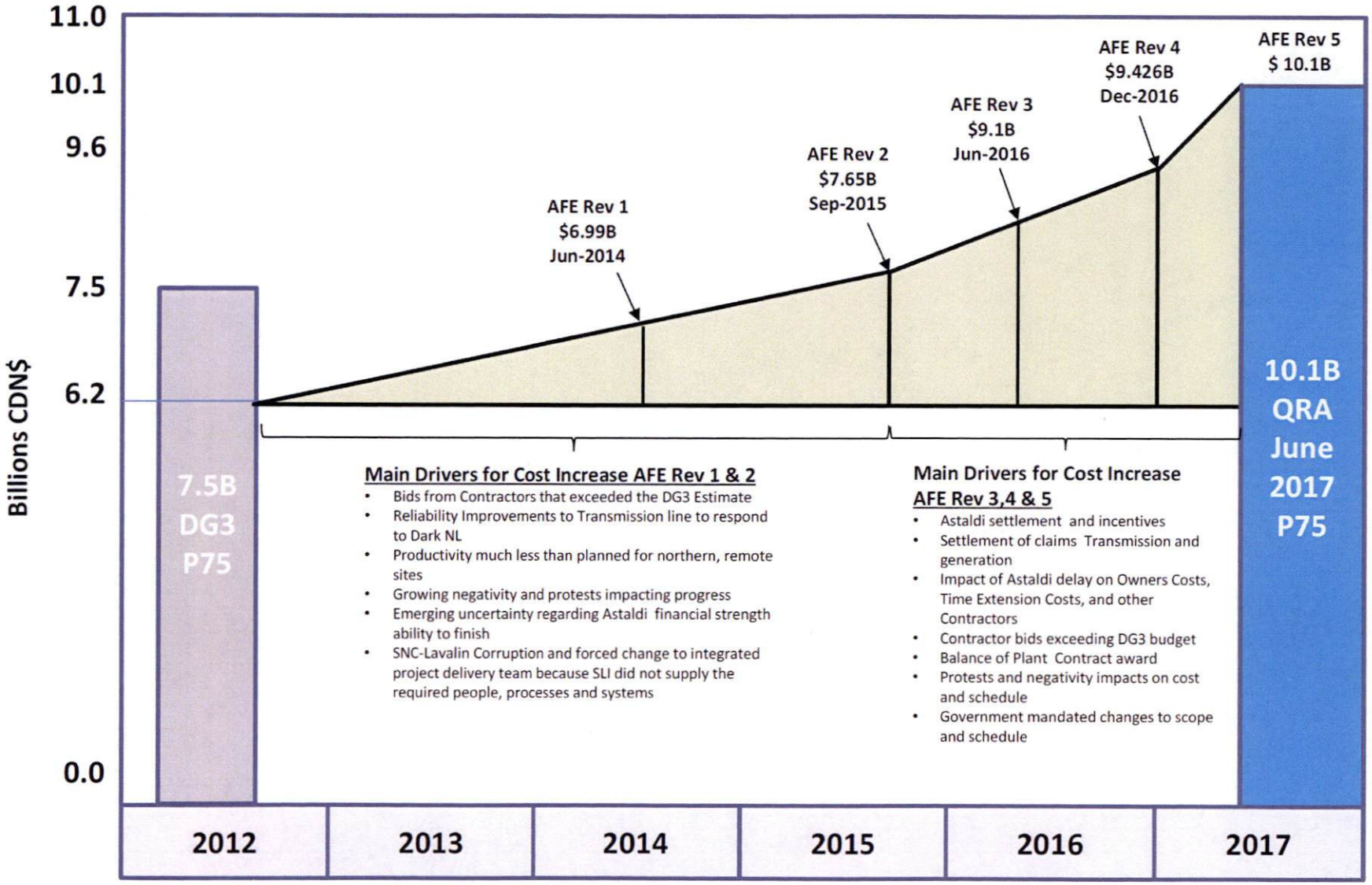
- **AFE Rev 5 June 2017**: A P75 projection of $10.1 B was primarily based on selecting the increased probability but also included the settlement of claims, increases in owner's costs to reflect the revised First and Full Power dates, power from Churchill Falls, and Government of Newfoundland and Labrador (GNL)-mandated costs.

Figure 9 bridges the timing of when the unknown events/unknown strategic risks were realized, with successive public cost announcements and resultant AFE increases that occurred subsequent to Project Sanction. As indicated, each AFE incorporated all knowns at the time in order to present a contemporaneous viewpoint of the expected final cost for the Project.

In summary, the main drivers for the cost increases represented under AFE Revisions 1 and 2 (up to end of September 2015) were market price conditions, combined with early investments made at Muskrat Falls and transmission line reliability improvements. It was only in Q4-2015 that the true exposure created by the Astaldi situation was understood, adding the major cost contributor beyond the $7.53 B.

The main driver of the progression of the annual AFE increases was the cost updates required by the Project Financial Agreements and the formal declaration of firm and certain cost overruns to the Federal Government. It is important to note that, as agreed with Canada and the financiers, the cost overruns were to be based on firm and certain costs and not forecasted costs that were still under development/negotiation or bid as these would be subject to the pre-funded equity provisions of the Project Financial Agreements.

Figure 9: Contribution of Unknown Events / Unknown Strategic Risks to each Public Cost Update



## UNEXPECTED EXTERNAL EVENTS / UNKNOWN STRATEGIC RISKS THAT SIGNIFICANTLY AFFECTED THE PROJECT

As highlighted in Figures 3 and 4, a number of unexpected external events or unknown strategic risks resulted in significant challenges for the Project, which largely manifested themselves as cost overruns, far in excess of the $7.5 B (P75) DG3 risk-adjusted cost estimate. The timeline shown in Figure 9 indicates when these unexpected events began to be realized.

In some instances (as in Risk #1 below) these external events were macro-economically driven (e.g. slumping oil price). This particular event resulted in turbulence within the Shareholder's world through declining oil revenues, which in-turn directly affected the Shareholder's ability to provide the guaranteed equity to the Muskrat Falls Project. The resultant turbulence within Nalcor and the Project has been further fueled by media messaging that the Province's fiscal woes were a result of Nalcor draining the public coffers, and hence social programs must suffer. With this, public support for the Project declined, providing ideal conditions for excessive negativity and an anti-Muskrat Falls sentiment, not just publicly but within the contracting and supply community as well. A prime example of this was an increase in claims with specific reference made to the lack of political support and subsequent fear of additional risk. As well, the increased negativity resulted in the willingness of the balance of plant (CH0031) bidders to take risk drop considerably.

In order to paint a picture of the effect these unknown and unexpected strategic risks had on the Muskrat Falls Project, herein is a summary of the main strategic risks, inclusive of their effect and consequences on the Project.

## UNEXPECTED EVENT / UNKNOWN STRATEGIC RISK #1
## SLUMPING OIL PRICES AND IMPACT ON SHAREHOLDER FISCAL CAPACITY

***Risk Brief***

- As illustrated in Figure 10, during the period beginning in mid-2014, oil prices, which had been hovering between $0 to $110 US/bbl, quickly declined, bottoming out at $28 US/bbl in February 2016. Combined with declining oil production, the Province's revenues from oil royalties dropped from the $2 B+ annually to ~$500 M (reference Figure 11), leading to increased deficits.

***When did the Risk Manifest itself into a Major Project Issue***

- By mid-2014, it was becoming clear that in a low-oil price environment, the Province's fiscal situation was worsening. that Concurrently with the negative impacts on the Province's fiscal capacity, the expected cost to complete the Project was increasing, thus leading to the Shareholder experiencing difficulties with meeting the equity investment requirements that the Province was obligated to provide under the Federal Loan Guarantee (FLG).

***Effect on Muskrat Falls Project***

a) **Ability of the Province to maintain pre-funded equity covenants for Project contained within the Federal Loan Guarantee 1 (FLG1).**

- FLG1 was predicated on Canada providing a loan guarantee of $5B of debt required for the Muskrat Falls Project, with the balance of the total $6.2B being funded by equity. All cost over-runs were to be funded by equity from the Province.

- Provisions within the FLG1 Agreement required that equity for any forecasted cost overruns be set aside by the Province in a pre-funded equity escrow account (i.e. COREA provision or Section 4.10 of FLG1 agreement). Interpretation of this provision meant that overly conservative forecasts would result in the Province having to put more of its limited revenue aside (i.e. in escrow) to fund such potential over-runs, or it would be in breach of FLG covenants. All funds placed in escrow for potential use at a later time would deprive the Province of current funds required to fund other Provincial programs.

- In an effort not be too punitive, Canada agreed that such forecasts would represent known, firm costs, such as awarded contracts and settled claims, and not be speculative in-nature by factoring in such elements as opening bid prices or submitted, unattested claims. By doing this, the amounts of funds the Province would have to place in escrow would be reduced, thus aiding their ability to maintain other Provincial programs in this period of reduced oil royalty revenues.

b) **Muskrat Falls Project targeted as a drain on the Province's limited fiscal resources.**

- The repeated and escalating cost forecasts contributed to public sentiment and perception that the Project was out of control.

- Incoming Liberal government made it clear that cost overruns on Muskrat Falls were a burden to the Province.

***Net Consequences***

a) **Cost forecasting had to consider the obligations under the COREA (pre-funded equity) provision, thus it would have punitive effects on the Province's fiscal situation if potential costs and not firm costs were provided.**

- Project cost forecasts made public were to reflect known cost over-runs, while future cost risks and trends were characterized as under study and subject to future confirmation and reporting.

- The net result was that public cost forecasts were not risk-adjusted cost forecasts that considered the potential exposure of potential risk items. This led to repeated cost updates and a view that costs were not in control.

- The Province's weakened fiscal situation contributed to the reluctance to communicate early to the public that cost over-runs had occurred, rather as illustrated in Figure 10, there was an extended lag between when Final Forecast Cost (FFC) updates were available and when such information was approved to be shared with the public.

b) **Declining public support and growth of anti-Muskrat Falls sentiment; declining reputation of Nalcor Energy**

- As illustrated in Figure 11, public support for the Project has declined significantly over the period of 2015 through 2017.

- Repeated negative media coverage and messages from GNL has resulted in a general air of negativity surrounding the Project, and a view that there is a lack of Shareholder support. This is dramatically different than the policy statements made within the 2007 Energy Plan, wherein the Shareholder is seen as a champion of Nalcor and the Muskrat Falls Project.

c) **Political opportunity – Liberals leveraged the situation as part of its 2015 campaign, promising to "open the books on Muskrat Falls."**

- Weakening public support for the Project as reflected in Corporate Research Associates (CRA) polling appeared to be factored into the opposition party 2015 campaign. Following election, the Premier announced an independent review (Ernst and Young (EY) review) into the Muskrat Falls Project which became a major distraction for the Project. One of the direct consequences of this review was a halt of negotiations with Astaldi regarding their commercial situation.

- The end result was the departure of CEO Martin, the arrival of CEO Marshall, and the negative statements in the media such as the Project is a "boondoogle."[12] Soon after, the Project Team was re-organized (i.e. bifurcation); new leadership was put-place and in the meantime, project negativity reached an all-time high. Contractors see the situation as opportunity, and in some case table large claims to compensate for their own performance shortcomings in an attempt to put blame on LCMC Management. This type of negativity turned what was already a challenging situation, into a much more difficult one.

[12] Reference CBC news article "*It's official: Muskrat Falls a boondoggle, says Stan Marshall*" published 24-Jun-2016.

**d) FLG2 significantly relaxed Canada's expectations that NL fund all forecasted overruns in an escrow account; Nalcor Executive and the Province were less concerned with forecasting the overall cost as it would not be punitive to the Province's current fiscal situation.**

- AFE Rev 4, 5 & 6 illustrate a more conservative forecasting philosophy than what was used for earlier AFEs. This was enabled by the relaxed provisions within FLG2, as well as by a changed ideology that was espoused by the new Nalcor Executive. Figure 14 illustrates that under the new CEO, contingency levels increased dramatically as percentage of spend-to-go.

**Figure 10: Relationship Between Project Approval Timeline and Oil Prices**

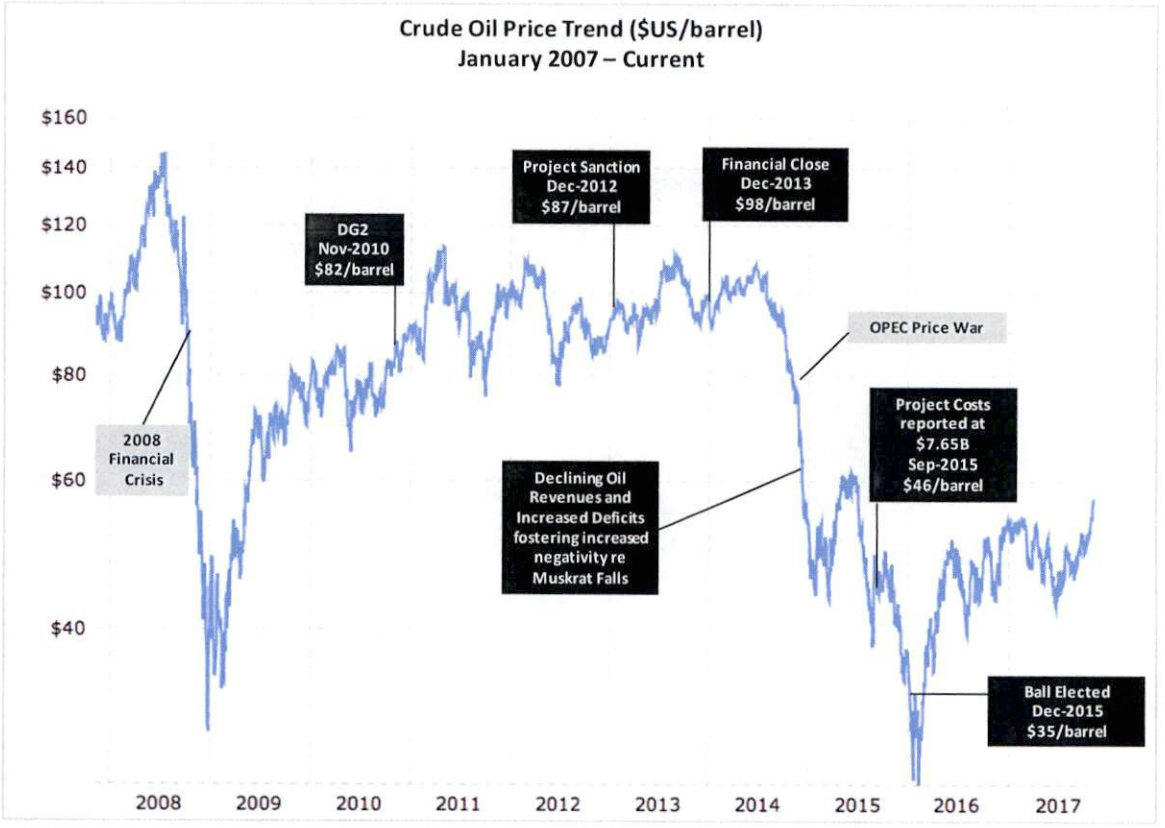


**Figure 11: Newfoundland and Labrador Revenue from Offshore Royalties** [13]

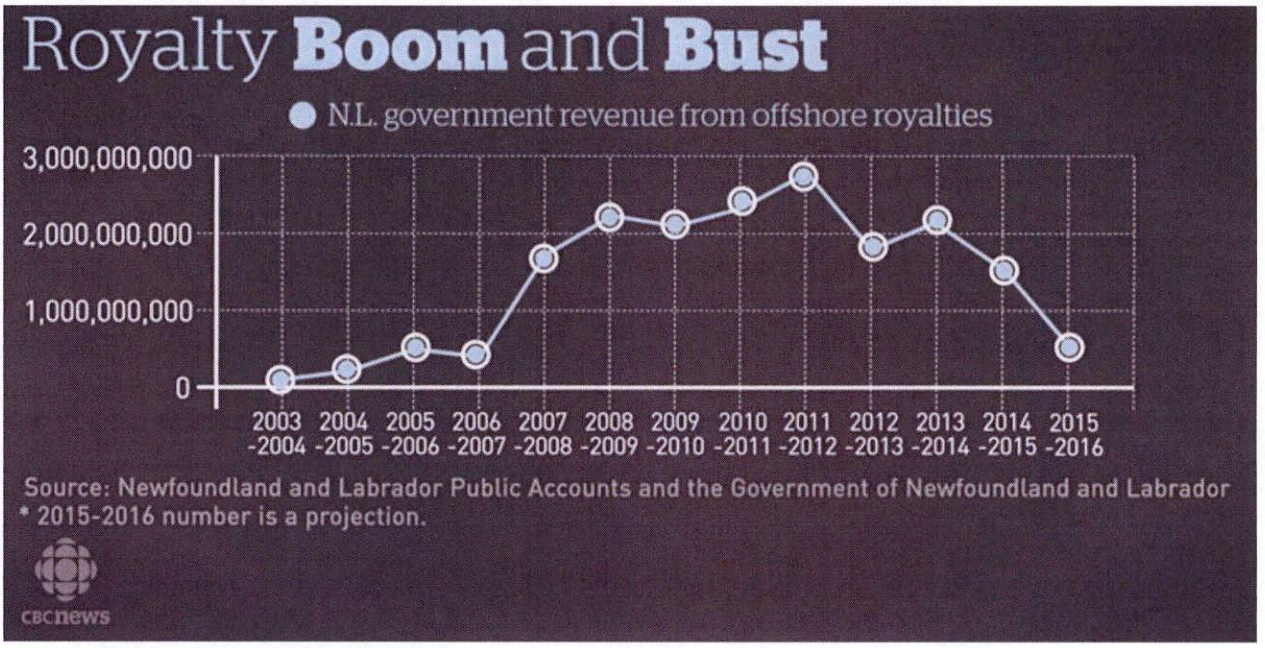
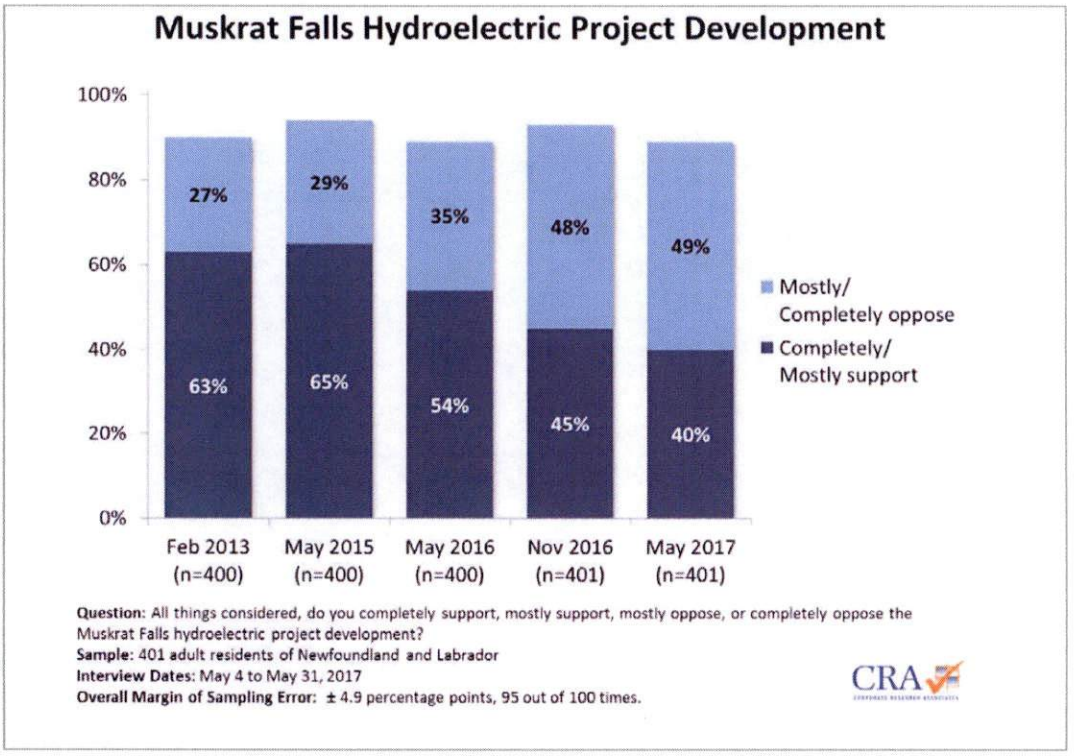



**Figure 12: Corporate Research Associates' Public Opinion Polling re Support for Muskrat Falls Project (2013 – 2017)** [14]




[13] From CBC News Article "*Royalty bust brings pain to Newfoundland and Labrador*" 13-Apr-2016

[14] Reference Corporate Research Associates news release "Support for Muskrat Falls development at its lowest level since 2013" dated 20-Jun-2017.

**Figure 13: Communication of Project Costs**

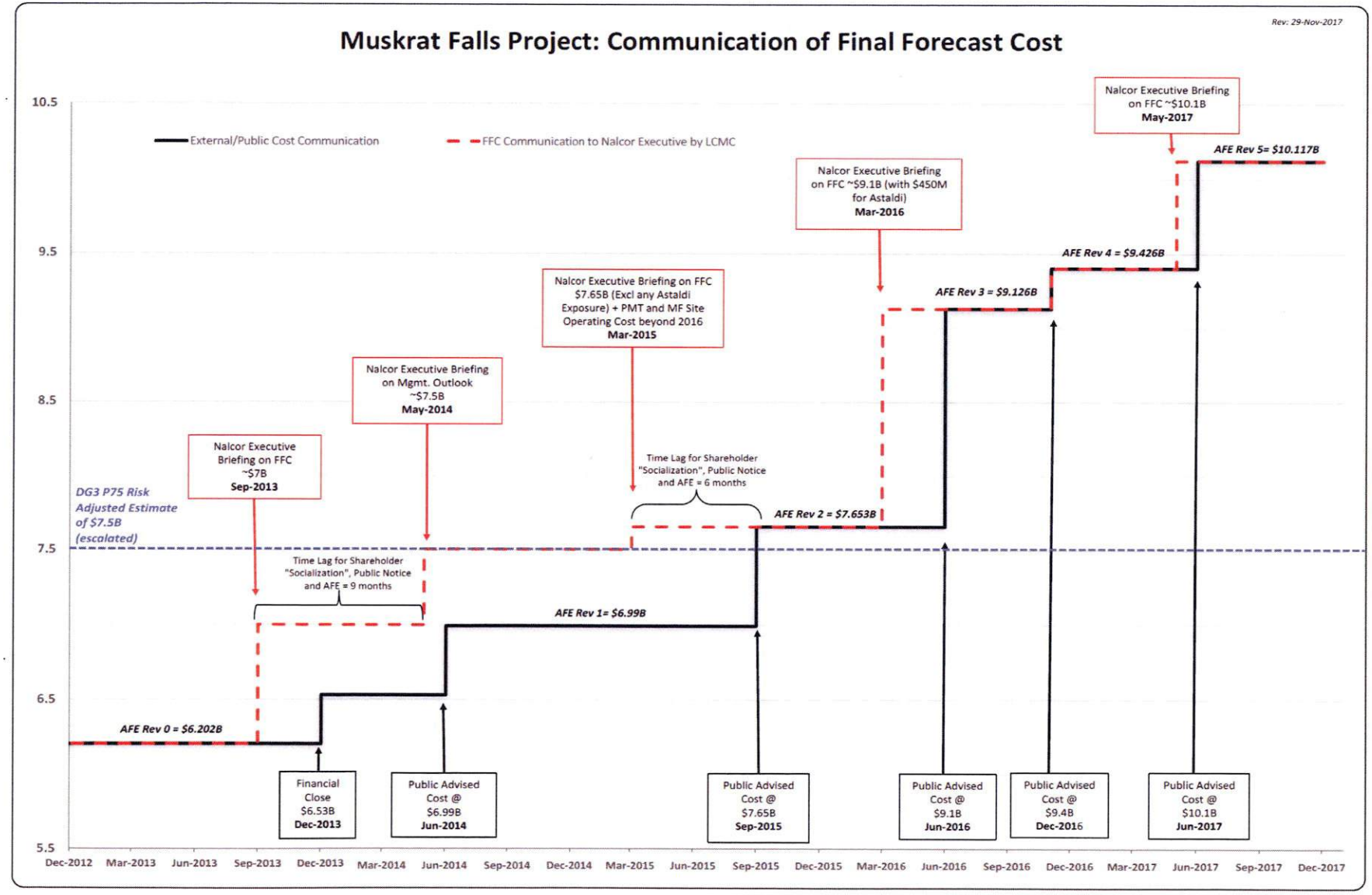
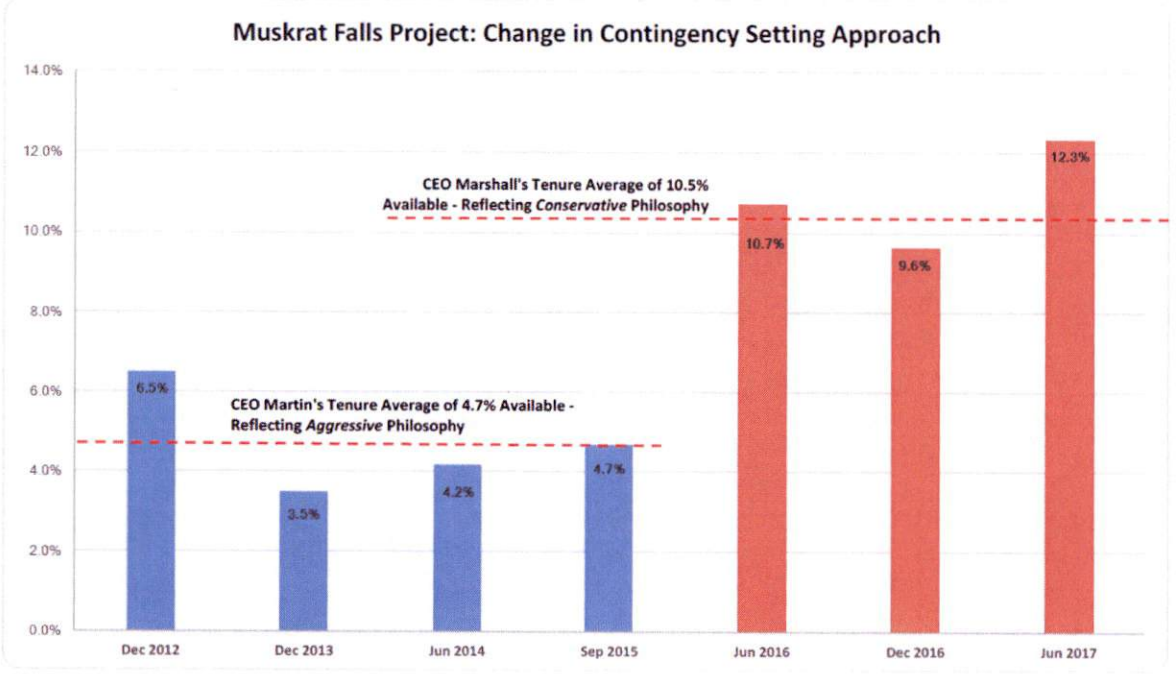


Figure 14: Contingency Setting pre-and post-FLG2 and Under Different CEO Regimes

**Muskrat Falls Project: Contingency Allowance Available for Risk Mitigation and Change Management**

| | Dec 2012 Sanction DG3 | Dec 2013 Financial Close | Jun 2014 Update AFE Rev 1 | Sep 2015 Update AFE Rev 2 | Jun 2016 Update AFE Rev 3 | Dec 2016 Update AFE Rev 4 | Jun 2017 Update AFE Rev 5 |
|---|---|---|---|---|---|---|---|
| Muskrat Falls Generation | 2,901 | 3,265 | 3,372 | 3,686 | 4,801 | 5,071 | 5,500 |
| Labrador Transmission Assets | 692 | 720 | 832 | 878 | 878 | 878 | 894 |
| Labrador Island Transmission Link | 2,610 | 2,546 | 2,786 | 3,089 | 3,447 | 3,447 | 3,724 |
| Total Facilities Costs ($M) | 6,203 | 6,531 | 6,990 | 7,653 | 9,126 | 9,396 | 10,117 |
| **Contingency Included Above** | **368** | **187** | **224** | **187** | **386** | **301** | **339** |
| Incurred To-Date | 187 | 971 | 1,381 | 3,457 | 5,138 | 5,970 | 7,029 |
| Plan Cost Remaining (excluding Contingency) | 5,648 | 5,373 | 5,386 | 4,009 | 3,603 | 3,125 | 2,749 |
| **Contingency (%) of Planned Cost Remaining** | **6.5%** | **3.5%** | **4.2%** | **4.7%** | **10.7%** | **9.6%** | **12.3%** |

All Costs above in $M CDN



## UNEXPECTED EVENT / UNKNOWN STRATEGIC RISK #2
## ASTALDI – MAJOR CONTRACTOR NEAR FINANCIAL FAILURE [15]

***Risk Brief***

- Astaldi Canada Inc. was awarded Commitment Package CH0007 "Construction of the Spillway, Transition Dams and Powerhouse" for the Muskrat Falls Generating Station in the fall of 2013. The bid award process took the better part of a year to complete and Astaldi beat out three other international contractors on both technical and commercial screening.
- Due to a number of issues, including primarily to lower productivity rates than had been estimated, start-up issues in 2014, construction management issues, a lack of understanding of the labour relations environment, their inability to execute their plan for winter production with the failure of the Integrated Cover System (ICS) and Astaldi's overall corporate liquidity, Astaldi's ability to complete the scope of work was severely jeopardized, resulting in the need for LCMC to identify the most effective way to ensure that the CH0007 remaining scope of work was completed in a commercially and technically sound manner, while maintaining the overall project schedule to the best extent possible.
- A thorough analysis was completed and confirmed by third parties including Westney Consulting, EY, and Canada's Independent Engineer (IE), which concluded that the best situation for the Project was to stay with Astaldi and negotiate a revised contract; however, Astaldi had to demonstrate consistent concrete placement amounts and a willingness to take a significant loss.

***When did the Risk Manifest itself into a Major Project Issue***

- The two main root causes of Astaldi commercial issues were (i) an estimated productivity target could not be met; and (ii) Astaldi's slow mobilization and start-up and failure of the ICS to allow year-round work in the powerhouse.
- The slow mobilization and start-up manifested in 2014 and LCMC took immediate corrective action to push Astaldi to turn around its performance in key areas such as project management organization, workface supervision, labor skills and competency assessment, project planning, quality control, and safe job planning. By late 2014 the turnaround ability became evident and clearly manifested itself in solid performance in 2015 onward (reference concrete production curve shown in Figure 15).
- The productivity gap between estimated and actual performance existed in 2014, with Astaldi's slow start and mobilization woes. By late 2015 / early 2016, the extent of the gap between actual or best practical attainable production rates and Astaldi's bid estimate became clear, including the labor cost delta between the bid price and Astaldi's projected outlay. Extensive analysis confirmed that Astaldi did not have the ability to cover the total financial exposure to which they were being exposed, however Astaldi still bear a significant part of the cost overrun.
- Further delays were a result of the collapse of draft tube 2 and the resultant Occupational Health and Safety stop work order issued to Astaldi, which resulted in approximately a five-month delay to the powerhouse completion date.

[15] For a complete insight into Astaldi file, refer to supporting project files in the PCNs.

***Effect on Muskrat Falls Project***

a) While the 2017 schedule was highly aggressive, as confirmed by the DG3 QRA, Astaldi's mobilization and start-up problems further compounded an already challenging situation, resulting in a two-year delay in first power. Had Astaldi not had these problems, it is quite probable considering the concrete production rates achieved in 2015 – 2017 that they would have been able to support a 2018 First Power target date, thereby surpassing the risk-adjusted schedule presented at DG3.

b) Astaldi's situation exasperated the significant negative publicity surrounding the Project and helped contribute to the downward spiral of Nalcor's reputation, and a general questioning of whether LCMC was in control of the Project.

c) Added risk of contractor default and non-completion of the work, would have likely resulted in First Power slipping another 1-year plus beyond the 2019 date.

d) Direct impact on Muskrat Falls Corporation's (MFC), via LCMC, obligations to other contractors (i.e. Andritz Hydro) leading to cost growth on these packages.

***Net Consequences***

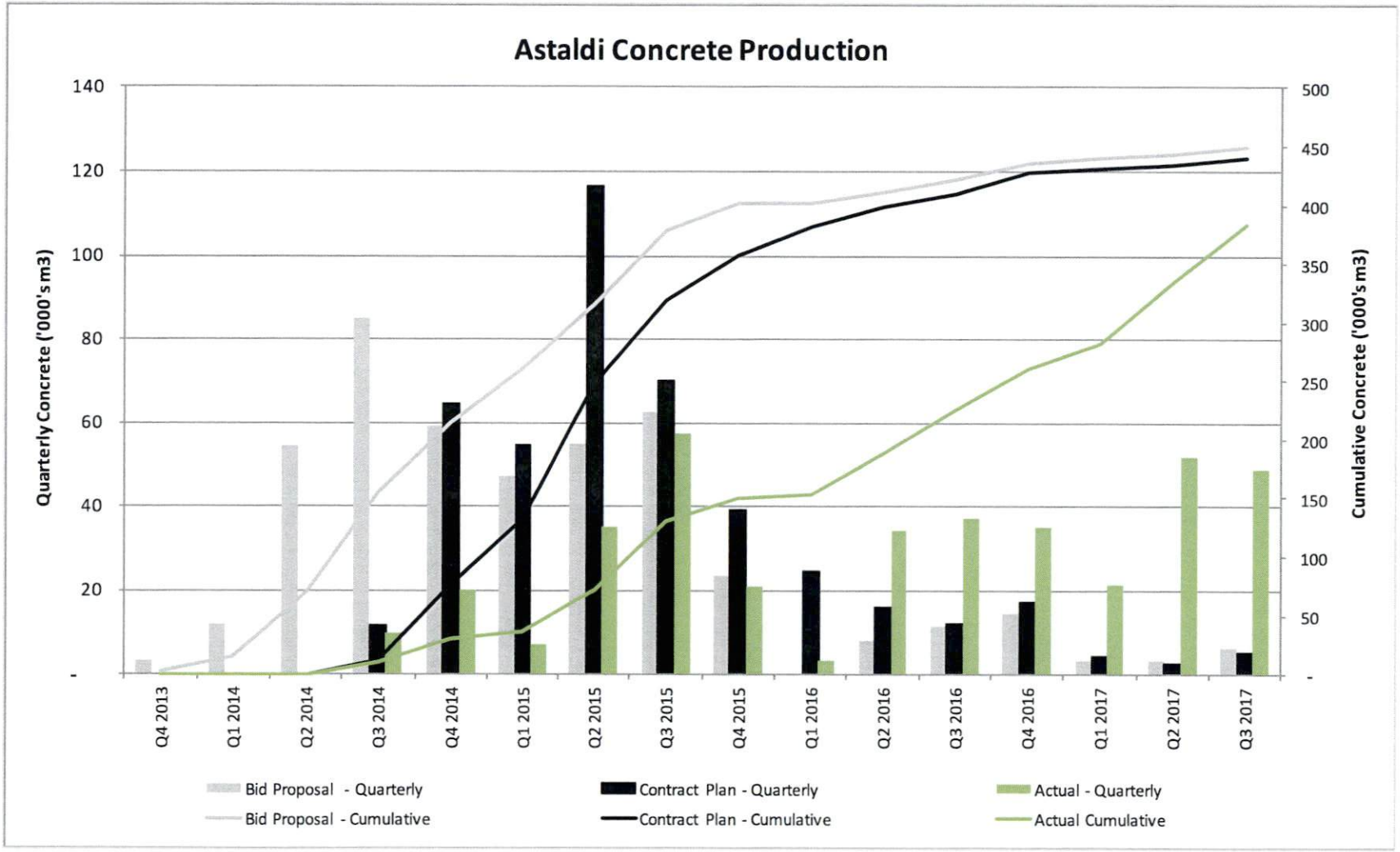
a) Nalcor's evaluation concluded that there were limited options available and that the preferred option which had the lowest cost and schedule risk to the Project was to retain Astaldi as the contractor and negotiate a contract amendment with them which would provide enough financial incentive to complete the job, but at the same time maximizing their losses and minimizing Nalcor's contribution. It is also important to note that financial securities were increased and Astaldi retained the completion risk.

b) CH0007 Completion Agreement and Bridging Agreements combined resulted in LCMC through MFC funding Astaldi an additional ~$700 million, however Astaldi would still take an estimated loss of $300+ million. Under this arrangement, Astaldi paid for their errors, including mobilization and start-up woes, while MFC paid for a reasonable equivalency of the estimated productivity gap.

c) MFC's exposure to other Contractors amounted to almost $200 million.

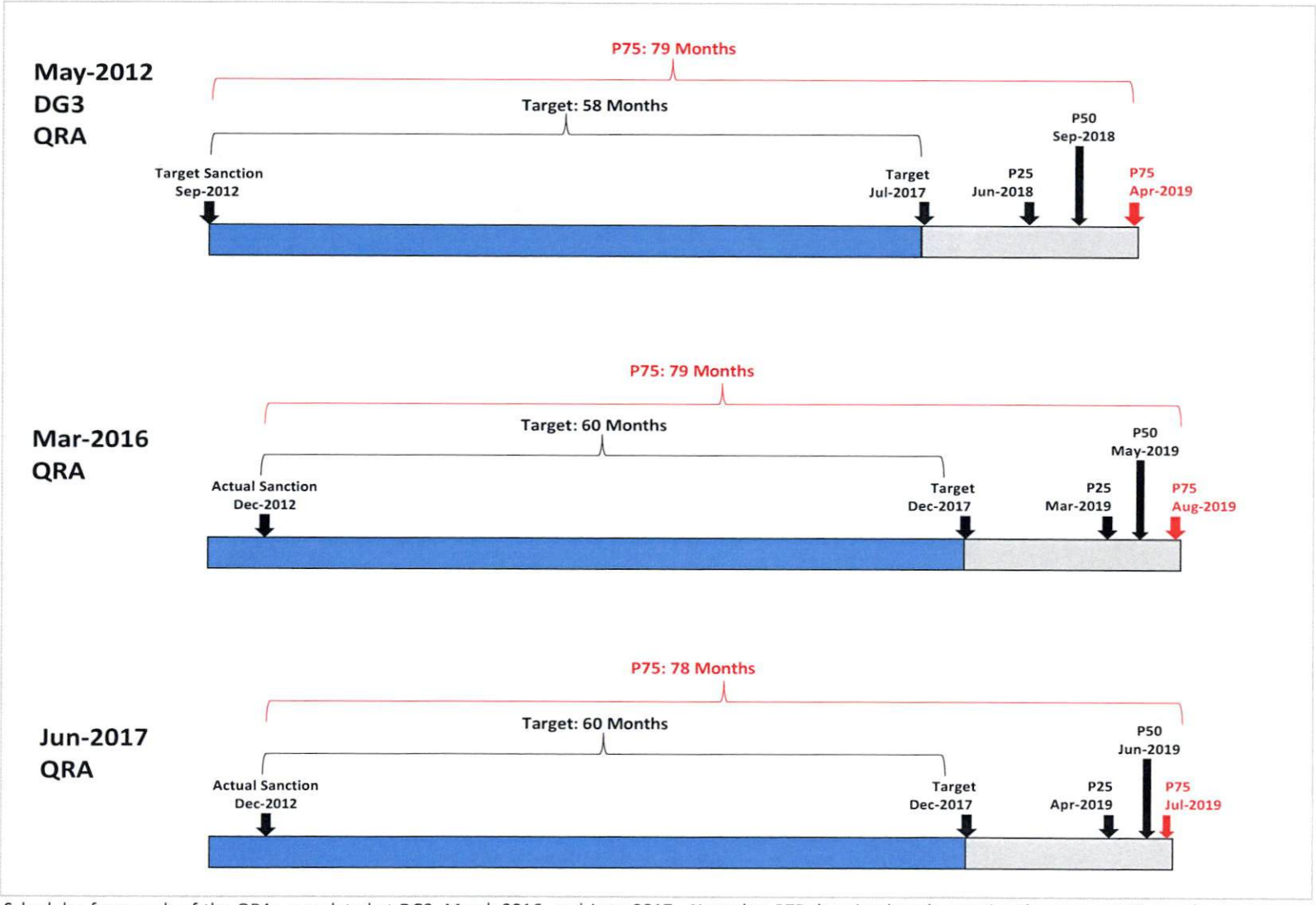
d) The delay in the first power dates by some two-years is expected to cost ~ $15 million per month in additional owner's costs. While LCMC did foresee a situation wherein its contractor would financially not be able to absorb the financial loss associated with poorer than planned productivity, within the DG3 QRA LCMC did identify that the schedule risk was significant at 21 months and the schedule carrying cost should be funded within the DG3 P75 Risk Adjusted Cost Estimate. Figure 16 below illustrates this concept.

Figure 15: Astaldi Production Curve




Note: The Bid Proposal Production Plan (dated Apr-2013) was adjusted to the Contract Plan given that the award date was later than anticipated within the RFP. Astaldi's adjusted production rates (for start-up) were extremely aggressive and as time would reveal, not achievable, while the actual production rates (green lines) illustrate the start-up and mobilization problems.

**Figure 16: Comparison of Risk-Adjusted Schedules for Muskrat Falls Generation**




Note: Schedules from each of the QRAs completed at DG3, March 2016, and June 2017. Note that P75 duration largely remains the same at 79 months, as opposed to the target duration of 58months to align with a 2017 First Power.

## UNEXPECTED EVENT / UNKNOWN STRATEGIC RISK #3
## 2014 ISLAND-WIDE POWER OUTAGES (DARKNL)

***Risk Brief***

- Substantial power outages occurred in January 2014 due to power supply interruptions by NL Hydro which resulted in a multi-day power outage across the Island. This lead to intense public criticism of both Nalcor and the GNL for how they handled the situation.

- Subsequent to power restoration, the PUB initiated a review to understand what caused such events. Using Liberty Consulting, the review concluded that the outages were rooted in *"poor asset management practices"* within Newfoundland and Labrador Hydro and fostered by a *"non-proactive organizational culture."* Going forward, the PUB's expectation was an increased level of reliability that must be expected from the provincial grid.

***When did the Risk Manifest itself into a Major Project Issue***

- The outages of 2014 reaffirmed that the future reliability of the Province's electrical grid was hinged upon the robustness of the Labrador-Island Transmission Link. Internal Nalcor discussions following the Liberty Review report confirmed the need to continue with the further implementation of strategic reliability enhancement measures.

***Effect on Muskrat Falls Project***

a) The Liberty Review heavily critiqued claims that reliability would be enhanced after Muskrat Falls was commissioned.

   - NL Hydro asserted that the Island grid would be significantly enhanced following the commissioning of the Muskrat Falls Generation facility, the Labrador-Island Transmission Link (LIL), and the Maritime Link (ML).

   - This review included an emphasis on the reliability of the HVdc link, including current planning assumptions, operating philosophies, etc. This level of critique provided the further impetus for Nalcor to make the incremental changes, investments and upgrades that would enhance the reliability of the HVdc link.

   - Liberty Consulting reached a conclusion that, based on the information Nalcor had presented, the Interconnected Island Muskrat Falls and the Maritime Link "*can represent a state-of-the-art electrical system whose reliability is improved over today's circumstances*" (August 2016 Report).

b) The Liberty Review internally highlighted that NL Hydro's planning for the operations and maintenance planning had not advanced and that gaps existed in the emergency restoration planning.

   - Despite conveying how the grid reliability would be enhanced because of the robust TL design, there was a need to improve how to access and repair the line during unplanned outages.

- During the Liberty Review, NL Hydro stated that repairs were based on a 2-week repair time, which in-turn influenced the overall reliability of the line.

- While the LIL Environmental Impact Statement (EIS) included the establishment of permanent access, the DG3 project planning and cost basis was premised on no requirement to establish permanent access for the operations and maintenance phase. Rather, only temporary construction access, exclusive of where helicopter and winter-only construction techniques were needed. However, in recognition of the reliability enhancements that would be gained with permanent access (i.e. reduced time to complete outage repairs leading to shorter outage duration), it was recognized that the access network being constructed should be to a standard for long-term operational use, and facilitate a much shorter repair time in case of line failure in remote locations.

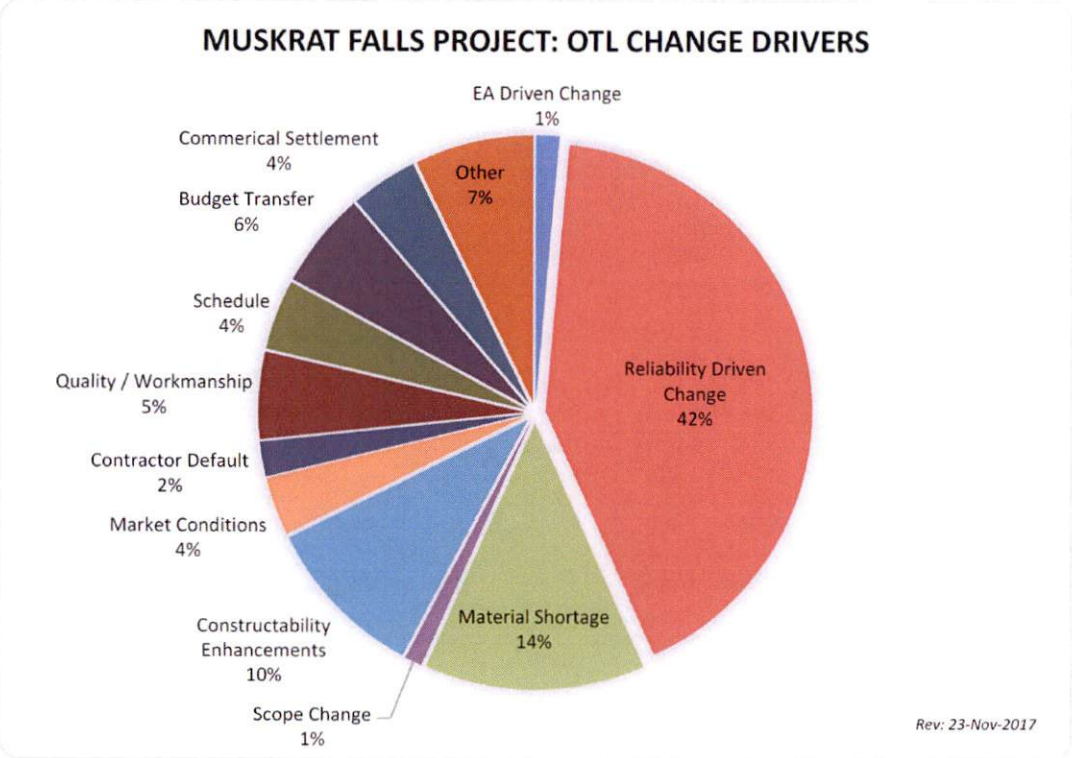
***Net Consequences***

- The design changes resulting from the Liberty Review, which had not been included in the DG3 estimate, were implemented in the HVdc transmission line in order to increase overall system reliability. These changes could not be funded within the DG3 P75 risk-adjusted estimate and included changes in routing, structure spotting, tower-type utilization, strength utilization, etc.

- Figure 17 provides some insight into the extent of the design changes as a percentage of overall changes across the entire High Voltage Alternating Current (HVac) and HVdc transmission line scope.

b) Nalcor made a decision to further enhance construction access along the HVdc transmission line so as to provide a long-term access solution for operation and maintenance, thereby enhancing the overall reliability of the HVdc link. These upgrades were beyond the DG3 P75 risk-adjusted estimate.

**Figure 17: Overland Transmission Lines – Causes of Changes** [16]




[16] Information is based upon an analysis of all Deviation Alert Notices logged within LCMC's Management of Change program from inception up to September 2017. Total DAN count = 566, where HVdc line = 368 and HVac line = 198. For details on the DAN process, refer to LCMC document Change Management Plan, Nalcor Doc. No. LCP-PT-MD-0000-PM-PL-0002-01.

## UNEXPECTED EVENT / UNKNOWN STRATEGIC RISK #4
## MARKET RESPONSE TO INCREASED NEGATIVITY OF PERFORMING WORK BOTH WITHIN THE PROVINCE AND AT MUSKRAT FALLS SITE

***Risk Brief***

- Following Project Sanction, it became apparent that contractor's bids for work were exceeding the DG3 estimate, while many bidders expressed an unwillingness to accept labour and productivity risk for work in the Province. The labour cost increases that were occurring on the Long Harbour Project and the Hebron Project contributed to this unwillingness to take labour risk.

- Prior to Sanction, the national and local marketplace for construction labour was competitive, with Western Canada oil sands projects and both Hebron and Vale's Long Harbour projects in NL consuming significant contractor and labor capacity at price premiums.

- Responses to Request for Proposals (RFPs) often contained pricing that was in excess of the DG3 estimate. This was particularly evident for all in-Province works (i.e. labor component within Province), while pricing for engineering and globally-manufactured items (e.g. turbines, generators, submarine cables, transmission line hardware, transformers, and conductors) were generally more aligned with the estimate.

- Market pricing showed extreme variance. In some cases, new international bidders (e.g. Isolux for CT0319-001 HVac Transmission Line) acknowledged that they were adding in significant risk premiums over and above the estimate to account for the unknowns of working in this jurisdiction, while in other cases local and Canadian firms acknowledged their inclusion of significant risk premiums based for labor productivity in NL and the cost of working in Labrador.

- The realization of this price differential was the main driver of the FFC presented at each of AFE Rev 1 and Rev 2.

***When did the Risk Manifest itself into a Major Project Issue***

- The risk first began to materialize in early 2013, following the receipt of key bids including:
  - CH0007 – Construction of Intake, Powerhouse, Spillway and Transition Dams
  - CH0032 – Supply and Installation of Hydro-Mechanical Equipment
  - CT0319 – Construction of 315kV HVac Transmission Lines (MF to CF)
  - CD0501 – Supply and Installation of HVdc Converters

- With successful RFP responses for the largest contracts, market conditions generally revealed that final pricing would reflect a premium beyond the DG3 estimate. Figure 18 provides an indication of how bid prices compared to budget prices.

- The situation continued to materialize into 2015 and was one of the key drivers for the cost increases presented in AFE Revisions 1 and 2. The final market pricing exposure would come with the award of Commitment Package CH0031 – Supply and Installation of Mechanical and Electrical Auxiliaries in summer 2017.

- The three major international bidders for the HVdc converter stations and switchyard contracts normally used a rule of thumb when bidding, whereby two-thirds of the bid price was for the manufacturing and installation of equipment and one-third for civil works. When preparing the bids for LCP they found that the civil works price from civil sub-contractors was two-thirds of the total bid price and the manufacturing and installation was one-third of the total bid price. They claimed this was because of labour productivity risk.

***Effect on Muskrat Falls Project***

a) By September 2013 internal discussions highlighted that market conditions would result in project cost reaching $7 B. This was reflected in the June 2014 AFE Rev 1 when $6.99 B was approved. Subsequently, further AFE revisions were sought to accommodate the price growth being experienced. Figure 19 endeavours to illustrate the linkage between timing for receipt of bid intelligence and the successive cost updates that were driving the need for each of the AFE Revisions 1 and 2. As can be seen, bid responses were directly feeding the cost outlooks being provided to Nalcor Executive.

b) Procurement timelines were extended dramatically due to (i) extended bid durations, (ii) requirement to conduct value-engineering exercises post RFP proposal submission in an effort to reduce the contract cost, (iii) multiple re-bids, and (iv) lengthy negotiations. The extended timelines for these activities often led to substantive delays in the receipt of bid prices and the final values that would be required for presentation in the costs presented to Canada and the Independent Engineer.

c) During contract negotiations it was extremely difficult if not near impossible to transfer labor and productivity risk (e.g. via a lump sum or unit price compensation scheme) to the contractor for the DG3 budget price. Achieving an outcome that would allow the Project to proceed without lengthy schedule delays, would often require that both LCMC and the contractor agree to a risk-sharing commercial framework. While rebidding of major packages did occur (e.g. CD0501 – Converters, and CH0031 – Mechanical and Electrical Auxiliaries), they had to be done with the awareness that there was a trade-off against time to re-bid, the potential cost savings, and the added schedule risk of a delayed award.

d) In attempts to achieve an acceptable cost at award and maintain true to the objective of balancing absolute cost against cost predictability, alternate risk-sharing contracting models were implemented as a way of exploiting opportunity to achieve the lowest possible cost for the Shareholder.

***Net Consequences***

a) The use of alternate risk-sharing arrangements had mixed success. In some instances, the results were very positive (CH0008 – North Spur), while in other instances a combination of factors contributed to an outcome that was far from envisioned (e.g. CT0327-001 – HVdc TL Right-of-Way (ROW) and Access Works – Part B and CH0009 – North and South Dams – Direct Labor Cost).

b) Uncertainty on outcomes resulted in an inability to provide firm cost forecasts. Considering that overly conservative forecasts would be punitive to the Shareholder under the COREA provisions of the FLG, only what was known was presented in the public cost forecasts, thereby creating a situation of repeated and changing cost increases for the Project. This in turn contributed to public claims and perception that Muskrat Falls was out of control.

**Figure 18: Muskrat Falls Project – Commitment Package Bid Receipt and Awards illustrating Differentials Between DG3 Estimate and Bid Prices**

| Commitment Package / Scope | DG3 Budget ($M) | Package as % of Total DG3 Budget [1] | Date RFP Responses Received | RFA Value ($M) [2] | Variance (DG3 to RFA) | |
|---|---|---|---|---|---|---|
| | | | | | $M | % Increase |
| CH0002 - Supply & Installation of MF Accommodations Complex and Utilities | 85 | 1.5% | 19-Apr-2012 | 150 | 65 | 76.0% |
| CH0004 - Construction of Southside Access Road | 40 | 0.7% | XX-May-2012 | 34 | (6) | -15.1% |
| CH0006 - Bulk Excavation | 140 | 2.4% | 02-Aug-2012 | 129 | (11) | -7.8% |
| CH0007 - Construction of Intake, Powerhouse, Spillway & Transition Dams | 781 | 13.4% | 16-Apr-2013 | 1,081 | 300 | 38.4% |
| CH0008 - Construction of North Spur Stabilization Works | 66 | 1.1% | 12-Jun-2014 | 144 | 78 | 117.0% |
| CH0009 - Construction of North and South Dams | 128 | 2.2% | 22-Oct-2014 | 289 | 161 | 126.2% |
| CH0024 - Reservoir Clearing (North and South Banks) | 148 | 2.5% | 15-Nov-2012 | 131 | (17) | -11.4% |
| CH0030 - Supply & Installation of Turbines and Generators | 205 | 3.5% | 26-Jan-2012 | 189 | (16) | -7.7% |
| CH0031 - Supply & Installation of Mechanical and Electrical Auxillaries | 101 | 1.7% | 22-Jan-2015 | 263 | 162 | 160.4% |
| CH0032 - Supply & Installation Hydro-Mechanical Equipment | 157 | 2.7% | 16-Apr-2013 | 250 | 93 | 59.1% |
| CD0501 - Supply and Installation of HVdc Converters | 433 | 7.4% | 26-Jun-2013 | 490 | 57 | 13.1% |
| CD0502 - Construction of AC Switchyards (MF, CF & SP) | 154 | 2.6% | 25-Nov-2013 | 188 | 34 | 22.1% |
| CD0503 - Switchyard and Converter Earthworks | 68 | 1.2% | 31-May-2013 | 60 | (8) | -11.1% |
| CD0504 - Civil Works and Buildings at Converter Station and Switchyards | 29 | 0.5% | 26-Jun-2013 | 79 | 50 | 171.7% |
| CD0534 - Supply & Installation of Synchronous Condensers | 81 | 1.4% | 30-Jan-2014 | 165 | 84 | 103.8% |
| LC-SB-003 - SOBI Submarine Cable Design, Supply & Installation | 173 | 3.0% | | 146 | (27) | -15.7% |
| CT0319 - Construction of HVac Transmission Line (MF to CF) | 200 | 3.4% | 15-Jan-2013 | 258 | 58 | 28.9% |
| CT0327 - Construction of HVdc Transmission Line (MF to SP) | 735 | 12.6% | 28-Mar-2014 | 1,043 | 308 | 42.0% |
| **Sub-Total** | **3,723** | **63.8%** | | **4,775** | **1,052** | **28.3%** |

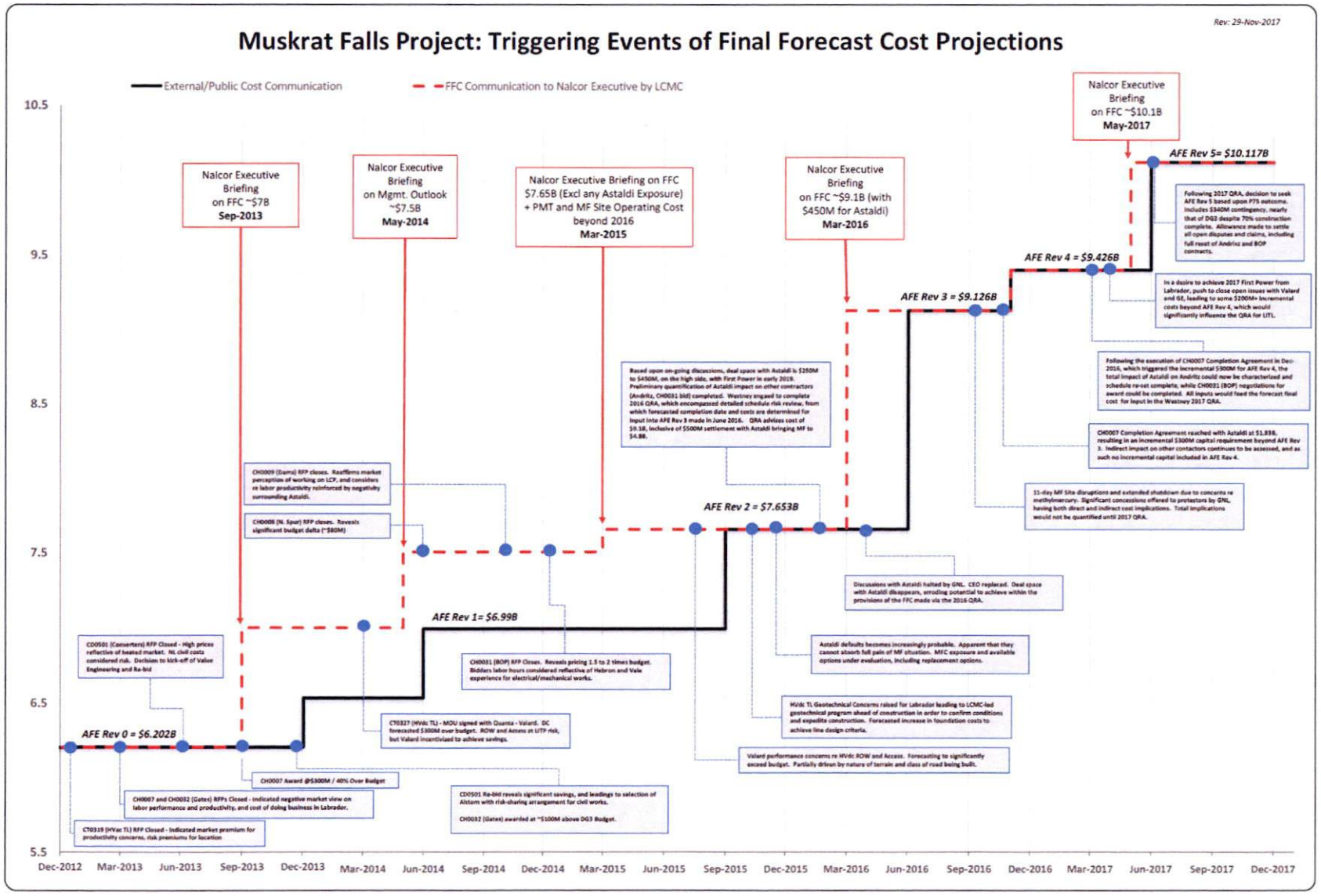
**Notes:**

1.) DG3 Budget of $6,202M less $368M contingency = $5,834M

2.) Recommendation For Award Value inclusive of growth allowance based upon identified package risks

Based upon the Award Recommendations for these packages, the DG3 Budget was expected to exceed by some $700M beyond the available contingency (i.e. $1,052 - $368M), therein representing a large differntial to the $3.9B overall growth on the Project.

Figure 19: Illustration of Linkage Between Contracting Market Conditions and Changes in Final Forecast Cost Projections



## UNEXPECTED EVENT / UNKNOWN STRATEGIC RISK #5
## SNC-LAVALIN CORRUPTION SCANDAL

***Risk Brief***

- Shortly after the award of the contract for EPCM Services to SLI, the corporation and many of its executive came under investigation by the RCMP for embezzlement of funds, bribery and other wrongdoing related to contracts SLI had in Libya between 2001 and 2011.

- In a separate investigation by the RCMP, SLI's CEO Pierre Duhaime faced charges of fraud, conspiracy to commit fraud and using forged documents in relation to the company's contract to build McGill University Health Centre's new $1.3-billion super-hospital. Duhaime resigned amid the allegations.

- With the onboarding of a new CEO, Robert Card, nearly all Executive and Senior VPs that were engaged in the LCP EPCM Services Agreement were either released or moved into new positions, leaving a gap in the continuity of engagement. This included Patrick Lamare, Executive VP for the Power Division.

- The ongoing investigations, terminations, removals, and movement of leadership personnel created a challenging situation within SLI in late 2011 through 2012 wherein Nalcor's voiced performance concerns regarding the Project received little attention from SLI's Executive. Nalcor recognized that the continued lack of performance by SLI against the as-promised approach contained within its RFP proposal would add tremendous risk to the Project.

- At the time Nalcor bid the EPCM services scope, the market was overheated due to the boom in oil sands activity as a result of high oil prices, and concerns existed about the quality of all of the EPCM firms' construction management capability. Due to this concern, Nalcor included an option in the contract, to be exercised at its discretion, to remove the construction management scope from the EPCM contractor, thereby creating an EP+CM model. When SLI's challenges were exacerbated by their corporate scandal, the option was exercised.

***When did the Risk Manifest itself into a Major Project Issue***

- Shortly into SLI's mobilization it became apparent to Nalcor that SLI were struggling to mobilize some of the key resources that Nalcor had interviewed and accepted as part of the EPCM bid.

- As 2011 proceeded and SLI were to produce the Stage 2 Deliverables by 15-Dec-2011, it was apparent to Nalcor that the intended effort had not been expended on engineering, in particular for C3 (Component 3 - HVdc Specialties) and C4 (Component 4 - Overland Transmission). In addition, SLI was not implementing all of its project management processes and tools. This was largely driven by a situation wherein those mobilized had no knowledge of these processes and tools which are essential for the successful delivery of a mega-project. While these processes and tools existed within SLI's Mines and Metallurgy Division, the Power Division had no experience with using them on projects.

| ***Effect on Muskrat Falls Project*** |
|---|
| a) The Project was highly exposed due to SLI's lack of performance. As such, Nalcor initiated an independent review in March 2012 of SLI's corporate practices and systems. The review found that these processes and systems had not been implemented within the Project.<br><br>b) The Project's readiness for DG3 was being hampered by SLI's performance.<br><br>c) Dealing with SLI's performance was a significant distraction for Nalcor Management, and before the switch to the Integrated Project Delivery Team (PDT) Model, team effectiveness was poor. |
| ***Net Consequences*** |
| a) Nalcor made the decision to switch from an EP+CM-model to an Integrated Project Delivery Team Model led by Nalcor under the umbrella of LCMC. SLI would remain the engineer-of-record for all scope for which they had design responsibility, exclusive of the SOBI Crossing.<br><br>b) LCMC had to take the lead in recruiting the necessary expertise to staff LCMC and develop and implement the necessary processes, tools and systems that SLI were to have brought.<br><br>c) The integration was achieved gradually and involved LCMC and SLI senior management working together to deal with the challenges of integration. Both LCMC and SLI were supportive of the efforts to integrate the Project Management functions and called upon the assistance of Deloitte to provide specialist support services in the field of organizational effectiveness and team building. The Independent Engineer was closely involved in the events that had forced the formation of an integrated team and was fully supportive of the organizational changes that had occurred.<br><br>d) The Integrated Project Delivery Team created organizational synergies and resulted in an organization that was well equipped to deliver the Muskrat Falls Project. External validation of LCMC was undertaken by IPA in 2015 wherein they concluded:<br><br>*"LCP established solid foundations for team effectiveness early in project development that are characteristic of successful megaprojects*<br>• *Clearly defined business and project objectives*<br>• *Integrated project team*<br>• *Defined roles and responsibilities*<br>• *Frequent risk assessments*<br>• *Use of work processes*<br>*Continuity of Project Director and senior key team members during execution is a characteristic typical of successful megaprojects."* [17]<br><br>e) The failure of SLI to deliver on its contractual commitments left Nalcor with little option other than to seek external resources from a variety of sources, including the use of independent contractor and agency personnel. This use of such resources was questioned publicly in 2017. Responding to questions posed by the Premier regarding the appropriateness of the use of independent consultants, Nalcor's Board of Directors responded as follows: |

[17] Extracted from IPA December 2015 report Mid-Execution Assessment, Nalcor Lower Churchill Project, p. 23.

*"It is important that there be some owner personnel involved in large construction projects to ensure there is a smooth transition from construction to the long-term operation of the facility. The owner's team presently includes approximately 50 Nalcor employees and approximately 80 contracted resources. The total number of personnel working on the Project in the areas of owner's team, Engineering and Project/Construction Management is approximately 500, with the balance of 370 personnel being contracted resources. In our view, this 90-10 split represents a typical and appropriate division between owner employees and contractors; it is in keeping with best practices for large construction projects. Based on information reported by international organizations with expertise in the management of large projects, it is our understanding that budgets for Project/Construction Management and the owner's team combined typically run between 9 to 11% of total costs. The costs associated with these groups for the LCP are currently running at 9.5% of total costs, but are forecasted to decline to 7% by Project completion."*[18]

[18] Reference letter to Premier D. Ball from Nalcor Board of Directors Chair B. Paddick dated 2-Oct-2017.

## Unexpected Event / Unknown Strategic Risk #6
## HVDC TRANSMISSION LINE COST OVERRUN

### *Risk Brief*

- Transmission line cost overruns contributed ~$900 million to the $3.9 B cost growth between DG3 and the June 2017 FFC.

- While some of the $900 million cost growth can be attributed to both reliability driven design changes, discussed in Unexpected Event/Unknown Strategic Risk #4, and planning related errors (e.g. geotechnical assumptions and access requirements), there are no less than seven (7) factors that came together to result in the substantive cost growth. These include:
  a) DarkNL Reliability Driven Changes
  b) Geotechnical Conditions – far worse than anticipated
  c) Conductor Proud Stranding – an unknown phenomenon to industry experts
  d) Compressed Schedule – resulted from late release from environmental assessment
  e) ROW and Access Works – scope changes, inefficiencies and execution errors
  f) Contracting Market Conditions – productivity and price gap from DG3 estimate
  g) Contract Strategy Changes – cost premium to accelerate for 2017 completion and monopole operation

  Figure 20 illustrates the cause-effect relationship in order to illustrate the root cause of cost change.

### *When did the Risk Manifest itself into a Major Project Issue*

- Each of the risk drivers materialized at different time periods throughout the Project, from pre-contract award through to the change in Nalcor Executive in 2016, resulting in the recognition of cost increases in each of the revisions to the original AFE.

- Figure 21 presents a timeline of the key events that triggered the final forecast cost presented with each public update (i.e. for each AFE).

### *Effect on Muskrat Falls Project*

a) **DarkNL Reliability Driven Change**: As discussed in Unexpected Event/Unknown Strategic Risk #4, a number of design changes were made to increase the design reliability and robustness of the HVdc transmission line in the period of 2013 – 2014.

b) **Geotechnical Conditions**: The differences in the actual geotechnical conditions versus the geotechnical baseline conditions used for the cost estimate in 2012, resulted in a significant change to the planned versus actual foundations types installed, with a significant increase in solid foundations. Where poor soil conditions were identified, alternate H-pile foundations were utilized at a frequency of nearly twice the original plan, adding significant cost to the foundation program (reference PCN-0531), particularly for the HVdc line.[19]

[19] For a comprehensive summary of the geotechnical conditions, reference presentation made to LCMC Change Control Board on 30-Mar-2016 entitle HVdc TL: Geotechnical Risk Review - Background, Current Situation, Action Going Forward.

c) **Conductor Proud Stranding**: The discovery of a technical/quality condition known as conductor proud stranding on the HVdc line in late spring 2016 led to a decision to halt stringing for three months until the root causes for the phenomenon could be narrowed down and a plan developed to avoid its future occurrence. Following the successful testing of a modified conductor, all non-installed conductor was modified accordingly, with a decision made to remove and replace the ~340 km of installed conductor with the modified design.[20]

d) **Compressed Schedule:** The delay in the release of LIL (HVdc line) from environmental assessment resulted in a compressed window available for construction, therein reducing opportunity to leverage winter construction techniques, as well as a compression of the overall construction schedule.

e) **ROW and Access Works:** For both the HVac and HVdc transmission lines, NL Hydro advised that it did not require the establishment of a permanent access network to support line operations and maintenance, rather it would maintain these lines consistent to its existing practices (i.e. combination of tracked equipment, ATV and snowmobile access).[21] With this design and operations philosophy established, SLI's proposed construction planning strategy for the transmission lines largely relied upon the contractor determining what level of temporary construction access would be required and establishing such access, with a heavy reliance of either winter-only access for the most remote areas (i.e. interior of Labrador, Terra Nova Winter Zone, Segment 3 Winter Zone), or helicopter access in the Long Range Mountains. The DG3 Estimate of ~$155 million for ROW clearing and access works was based upon this construction access philosophy. The late EA release resulted in the loss of one of the four available winter seasons (i.e. 25% of available time) around which that the construction plan had been developed, which added significant risk to the program.

The market response to the RFP for CT0319 – 315kV HVac Transmission Lines (MF to CF) bid package, combined with the market prices being received on the other RFPs, largely influenced Nalcor's decision to use an alternate model for the construction of the HVdc transmission line. Under this model, Valard Construction LP was responsible for the entire scope, while Nalcor assumed the financial exposure for access conditions.[22] As documented in the correspondence between the parties, Nalcor felt that Valard's poor management of the work on the HVdc line contributed significantly to the cost growth of access works, while other cost growth could be attributed to both the poor on-site geotechnical conditions which were unfavorable for envisioned temporary road-building techniques.[23] Additionally, the final tower and foundation designs made helicopter construction of limited application for both the installation of foundations and the more robust towers designed for use in the Long Range Mountains.

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[20] For a comprehensive summary of the Conductor Proud Stranding, reference presentation made to LTIP's insurance underwriter adjuster, ClaimsPro, on 18-Oct-2016 entitled Conductor Proud Stranding Investigation.

[21] Reference document Operations and Maintenance Philosophy for Design, Nalcor document no. LCP-PT-ED-0000-EN-PH-0005-01, Rev. B1, Section 7.8. It is noted that the supporting design philosophy Design Philosophy for Emergency Repair of Overhead Transmission, Nalcor document no. LCP-PT-ED-0000-EN-PH-0026-01 was not issued for use.

[22] For complete history on the selection of Valard, refer to document Bidder Selection and Preliminary Award Recommendation, CT0327 – Construction of 350kV HVdc Transmission Line approved 27-Apr-2014 as contained in Aconex.

[23] Reference presentation made to Nalcor Executive on 14-Jul-2016 entitled Valard Performance Discussion for a complete summary of the Valard file as of end of June 2016.

As ROW and access works proceeded in 2014 through 2015, concurrent to the Liberty Review underway by the PUB, Nalcor acknowledged that NL Hydro's operations and maintenance philosophy needed adjustment, and that a near permanent access network would be required to be established not only to support line construction, but also to enable unplanned line repairs to occur in remote regions through which the HVdc line was routed. With this acknowledgement, investments were made in the Access Works (reference PCN-645, 650 & 656) in order to provide year-round access along the vast majority of the transmission line.

f) **Contracting Market Conditions:** As discussed within Unknown Event / Unknown Strategic Risk #3, RFP pricing typically far exceeded the DG3 estimated price. The RFP submissions for CT0319-001 – 315 kV HVac Transmission Line (MF to CF) also confirmed the existence of a significant gap between the budgeted price for the HVac transmission lines scope, and the remuneration expected by contractors. For package CT0319-001, LCMC were able to reduce this premium with Valard far below what other contractors were willing to offer through an extensive and lengthy negotiation.

g) **Contract Strategy Change:** The change of contracting strategy was made to accelerate the completion of the Labrador Transmission Assets and Labrador-Island Transmission Link in an effort to deliver power to the Island from Churchill Falls in the winter of 2017-2018. While publicly committing to a mid-2018 power flow from Labrador, settlement agreements reached with each of the two key contractors, General Electric / Alstom and Valard, were predicated upon Valard achieving Substantial Completion by 15-Nov-2017 (reference PCN-0740) and GE/Alstom having Pole 1 Dynamic Commissioning Complete by 31-Dec-2017 (reference PCN-0712). The resultant acceleration cost to be paid to both contractors to achieve a completion in 2017, was to be offset by fuel savings of reduced reliance on Holyrood in winter 2017-2018, as stated in PCN-0712 "*This strategy will result in the displacement of thermal generation capacity at the existing Holyrood Thermal Generating Station. Nalcor's Investment Evaluation division has advised that the projected benefits from January 2018 to July 2018 would range from approximately $62M to $93M (based on a 7 month period).*"

***Net Consequences***

a) The net result from a cost perspective was an increase in total planned capital expenditure by ~$900 million beyond that estimated at DG3. Of this total amount, the HVdc line construction cost (exclusive of materials) represented $830 million (~92%) of the overall cost growth. Figure 22 presents a step-chart to highlight the FFC growth pre-and post-contract award.

b) The net result from a reliability perspective was an improved line reliability through the establishment of what can be characterized as permanent transmission line access roads across the bulk of the transmission line, which will greatly aid both operational efficiencies and reduce the time to repair in the event of an unplanned failure.

Figure 20: Fishbone Diagram Illustrating Cause and Effect Relationship For ~$900 million Cost Growth From DG3 Estimate to June 2017 for Overland Transmission Line Scope

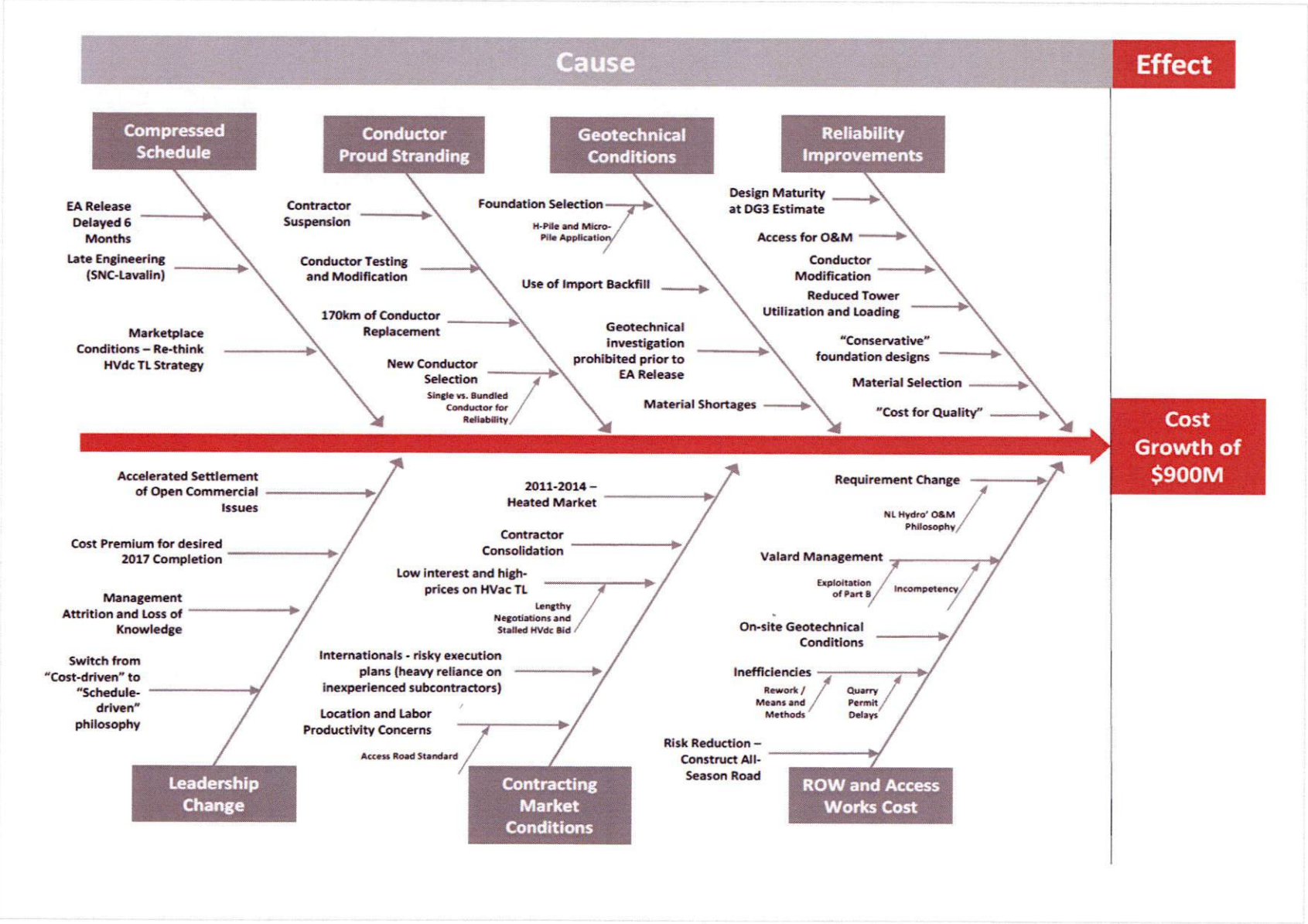


**Figure 21: Overland Transmission Lines – Timeline of Significant Events Influencing the Final Forecast Cost (both HVac and HVdc scopes)**

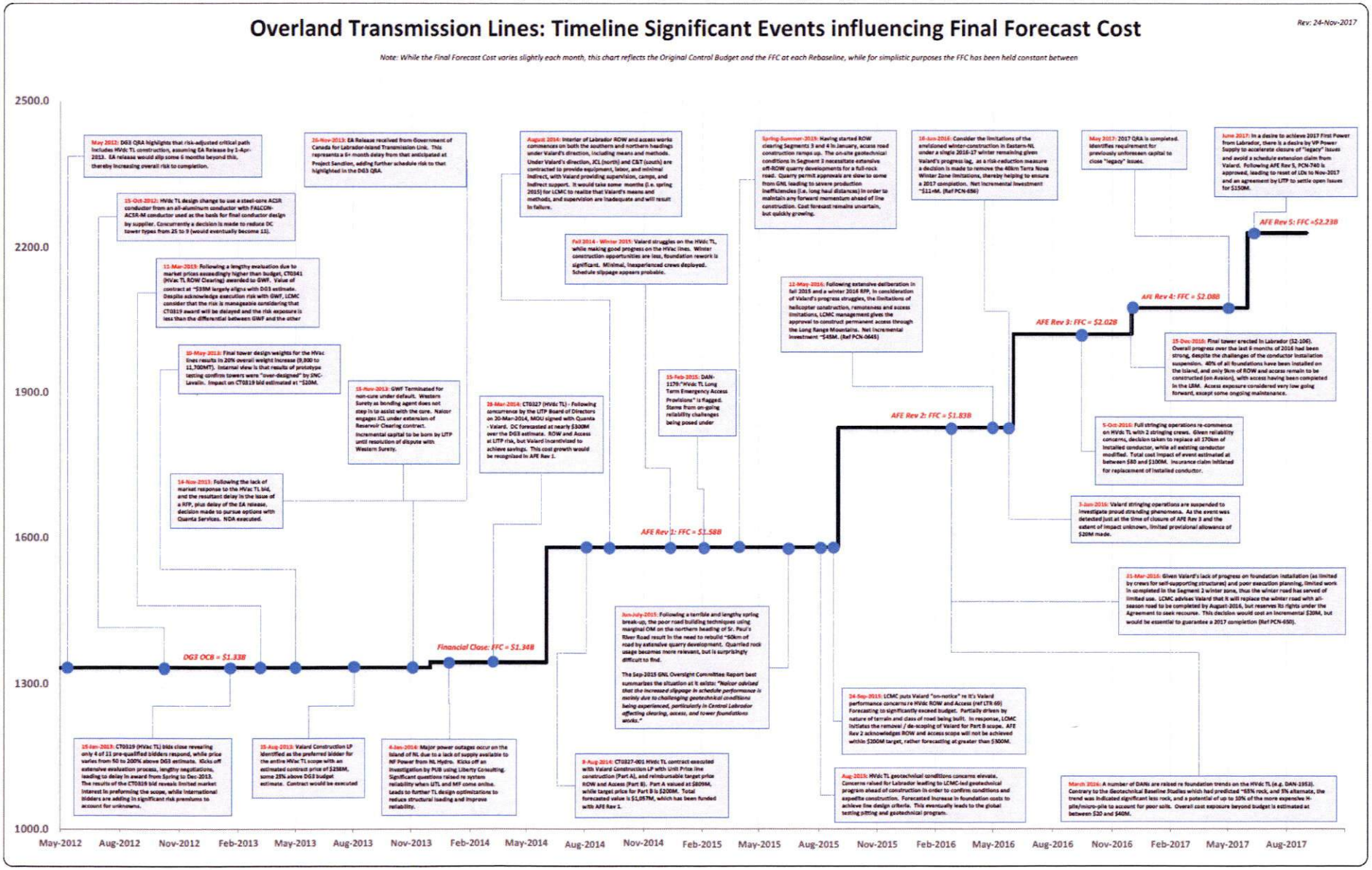
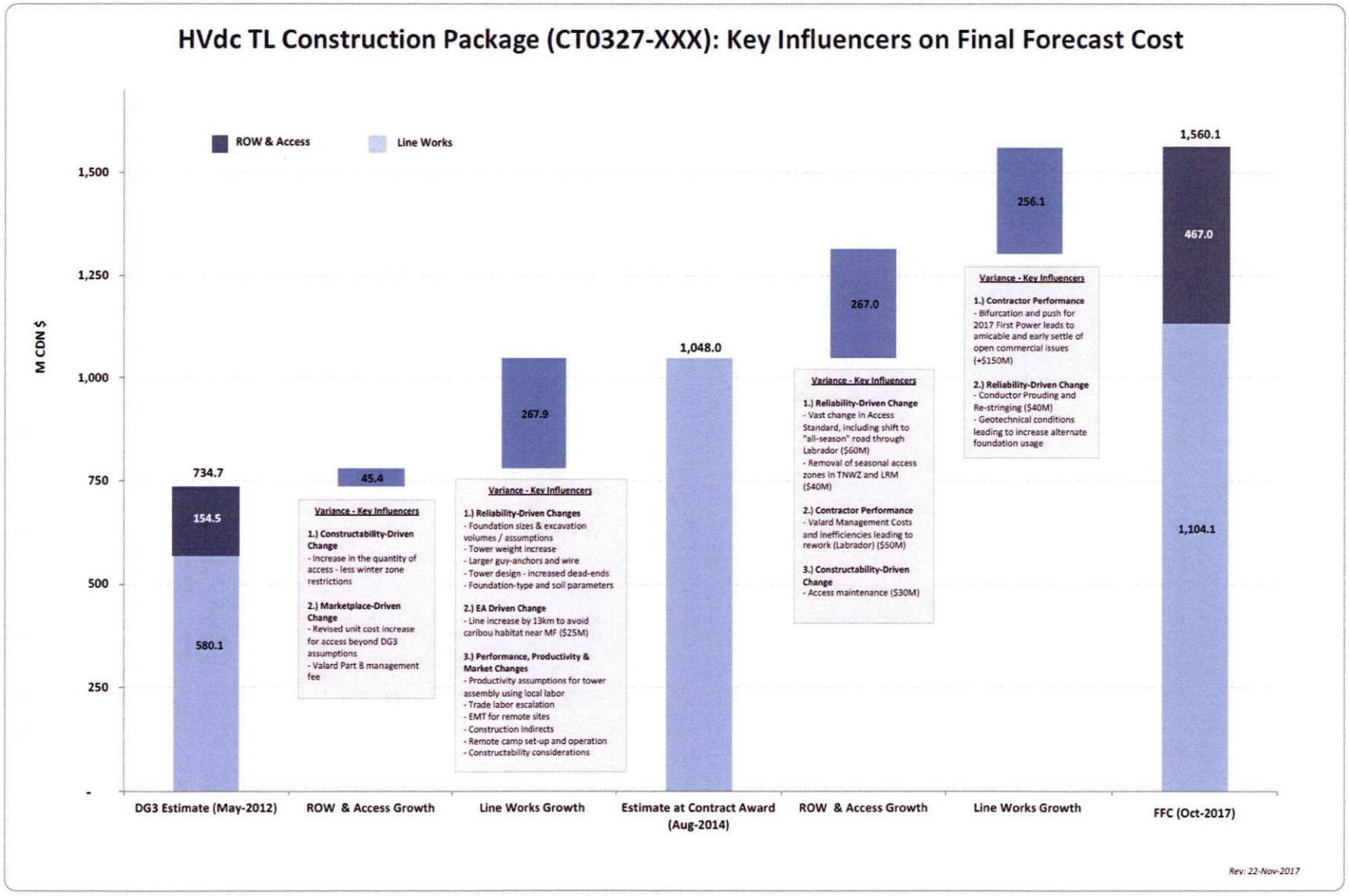


Figure 22: Breakdown of Cost Growth of HVdc TL Construction Cost (excluding materials) – Major Cost Influencers Pre-and Post-Contract Award



| UNEXPECTED EVENT / UNKNOWN STRATEGIC RISK #7<br>PROJECT UNREST – PROTESTS, SITE INVASIONS AND INTERRUPTIONS |
|---|
| ***Risk Brief*** |
| • In the months leading up to and following the November 2015 provincial election, the Muskrat Falls Project became increasingly politicized, with the campaign of the incoming Liberal government centering around opening the books on Muskrat Falls which helped to foster negativity regarding Project. There was an increase in public criticism and attacks on the Project, Nalcor and the Project Management Team (PMT).<br><br>• While the impacts of lack of Shareholder support publicly for the Project, signifying an attenuated governance system, were forewarned by LCMC Management, they had little ability to influence the actions of the Shareholder of the net impact of their actions on the Project. |
| ***When did the Risk Manifest itself into a Major Project Issue*** |
| • Negativity towards the Project increased dramatically in late 2015 through 2016, coinciding with decreased public support for the Project.<br><br>• During this period, the Muskrat Falls Site was disrupted for nearly 30 days due to site protests and invasions. The peak of the activity was in October 2016 when a wide-scale invasion lasting 11 days forced the entire demobilization of the Muskrat Falls worksite. A review of the impact of protests, site invasions and unrest is shown in Attachment 1. |
| ***Effect on Muskrat Falls Project*** |
| • The effect was a marked increase in public protest by interest groups leading to numerous site shutdowns, numerous claims from contractors, and a general loss of control of the Project by LCMC.<br><br>• Following the October 2016 protest over methylmercury concerns, GNL intervened and gave directives to Nalcor with respect to addressing the concerns of site protestors, including to what level impoundment was permissible, requirements for dewatering in Spring 2017, and the need to undertake further reservoir clearing operations.[24] |
| ***Net Consequences*** |
| • Weakening governance systems reducing the Project's ability to deal to unexpected events requiring alignment with and support from the Shareholder.<br>• Added cost to resolve contractor claims for losses during site disruptions (e.g. rework, demob cost, re-sequencing of work).<br>• Direct site disruptions leading to loss of schedule during critical summer and fall construction periods.<br>• Loss of LCMC team morale and increased risk of attrition.<br>• Loss of control of the day-to-day running of the Project as direction was now being provided by the Province on critical operations such as reservoir impoundment. |

[24] Reference Government of Newfoundland and Labrador news releases of 19th and 26th of October 2016 for specific directives and commitments made regarding the Project.

## UNEXPECTED EVENT / UNKNOWN STRATEGIC RISK #8
## CHANGING INTERNAL AND EXTERNAL LEADERSHIP CREATING PROJECT UNREST

***Risk Brief***

- The planning and execution of the Muskrat Falls Project required the participation of numerous organizations, including Nalcor, GNL, Emera Inc., and numerous contractors and consultants. Together this portion of the "meta organization" provided the pre-requisite leadership and talent in order to deliver the Project.
- Over the lengthy duration of the Project since DG2 in 2010, the Project has seen extensive internal and external leadership changes within this meta-organization which combined has affected the overall continuity. Leadership changes have included:
  - Five Premiers, numerous Ministers of Natural Resources, and change in governing party
  - Nalcor CEO – departure of EJ Martin in April 2016
  - Nalcor Executive VP – bifurcation and introduction of Power Development and Power Supply VPs
  - SLI CEO changed three (3) times and sponsoring VP changed multiple times since contract award in December 2010
  - Astaldi CEO and North American Director change
  - Acquisition of Alstom Grid & Power by General Electric in November 2015 and resulting organizational challenges
  - Quanta Services CEO change in March 2016
  - Numerous contractor key personnel changes (Project Director/Manager, etc.)
- This loss of continuity has a particularly negative impact when change exists at the core of a meta-organization.[25] A prime example in the case of the Muskrat Falls Project is the change in leadership at the Shareholder level and the Nalcor Executive level, resulting in policy change (i.e. Energy Plan) and support that had a direct impact on the Project.

***When did the Risk Manifest itself into a Major Project Issue***

- While the loss of key internal and external leadership occurred progressively over the Project's lifespan, it is difficult to pinpoint when this became a major project issue, however it is fair to say that the Project suffered significant loss of support in 2016.

***Effect on Muskrat Falls Project***

- The attrition of meta-organization leadership fundamentally resulted in a change in vision under which the Project had been premised to date, and a resulting adjustment in general sponsorship for the Project.
- The loss of contractor leadership resulted in the need for Nalcor Executive to re-build relationships in order to regain alignment on the importance of the Project for the people of the Newfoundland and Labrador, and expectations of how both entities were to work together towards a mutually acceptable outcome.

[25] The (under) performance of mega-projects: A meta-organizational perspective by Lundrigan, Gil & Puranam published by The University of Manchester, April 2014 studied the influence of meta-organizational factors on mega-project performance. Noted findings included: "*We find that the changing nature of the core membership and the bargains and compromises struck among its members imply that the scope of the mega-project: a) will evolve considerably; b) will deviate substantially from initial estimates; c) will be measured on very different dimensions; and d) will always leave some core (and non-core) members dissatisfied.*"

| |
|---|
| • New internal and external leadership generally brought ideologies that quite often differed from the established ideologies and resultant plans. This resulted in a significant amount of project change that was often unmanageable for the PMT who were otherwise occupied addressing both the strategic and operational challenges inherent in a mega-project, including managing the unexpected events / unknown strategic risks that occurred. |
| ***Net Consequences*** |
| • The Project's overall performance suffered. Leadership change created organizational distraction and a loss of focus. Critical resources were often having to be re-directed towards managing the fall-out of these unexpected events, rather than focussing on delivering the Project against the commitment plan. |

## ALLEGATIONS OF LCMC IGNORING RISKS IDENTIFIED BY SNC-LAVALIN IN 2013

In June 2017 allegations arose as to whether Nalcor knowingly ignored risks that SLI had identified and communicated to it as part of a SLI-internal risk assessment. As publicly stated in June 2017, Nalcor did not receive this SLI risk assessment until 2017. Given the seriousness of the allegations, LCMC initiated a thorough review to determine the facts behind the issue.

Specifically, this review sought to bring clarity to questions of public concern that have been posed, including:

a) Whether SLI provided the 2013 Risk Assessment Report to the CEO at the time and was it returned and/or rejected;
b) Whether LCP deliberately ignored the risks identified and took no action to mitigate them;
c) Whether LCP were not aware or ignorant of the risks identified by SLI; and
d) Whether the risks identified by SLI were not quantified and reported to Executive.

Regarding the allegation that SLI was unable to deliver the Risk Assessment to the CEO in 2013 (which the then CEO denies)[26] it is important to note that SLI could have simply sent the risk assessment using established communication methods under a cover letter to LCMC. If this had been done there would have been a record of LCMC receiving such a cover letter in the Project's document management system 'Aconex'. This system does not allow deletion of incoming records, a check has been performed and no record exists of the report or associated cover letter.

In order to verify that the 2012 DG3 QRA[27] commissioned by LCMC included the risks identified by SLI, LCMC engaged Westney to conduct a comprehensive comparative analysis of the two reports. The analysis, as presented in Attachment 2 – Westney's December 2017 Report, An Analysis of SNC-Lavalin's Risk Assessment Report, cross references the LCMC risk register (including those considered Key Risks presented in Attachment 3 – Key Project Risk Frames as of Decision Gate 3) used in the 2012 DG3 QRA with the risk items listed in the SLI risk assessment. This review confirmed that LCMC had considered all of the risks in the SLI report. It also reaffirms that senior members of SLI were active participants in the risk management activities. As such, the allegation that LCMC deliberately ignored the risks identified by SLI or were simply ignorant or unaware of them is inaccurate. The fact that the risks were known by LCMC in 2012 leads to the next question; were they being actively mitigated? The Project risk register, including those contained in the risk frames of Attachment 3, includes the mitigation actions taken by LCMC, while the DG3 QRA includes a comprehensive analysis of the potential cost and schedule impact of these risks.

Finally, the question regarding the quantification of the risks identified by SLI by LCMC to determine their probabilistic range of results and if these were reported to the Nalcor Executive is addressed. That

[26] Reference article *Ball, Martin spar over 2013 risk assessment report* contained in The Telegram, 27-Jun-2017.

[27] Decision Gate 3 Project Cost and Schedule Risk Analysis Report, Nalcor document no. LCP-PT-ED-0000-RI-RP-0002-01, Rev. B1.

question has been investigated and the 2012 DG3 QRA carried out by Westney includes the very same risks identified by LCMC in the Risk identification workshop (attended and participated by SLI). The results of the QRA are part of the Sanction (DG3) deliverables and the potential high range on the probabilistic curve reflects the high range of the SLI assessment.

As such, the allegations that LCMC were not aware of, did not mitigate, or did not quantify the risks are not founded. Westney's analysis contained in Attachment 2 provides the facts that have led to this conclusion. For reference, the table below provides commentary against each of the highest ranked risks identified by SLI and the mitigation actions that were underway by LCMC at the time SLI undertook its internal analysis.

| SLI Risk Items Categorized as having High Exposure (2013 Internal SLI Risk Assessment) | LCMC Commentary |
|---|---|
| **Risk 1**<br>Restricted pool of major contractors capable of bidding on very large packages developed for the Project (already out for bids allowing for limited possibility to re-scope or develop new packages). Fewer bids could be submitted and at a higher than original budget cost. | This item demonstrates the misalignment in contracting strategy between SLI and LCMC. From their work in Quebec, SLI is familiar with the contracting strategy employed by Hydro Quebec (HQ) which is based on smaller contract packages. The Muskrat Falls Project is a financed project and the rating agencies and financial advisors require large, financially secure contractors and minimal interfaces, thus requiring large contract packages. This is diametrically opposed to the SLI contracting philosophy used in Quebec.<br><br>In fact, LCMC mitigated this potential risk by aggressive project profiling with potential bidders, meeting the bidders at senior levels and assuring the bidders that the project was real and moving ahead. Most bids were sent out to at least four pre-qualified bidders |
| **Risk 32**<br>The inability to provide sufficient camp accommodation facilities may force contractors to find alternative accommodations which could lead to mobilization and start-up delays, resulting in claims and ultimately project schedule delays. | The risk was recognized and identified in 2012 and was mitigated by changing the design of the in-ground services to allow for additional camp accommodation blocks to be built as the need arose. There were eventually three accommodation blocks built. The starter camp was designed for ~350 people. This was followed by the main camp which could accommodate ~1,100-persons. Finally a further 450-person accommodation complex was added in 2016 to meet the peak construction period in 2017. |

| SLI Risk Items Categorized as having High Exposure (2013 Internal SLI Risk Assessment) | LCMC Commentary |
|---|---|
| **Risk 4**<br>A significant portion of the local labour market works in Western Canada, local workers are inexperienced in the LCP nature of work. Currently the Hebron Project is competing with our project and is attracting labour by offering good conditions. The unavailability of qualified construction manpower may lead to schedule delays and extra labour costs, as well as impacting on the quality of the works, increased safety risks etc. For C1 (Component 1 – MF Generation) the main trades issues being carpenters, electricians, iron workers (rebar) concrete pouring specialists. For C3 the main trades being electricians. For C4 main trades issues being linemen. | This risk was acknowledged by LCMC and was included in the 2012 DG3 QRA. The mitigation measures employed by LCMC included:<br>• A competitive wage and labour agreement in line with the Hebron Project.<br>• A good quality camp and accommodations.<br>• Construction of a fibre optic internet connection to the Goose Bay area with sufficient bandwidth for modern communications needs<br>• Provision of TVs in all rooms, a central gym, recreation facilities and a cinema,<br>• An aggressive campaign to attract workers from Western Canada which was assisted by a downturn in activity there.<br>• Ensuring charter aircraft were available to efficiently move workers from various locations in Newfoundland to Goose Bay.<br><br>The mitigation measures that LCMC put in place resulted in no appreciable impact to the project from labour availability. |
| **Risk 18**<br>Due to the heated market conditions in transmission lines market (currently the case in Alberta; LCP is dealing with the same bidders) and the size of the construction packages, fewer bids could be submitted and at a higher than budgeted cost. Also, very few of these major contractors will be able to perform these large packages in the proposed timeframe. | This risk was acknowledged by LCMC and was included in the 2012 DG3 QRA.<br><br>LCMC mitigated the issue by undertaking a competitive bidding process for the smaller Labrador Transmission Assets (LTA) contract. After award of the LTA contract, LCMC monitored the performance of the selected contractor to determine if they could undertake the much larger scope of LIL. Based on their performance on the LTA, LIL was awarded to the same contractor based on the good performance in quality, safety and productivity achieved on LTA. In fact, the other qualified bidder being considered was Abengoa and that company went into bankruptcy protection. |

| SLI Risk Items Categorized as having High Exposure (2013 Internal SLI Risk Assessment) | LCMC Commentary |
|---|---|
| **Risk 5**<br>Major components such as turbines and gates will be procured and manufactured in China. Based on SLI past experiences, quality, performance, warranty service and schedule problems can be anticipated with these lump sum turnkey packages, potentially resulting in major claims, delays and rework. | This risk was acknowledged by LCMC and was included in the 2012 DG3 QRA.<br><br>LCMC mitigated this risk by using an extensive bid review process which included and supplier inspections and quality reviews of proposed facilities in China. The selection process identified the contractor that met all the required quality, safety and performance criteria. In addition, LCMC performed regular site inspections. The quality of the products from the facilities in China has been high as a result. |
| **Risk 2**<br>Powerhouse and spillway concrete works are planned on a three-year duration (2 winter seasons) with a very tight and aggressive schedule providing little float, which might result in additional delays (possible 6 months) and costs. | The aggressive schedule for powerhouse and spillway was acknowledged by LCMC in 2012 and was part of the 2012 DG3 QRA. As discussed within this document, the Project schedule at Sanction was recognized as a target schedule with aggressive milestones. |
| **Risk 3**<br>As start-up of the spillway, river closure and river diversion are to be fulfilled in the schedule with the preceding activities (EA release, camp, road etc.), any delay in the previous activities may trigger missing the diversion window which will result in a one year delay in the project schedule. Furthermore, there is also the technical risk of being unable to finish the work within the ice-free window timeframe. | The critical path activities of spillway completion, river closure and diversion were acknowledged by LCMC and were included in the 2012 DG3 QRA.<br><br>The active mitigations work implemented by LCMC to ensure that these key milestones were met were successful with river closure, diversion, and spillway operation being achieved on schedule |
| **Risk 11**<br>Large EPC (Turnkey) packages sent to a restricted pool of specialize DC manufacturing firms not used to all-inclusive TK work including civil work. These added risks most likely result in higher than bid budget costs. | This risk was acknowledged by LCMC and was included in the 2012 DG3 QRA.<br><br>This risk as stated by SLI again illustrates the misalignment in contracting strategy (see Risk 1).<br><br>Notwithstanding the above LCMC was successful in having three bidders bid for the HVDC work (e.g. converter stations and switchyards) including the civil works. |

| SLI Risk Items Categorized as having High Exposure (2013 Internal SLI Risk Assessment) | LCMC Commentary |
|---|---|
| **Risk 33**<br>As no geotechnical investigations have been performed in the river under the footprint of dam and cofferdam, adverse conditions could be discovered during construction leading to major rework, cost overruns and delays. | This risk was acknowledged by LCMC and was included in the 2012 DG3 QRA.<br><br>A decision was made that the in-river geotechnical investigations actually offered a much lower cost and schedule risk than portrayed by SLI's geotechnical engineers. In actual fact, the geotechnical conditions in the river were not an issue and had no cost and schedule impact. |

Attachment 2 contains Westney's analysis of the SLI risk report.

## BENCHMARK PROJECT COMPARATORS

The information contained in this briefing document deals primarily with explaining the cost overruns from DG3 projection occurred, including detailed descriptions of where costs increased and a high-level presentation of why this occurred. At its core, this analysis compares original expectations with final outcomes. The fact that cost increased from a planned $6.2 B to a forecasted at completion cost of $10.1 B, is often used as the basis to support negative statements regarding the Project Team's management of costs.

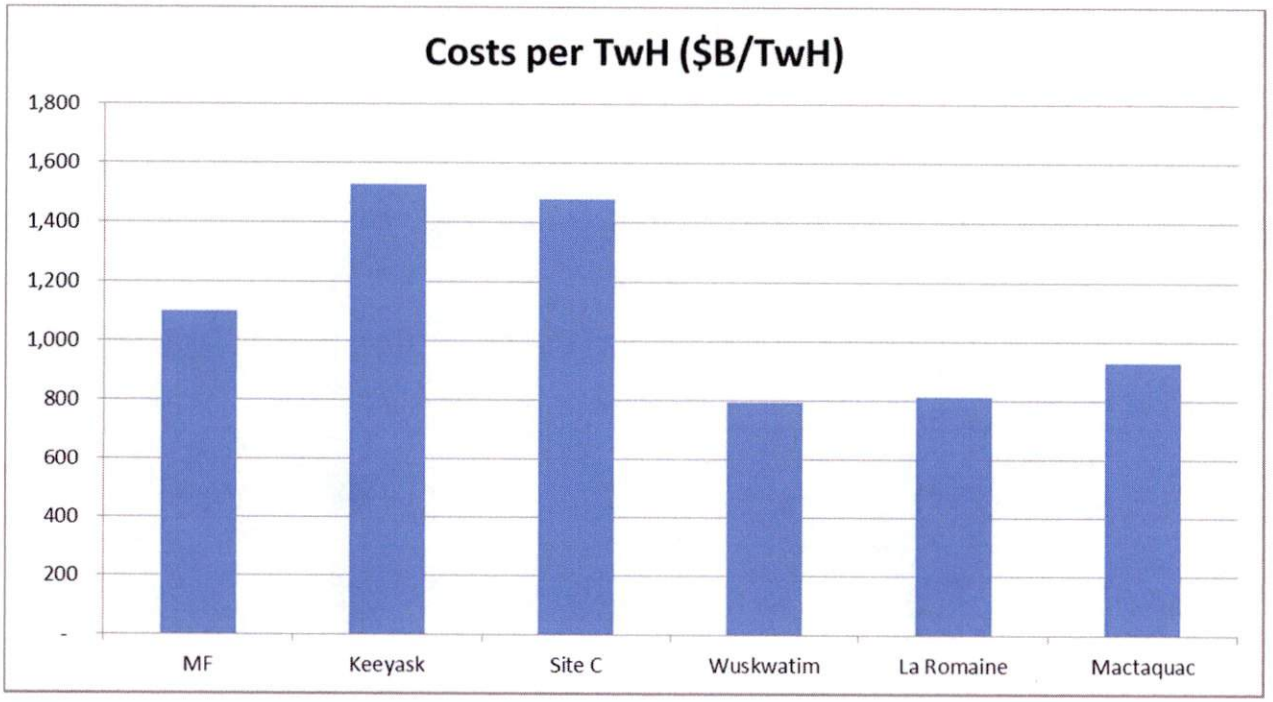
Looking beyond this approach in order to assess the outturn cost performance and capital efficiency provides a more holistic view of whether the result was better or worse than similar energy investments made in Canada in recent years, including several large hydro generation developments. Even though there are considerable differences in these recent developments that would account for overall cost (e.g. site conditions, labour performance in the market, overall size, external turbulence involved, geography, etc.) the calculation of a unit cost per energy production($/TWH) provides an industry-recognized basis for comparing the capital cost utilization and validating the prudency of the investment. Calculating this metric across these developments provides a *Hydro Project Capital Efficiency,* and a true basis of benchmarking capital performance.

**NOTE:** This benchmark comparator measures capital efficiency and whether the capital used was expended in an efficient manner as compared to similar projects. It does NOT compare whether other options are better. Case in point, in this situation the capital efficiency of generation and transmission would have to be measured separately as compared to other similar projects but whether the total cost to the ratepayer is the best option is a different question.

The negativity surrounding the Muskrat Falls Project, including many unsupported statements, such as being the most expensive power project in the country can be addressed using this comparator. As shown in Figure 23, when compared to the most contemporaneous hydro project data across Canada, Muskrat Falls Generation unit cost per TwH falls in the middle of the pack. Some of these projects are completed and others are still in progress so could grow higher. One noted trend is that the larger the project it seems the higher the outturn cost. A point that aligns with the literature on mega projects and the fact that the bigger the project the more likely strategic uncontrollable risks will impact it as is represented by the Turbulence referred to earlier in this briefing note.

For Transmission, including switchyards and conversion (if applicable), a standard measure that could be used is the cost per kilometre. This analysis has not been undertaken formally but unofficial information indicates that the cost per kilometre is very competitive.

Figure 23: Hydro Generation Project Capital Efficiency Cost Per Terra Watt Hour Comparator



## Attachments

Attachment 1 – Muskrat Falls Project Summary of Protests, etc. May 2017

Attachment 2 – Westney Dec 2017 Report

Attachment 3 – Key Project Risk Frames as of DG3

## Acronyms

| Acronym | Meaning |
|---|---|
| AFE | Authorization for Expenditure |
| B | Billions |
| bbl | Barrel |
| BOD | Board of Directors |
| C1 | Component 1 (MF Generation) |
| C3 | Component 3 (HVdc Specialities) |
| C4 | Component 4 (Overland Transmission) |
| CEO | Chief Executive Officer |
| CF | Churchill Falls |
| COREA | Cost Over Run Escrow Account |
| CPW | Cumulative Present Worth |
| CRA | Corporate Research Associates |
| DG2 | Decision Gate 2 |
| DG3 | Decision Gate 3 |
| EA | Environmental Assessment |
| EIS | Environmental Impact Statement |
| EPC | Engineering, Procurement and Construction |
| EPCM | Engineering, Procurement and Construction Management |
| EY | Ernst and Young |
| FEED | Front End Engineering Design |
| FEL | Front-end Loading |
| FFC | Final Forecast Cost |
| FLG | Federal Loan Guarantee |
| FLG1 | Federal Loan Guarantee #1 |
| FLG2 | Federal Loan Guarantee #2 |
| fx | Foreign Exchange |
| GI | Gull Island |
| GNL | Government of Newfoundland and Labrador |
| GWF | Great Western Forestry |
| HDD | Horizontal Directional Drilling |
| HQ | Hydro Quebec |
| HVac | High Voltage Alternating Current |
| HVdc | High Voltage Direct Current |
| HVGB | Hapy Valley-Goose Bay |
| IBA | Impact and Benefits Agreement |
| IBEW | International Brotherhood of Electrical Workers |
| ICS | Integrated Cover System |
| IE | Independent Engineer |
| IEC | International Electrotechnical Commission |
| IIS | Interconnected Island System |
| IPA | Independent Project Analysis |
| LCMC | Lower Churchill Management Corporation |
| LCP | Lower Churchill Project |

| Acronym | Meaning |
|---|---|
| LIL | Labrador Island Transmission Link |
| LTA | Labrador Transmission Assets |
| M | Millions |
| MF | Muskrat Falls |
| MFC | Muskrat Falls Corporation |
| ML | Maritime Link |
| NGO | Non-Governmental Organizations |
| NL | Newfoundland and Labrador |
| PCN | Project Change Notice |
| PDT | Project Delivery Team |
| PMT | Project Management Team |
| PUB | Newfoundland and Labrador Board of Commissioners of Public Utilities |
| QRA | Quantitative Cost and Schedule Risk Analysis |
| RFP | Request for Proposal |
| ROW | Right of Way |
| SLI | SNC-Lavalin |
| SOBI | Strait of Belle Isle |
| TL | Transmission Line |
| TwH | Terrawatt Hours |

**Attachment 1 – Muskrat Falls Project Summary of Protests, etc. May 2017**

# Muskrat Falls Project
# Summary of Protests, Work Interruption/Distraction
## As of 29 May 2017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LOWER CHURCHILL PROJECT

Total Page Count = 10

# Summary of Key Protest Events resulting in Work Interruption

| Date | Nature of Protest | Duration of Interruption |
|---|---|---|
| Oct 2012 | Rte 510 Blocked - no access to site | 5 hrs |
| April 2013 | MF Site incursion – workers removed from site | 2 days |
| May 2015 | Transmission camps blockaded | 4 days |
| Mar/Jun 2015 | N Spur site incursions | 6 hrs |
| Aug 2015 | MF Site and N Spur blockaded | 5 days |
| Jun 2016 | Main gate blockaded | 4 days |
| Oct 2016 | N Spur and spillway incursions | 15 hrs |
| Oct 2016 | MF Blockade and site incursion | 11 days |
| Nov 2016 | N Spur and Main gate MF | 36 hrs |
| May 2017 | N Spur site incursion | 3 hrs |
| May 2017 | MF Main gate blocaded | 11 hrs over 2 days |
| | **Total** | **26 days and 73 hours** |

# Details: 2012 – 2015 Protest Events (1/2)

- **10-Oct-2012:** Nunatukavut Protest on Route 510 near causeway slowed traffic and the eventual blocked it for a short period of time. Duration was about 5 hrs. First court injunction granted. Arrests were made by the RCMP.

- **18-Dec-2012:** Dennis Burden at North Spur damaged hydro pole. ( No work at this time on North Spur). Male arrested by RCMP and charged for mischief.

- **18/19-Apr-2013**: Labrador Innu came on site and to the camp. Workers were placed on buses and brought to Goose Bay for the night. Site was reopened at 6:00 pm the next day.

- **08-Feb-2014:** Worker who was laid off protested at the main gate slowing traffic as workers entered site at start of dayshift. Lasted for approximately 2 hrs.

- **10-Feb-2014:** Worker who was laid off protested at the main gate slowing traffic as workers entered site at start of dayshift. Lasted for approximately 2 hrs.

- **03-Mar-2015:** Quebec Innu blocked Route 510, 2 km. north of Eagle River Camp. Not allowing any traffic through for the project. TLH blocked at 1:30 pm

# Details: 2012 – 2015 Protest Events (2/3)

- **05-Mar-2015:** Blockade to St. Paul's River access road and TLH was over in the morning and they travelled to Goose Bay

- **05-Mar-2015:** Quebec Innu set blockade up on Route 510 north of the causeway at 4:30 pm. Blockade lasted for approximately 2-3 hrs.

- **29-June-2015:** Two males drove their vehicle onto the North Spur. Duration was approximately 3 hrs. RCMP advised them to leave .

- **13-17-Aug-2015:** Labrador Innu blocked North Spur and MF Site. Duration was 5 days. The protest was over at approximately 4:00 am on the 17th-August-2015. This was the protest involving David Nuke.

- **19-Aug-2015:** Quebec Innu set a road block on the TLH, Route 500 just east of the North Spur. The RCMP spoke with them and they took down their road block. Duration was for about 1 hr. Just a note they arrived in Goose Bay on 18-Aug-2015 to support David Nuke, but the protest was over before they arrived. They departed the area the night August 19th.

# Details: 2016 Protest Events (1/3)

- **9-12-June-2016:** Bart Jack Sr. and Jerome Jack blocked the main gate at Muskrat Falls. RCMP made arrests. Lasted 4 days. Second court injunction was granted during this period.
- **14-Sept-2016:** 3 unauthorized people came by boat to the MF Site and came ashore at the lower falls where the cofferdam work was occurring. Work was stopped in the area of the cofferdam for approximately 1.5 hrs.
- **03-Oct-2016**: Protesters walked onto the North Spur. Duration 1.5 hours.
- **07-Oct-2016:** Protesters walked onto the North Spur. Duration 1.5 hours.
- **10-Oct-2016:** Protesters walked on the North Spur. Duration 3 hrs.
- **15-Oct-2016:** Four protesters walked from the North Spur to the spillway closing the site for approximately 1 hour.
- **16-27 -Oct-2016:** Main Gate blocked by protesters. This was the major protest when they breached the gate and occupied the camp. Duration 11 days.
  - Protesters breached the gate 22-Oct-2016 and occupied the camp
  - Protesters left the camp and site on 26-Oct-2016 at 12:25 pm
  - Protesters breached the gate on 23-Oct-2016 when bus was exiting to take workers to the airport

# Details: 2016 Protest Events (2/3)

- **18-Oct-2016**: Two boats containing six protesters come to shore on the MF Site at the lower falls on two different occasions. First time the duration 1.5 hours. Second time was for a half hour.
- **21-Oct-2016:** Protesters blocked North Spur. Duration 1.5 hrs.
- **24-Oct-2016:** Protesters arrived on the North Spur. Duration 3.5 hrs
- **5-Nov-2016:** Protesters walked onto the North Spur. Duration 2 hours
- **6-Nov-2016:** Protesters were on the protest pad when they crossed the road to the entrance and left. Duration 30 minutes.
- **11-Nov-2016:** Protesters walked onto the North Spur. Duration 3 hrs.
- **19–Nov-2016:** Protesters blocked entrance and walked on North Spur. Duration 5 hrs.
- **19-Nov-2016:** Protesters block MF entrance at the gate. Duration 9 hrs.

# Details: 2016 Protest Events (3/3)

- **20-Nov-2016:** Seven protesters block entrance to quarry opposite North Spur for 3.5 hours. Quarry was shut down, but work continued at North Spur.
- **20-Nov-2016:** Protesters block entrance to MF Site. Duration. 8 hours
- **21-Nov-2016:** Protest at MF Site main gate by approximately 10-15 protesters. Traffic is prevented from entering and leaving site periodically. Duration 4 hours.
- **22- 29-Nov-2016**: Protestors still arriving on protest pad, no issues accessing site. RCMP present, but main gate still had to be maintained by security during this period.
- **10-Dec-2016:** Protest at main gate Muskrat Falls by approximately 20 protesters staying in protest area. Traffic not prevented from entering or exiting site.
- **30-Dec-2016:** Six protesters protest at protest pad. They cross to main gate to take pictures. No traffic blocked.

# Details: 2017 Protest Events (1/3)

- **1-Jan-2017:** Approximately 30 persons protested at the protest pad. No interruption of traffic entering or leaving site.
- **28-Jan-2017:** Protest motorcade held at main gate Muskrat Falls. Vehicles arrive and turn around at site entrance over period of nine minutes. No blocking of traffic.
- **4-Feb-2017:** Protest at main gate Muskrat Falls by approximately 15- 20 protesters. Traffic entering site not stopped was slowed due to activity. Duration of protest 3 hours.
- **1-Mar-2017:** Lone protester walked back and forth in front of the main gate Muskrat Falls site slowing and sometimes stopping traffic to allow her to cross. Duration 3.5 hours.
- **7-Mar-2017:** Three protesters on protest pad opposite Muskrat Falls site waving signs. Gates were closed as a precaution. Protesters at protest pad for approximately 3 hours. No interference to site traffic.
- **8-Mar-2017:** Six to seven persons at protest pad opposite main gate Muskrat Falls. No interference with site traffic.
- **11-Mar-2017:** Three protesters walk back and forth main gate entrance to Muskrat Falls site slowing traffic entering and leaving site for duration of 3 hours.

# Details: 2017 Protest Events (2/3)

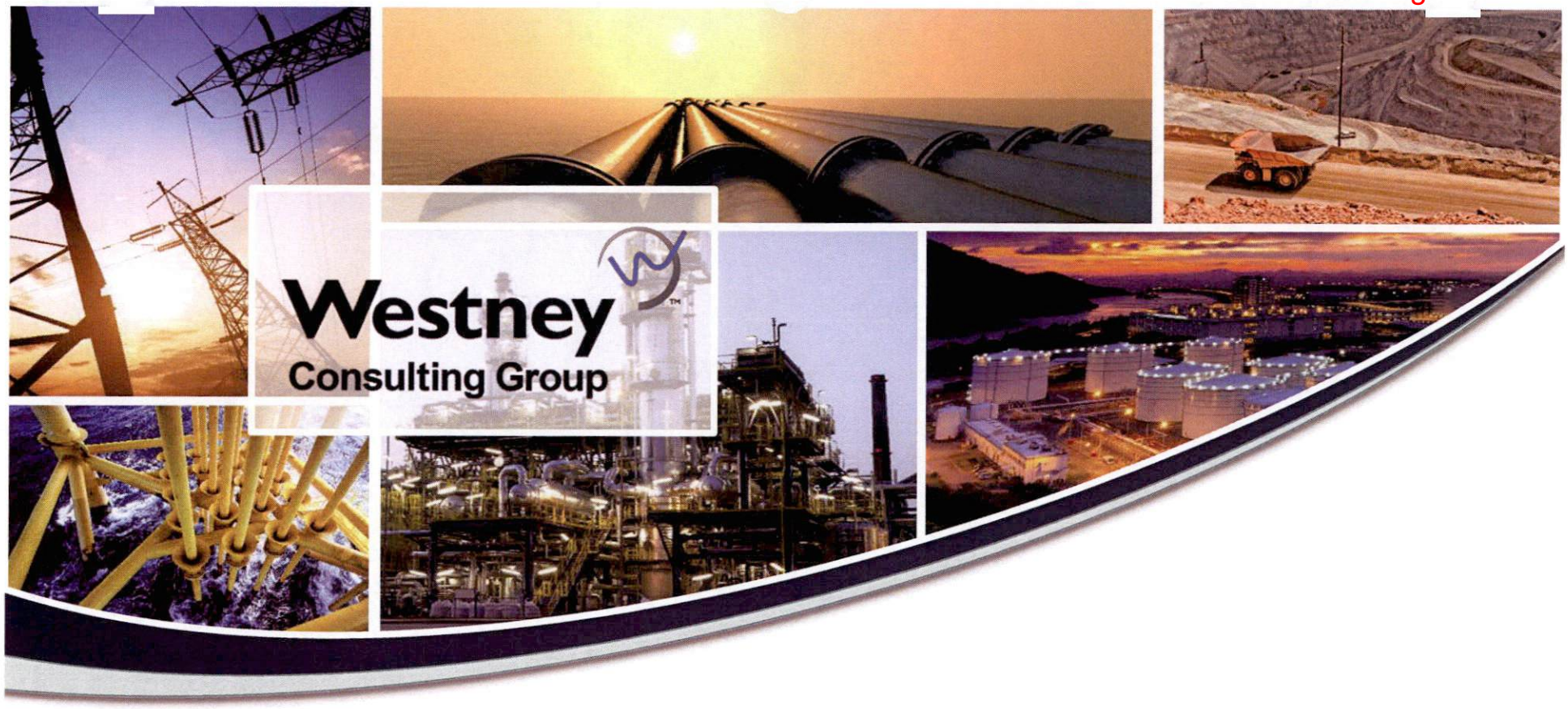
- **12-Mar-2017:** Lone protester walks back and forth main entrance for Muskrat Falls site slowing traffic entering and leaving site for approximately 3 hours.
- **11-Apr-2017:** Seven vehicles at protest pad opposite Muskrat Falls site and gates closed as precaution only opening to allow the movement of traffic. No protesters interfere with traffic.
- **10-May-2017:** Fourteen protesters arrive at entrance to North Spur. Five of the protesters walk on to the North Spur. Duration 3 hrs.
- **19-May-2017(dayshift):** Seven protesters arrive at the protest pad opposite Muskrat Falls site. They do not interfere with traffic entering or leaving site.
- **19-May-2017(night shift):** Ten protesters at protest pad opposite main gate Muskrat Falls site. One protester walks back and forth entrance way to site, but traffic is allowed to move freely.
- **20-May-2017:** Approximately 20-30 protesters at protest pad opposite Muskrat Falls site and block traffic. Duration 5 hours.

# Details: 2017 Protest Events (2/3)

- **21-May-2017:** Approximately 20 protesters arrive outside main gate Muskrat Falls and prevent traffic from entering site. Duration approximately 6 hours.

- **22-May-2017:** Throughout day 14-20 people at the protest pad opposite Muskrat Falls. Gates closed as precaution and maintained by security. No traffic was interfered with while entering and leaving site.

**Attachment 2 – Westney Dec 2017 Report**

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# An Analysis of SNC-Lavalin's Risk Assessment Report

Discussion document

December 2017

Total Page Count = 9

# Context

- In June of 2017, a Risk Assessment report for the Lower Churchill Project (LCP) was released to the public that was developed by SNC-Lavalin in 2013
- The Risk Assessment made several assertions about Nalcor Energy – LCMC's risk management practices
- LCMC requested that Westney complete a review of the Risk Assessment to analyze the validity of those assertions

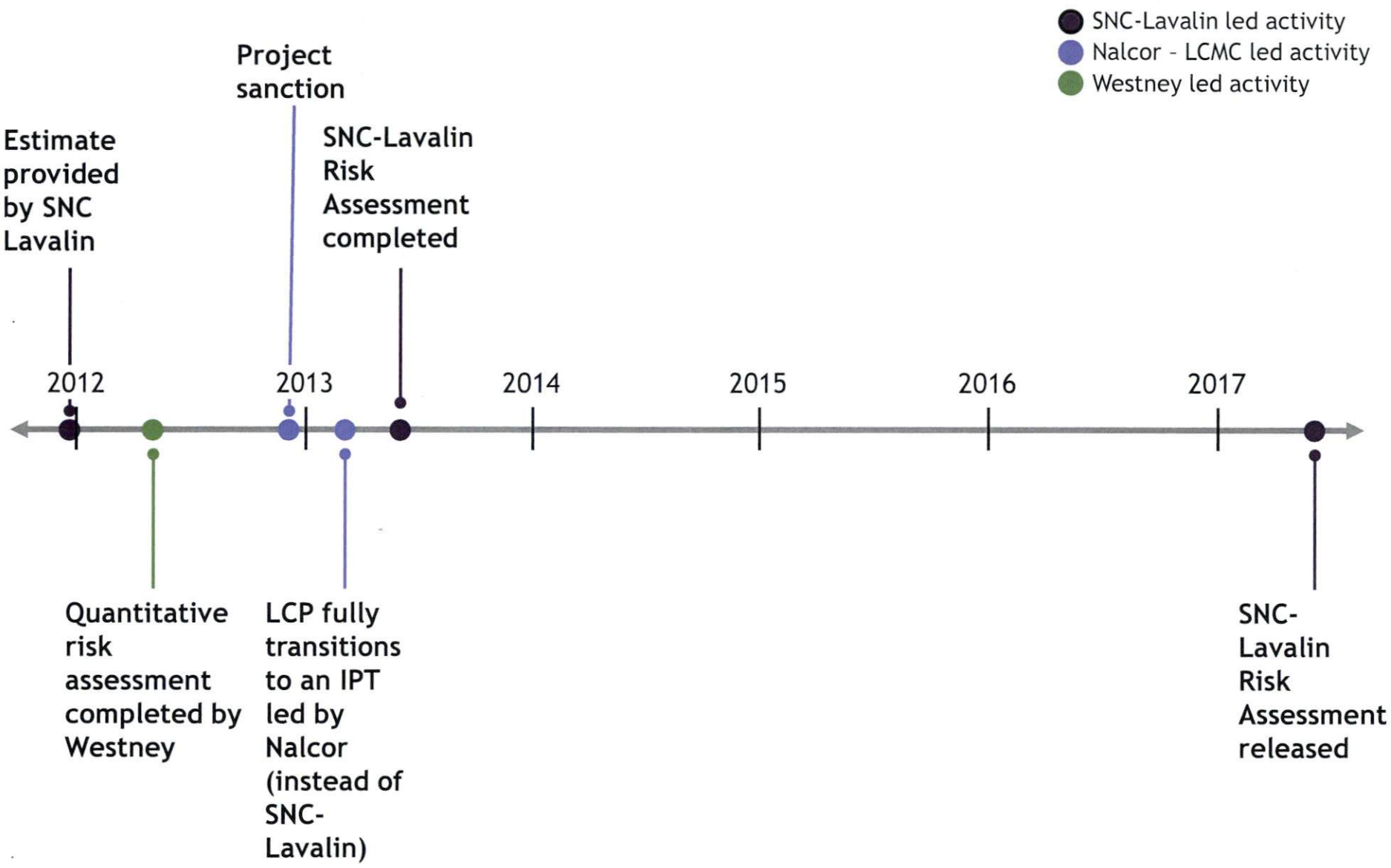
# Important items to note

- The SNC-Lavalin Risk Assessment for the LCP developed in 2013 was never submitted to Nalcor
- No copy exists in LCMC's comprehensive document control system
- The review was not requested by LCMC management
- The document is identified as "Confidential for SNC-Lavalin Internal Use Only" and was not approved (signed) by Executive VP Scott Thon, who was a sitting member of the Steering Committee for SNC-Lavalin's EPCM services agreement

# Assertions made in the 2013 SNC-Lavalin Risk Assessment are not supported by the facts available

| Assertions about LCMC's risk management approach | Facts available | Supporting slides |
|---|---|---|
| 1 A quantitative evaluation of risk exposure was not completed | ▪ Westney with LCMC and SNC-Lavalin completed a quantitative risk analysis in 2012 prior to sanction | 4 |
| 2 The existing LCP risk register did not provide a realistic portrait of actual project risk | ▪ All risks identified by SNC-Lavalin were included in the LCP risk register and considered in Westney's analysis<br>▪ SNC-Lavalin had several participants in Westney's risk identification and ranging sessions (which leveraged the existing LCP risk register) | 5 - 6 |
| 3 A clear picture of the total cost-risk exposure was not provided | ▪ The range of outcomes from Westney's analysis were inclusive of the results in SNC-Lavalin's Risk Assessment<br>▪ SNC-Lavalin provided critical cost estimate data to LCP (e.g., concrete installation production rates, costs per cubic meter) and was a key contributor in risk sizing/ranging | 7 |
| 4 The risk management function was not empowered | ▪ SNC-Lavalin was compensated for a full-time risk manager and a LCMC senior manager was engaged in the day-to-day risk activities | |
| 5 Mitigation plans were needed for the top 9 risks identified | ▪ Top risks had been identified prior to sanction, with mitigations planned or already underway in 2013 | 8 |

# Timeline of key events



# All risks included in the SNC-Lavalin Risk Assessment had already been identified by Nalcor-LCMC (1/2)

Top 9 risks by size

| | Risk title | Included[1] | Nalcor-LCMC reference[2] |
|---|---|---|---|
| Very high[3] | ● High market cost from contractors to be expected | ✓ | ▪ KR 5 / KR 20 |
| | ● Concrete works slippage from baseline schedule | ✓ | ▪ KR 20 |
| | ● River closure slippage from baseline schedule | ✓ | ▪ KR 20 |
| | ● Limited availability of skilled and experienced manpower | ✓ | ▪ KR 24 |
| | ● Major components outsourcing in China | ✓ | ▪ KR 26 |
| | ▪ Limited availability of skilled site management personnel | ✓ | ▪ KR 22 |
| | ▪ Difficulty transitioning to an integrated team project delivery model | ✓ | ▪ KR 43 |
| | ▪ Mobilization of community against the project | ✓ | ▪ KR 18 / KR 19 |
| | ▪ Additional delays resulting from difficult early works | ✓ | ▪ **Time-risk analysis variable |
| | ● Large EPC packages | ✓ | ▪ KR 29 |
| | ▪ Insufficient geotechnical information for north spur area | ✓ | ▪ KR 23 |
| | ● Large packages issued for transmission lines | ✓ | ▪ KR 28 |
| | ● No geotechnical data available | ✓ | ▪ KR 23 |
| | ▪ Lack of control on delivering of Strait of Belle Isle (SOBI) crossing cable | ✓ | ▪ KR 11 |
| | ▪ Commissioning failures of T&G units | ✓ | ▪ KR 13 |
| | ▪ Insufficient geotechnical information | ✓ | ▪ KR 23 |
| | ● Limited camp accommodation capacity at Muskrat Falls site | ✓ | ▪ R 185/ KR 24 |
| | ▪ No geotechnical information for dam | ✓ | ▪ KR 23 |
| | ▪ C3 coordination of packages will be a challenge | ✓ | ▪ R 162 |
| | ▪ Insufficient suppliers' QA/QC | ✓ | ▪ R 61 / R 159 |

[1] Included in Nalcor's Decision Gate 3 Project Cost and Schedule Risk Analysis Report and incorporated into Westney's analysis [2] KR = Key risk, R = Risk [3] SNC-Lavalin risk level based on "probable consequence" (further details on slide 7)

Westney

# All risks included in the SNC-Lavalin Risk Assessment had already been identified by Nalcor-LCMC (2/2)

| | Risk title | Included[1] | Nalcor-LCMC reference[2] |
|---|---|---|---|
| Very high[3] | Contractors' (or sub-contractors') errors / omissions | ✓ | R 59 |
| | Native issues for powerlines in Labrador | ✓ | KR 18 |
| | Possibility of strike | ✓ | KR 24 |
| | Underestimating workforce required to accomplish project | ✓ | KR 24 |
| | Claims arising from contractors or suppliers | ✓ | R 24 |
| High[3] | Requirements surrounding environmental assessment release | ✓ | KR 15 |
| | Complexity of commissioning and system integration | ✓ | KR 13 |
| | Riverside cofferdam catastrophic flooding | ✓ | R 12 |
| Medium[3] | Scope of packages not aligned with suppliers' core businesses | ✓ | R 147 |
| | Readiness for start-up might be a challenge | ✓ | KR 13 |
| | Problematic long lead items | ✓ | R 51 / R 130 |
| | Possible dispute for acquiring ROW for approx. 100km of powerlines | ✓ | R 84 |
| | Powerlines corridor located in remote areas | ✓ | R 122 / R 94 |
| | Delay in availability of admin. building creating inefficient site mgmt. | ✓ | Not considered a risk (minor issue) |
| | Suitability of site south access road | ✓ | R 37 / R 130 |
| | Cost overrun on electrode pond in Labrador | ✓ | R 70 |
| | Bankruptcy of major LCP contractors or suppliers | ✓ | KR 26 / KR 5 |
| Low[3] | Limited camp accommodations capacity at Upper Churchill Falls site | ✓ | KR 5 |
| | Adverse weather conditions | ✓ | **Time-risk analysis variable |
| | Insufficient air travel to LCP sites | ✓ | KR 24 |

[1] Included in Nalcor's Decision Gate 3 Project Cost and Schedule Risk Analysis Report and incorporated into Westney's analysis [2] KR = Key risk, R = Risk [3] SNC-Lavalin risk level based on "probable consequence" (further details on slide 7)

# The range of outcomes from Westney's analysis were inclusive of the results in SNC-Lavalin's Risk Report

| | Westney | SNC-Lavalin |
|---|---|---|
| Cost timing assumptions | ▪ 2012 C$ (at time of estimate) | ▪ End-of-project costs |
| Estimate basis | ▪ C$5.465 Billion | ▪ C$6.1 Billion stated, which is likely inclusive of contingency (the amount was C$5.8, excluding contingency) |
| Risk identification | ▪ LCP's risk register and collaborative risk identification sessions with SNC-Lavalin and Nalcor | ▪ LCP's risk register and discussion with SNC-Lavalin internal personnel |
| Risk quantification and modeling | ▪ Ranging of best and worst cases for both "tactical" (i.e., risks around the estimate) and "strategic" risks, with probabilistic modeling of all risks via Monte Carlo simulation techniques | ▪ Sizing of each risk based on a formula for probable consequence ("consequence" x "probability" x (1 - "manageability"))<br>▪ Probable consequences added to determine total risk |
| Analysis completion | ▪ 2012 | ▪ 2013 (after several key bid packages had been received) |
| Cost-risk results | ▪ C$5.8 Billion - C$8.2 Billion[1] (P5 to P95, escalated to end-of-project C$) | ▪ C$8.2 Billion (C$5.8 Billion + C$2.4 Billion in risk) |

[1] P5 to P95 range in 2012 C$ is C$5.5 Billion - C$7.4 Billion

# Top risks had been identified by Nalcor prior to Decision Gate 2 (2010), with mitigations planned or already underway in 2013

| Risk title | SNC-L risked amount ($ millions) | Nalcor-LCMC response / actions already underway in 2013 |
|---|---|---|
| ▪ High market cost from contractors to be expected | 225 | ▪ Bidders were aggressively profiled<br>▪ Almost all packages bid had 4 or more bidders |
| ▪ Limited camp accommodation capacity at Muskrat Falls site | 203 | ▪ Design of the "in ground" services was changed to allow for additional camp accommodation blocks to be built as the need arose |
| ▪ Limited availability of skilled and experienced manpower | 203 | ▪ A competitive wage / labour agreement with the Hebron Project was established<br>▪ A high quality camp and accommodations was built (e.g., fiber internet, TVs in all rooms, central gym, cinema, etc.)<br>▪ An aggressive campaign was executed to attract workers from Western Canada<br>▪ Transportation was streamlined (e.g., charter aircraft, bussing from the airport) |
| ▪ Large packages issued for transmission lines | 180 | ▪ First package bid (HVac TL) was broken into small packages. Bid revealed significant savings for larger package which was leveraged for the HVdc TL |
| ▪ Major components outsourcing in China | 168 | ▪ An extensive bidding process was conducted and supplier inspections/quality reviews were completed for the proposed facilities in China<br>▪ LCP had a full-time QA team on-the-ground in China, and quality was good |
| ▪ Concrete works slippage from baseline schedule | 126 | ▪ The project schedule at sanction was recognized as a target schedule with aggressive milestones |
| ▪ River closure slippage from baseline schedule | 96 | ▪ To further de-risk schedule, a decision was made in March of 2013 to move diversion from 2015 to 2016<br>▪ Mitigations resulted in river closure, diversion, and spillway operation being achieved on schedule |
| ▪ Large EPC packages | 90 | ▪ LCP's financial advisors and rating agencies required large packages that limited interfaces from contractors with global EPC capabilities and high credit-worthiness, with a preference for unit-rate and lump-sum contractors |
| ▪ No geotechnical information for dam | 90 | ▪ A decision was made that the in-river geotechnical investigations actually offered a much lower cost and schedule risk than portrayed by SNC-Lavalin's geotechnical engineers |

**Attachment 3 – Key Project Risk Frames as of DG3**

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# Strategic Risk Frame

| Revised | 16-Sep-12 |
|---|---|

| Risk # | R1 | Category | Enterprise | Current Risk Rating | High |
|---|---|---|---|---|---|

## Risk Details

| | |
|---|---|
| **Lead** | **P. Harrington/B. Crawley** |
| **Risk Title** | Organizational experience and resources for a project of this size |
| **Risk Description** | Potential for the accelerated growth and diversification of Nalcor Energy to place strain on the organization and hinder timely decision making. Nalcor needs to recognize the risk and make the required changes in organizational governance and devolution of financial authorities and decision making in order to avoid loss of opportunities and best in class Project execution. |
| **Specifics and Root Causes** | This risk encompasses 2 primary issues: Organization and Authority / Empowerment.<br><br>Nalcor is going through a significant growth phase straining limited resources and making it challenging to get priority issues addressed at the Executive level. Decision made to grow resources cautiously, which is difficult when significant effort is required to bring the organization processes, standards, etc. up to a level required to execute a megaproject.<br><br>Nalcor Energy has not undertaken a project of this size/magnitude - challenges are:<br>- Project Governance - Driving accountability down within the organization and empowering appropriately. Inherent governance structure of a crown corporation is influencing challenges with accountability and decision making.<br>- Processes, Resources and Governance Structure<br>- Specific experience of large hydro project<br>- Depth of resources to draw upon<br>- Lack of JV arrangements to lean upon for support.<br><br>- Suitability and robustness of decision making processes for project execution. |
| **Consequence / Impact** | -Delay in making urgent decisions and resource limitations results in lost opportunities.<br><br>Poor project execution using planned execution approach.<br><br>Lender's & shareholder confidence required to minimize owner's contingency and to ensure timely and adequate financial backing for Project. |
| **Early Warning Indicator of Risk Materialization** | Turnaround time on Approvals / Decisions |

## Risk Response

| | |
|---|---|
| **Management Strategy** | Avoid this risk by early and aggressive effort to address each specific cause:<br>- Select project execution strategy that helps reduce this risk.<br>- Demonstrate internal alignment and clarity on strategic direction<br>- Secure experienced resources to supplement existing organization breadth and depth<br>- Establish a project governance approach<br>- Implement best PM practices, including structured decentralized decision making processes<br>- Consider planned commercial structure for Maritime Link and understand impact on the overall execution approach for the LCP.<br><br>An amount of residual risk that cannot be avoided will have to be accepted by Nalcor. |

| Risk Strategy | ☑ Avoid | ☐ Mitigate | ☐ Transfer | ☑ Accept |
|---|---|---|---|---|

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LOWER CHURCHILL PROJECT

# Strategic Risk Frame

| Revised | 16-Sep-12 |
|---|---|

| Risk # | R1 | Category | Enterprise | Current Risk Rating | High |
|---|---|---|---|---|---|

| Action Plan | - Define corporate/enterprise governance and establish a decision making structure<br>- Establish project charter.<br>- Establish decision making protocol and processes.<br>- Develop Project Execution Plan<br>- Clearly define corporate / matrix organization interfaces.<br>- Document and seek alignment on project governance approach<br>- Leverage insight from other owners / developers who have faced similar challenges.<br>- Finalization of PM / contracting approach<br>- Develop Nalcor Matrix Organization LACTI - Identify roles and responsibilities<br>- Develop LACTI defining interface between LCP and appropriate Nalcor departments (matrix organization)<br>- Early engagement of lender's engineer and demonstrate internal capacity - ($2 to $5M)<br>- Engagement of competent experienced contractors (known entities with the "A" team) |
|---|---|
| Risk Responsibilities (LACTI) | Gilbert Bennett - Accountable<br>Paul Harrington - Lead<br>LCPMT - Technical<br>Fasken - Consult<br>PWC - Technical<br>AON - Consult<br>Owner's Eng - Technical |
| Unmitigated Risk Rating Rationalization | An event which would result in substantial losses to Nalcor due to claims from contractors is considered a Major impact; the likelihood is rated at 5 (Almost Certain) given that this has been a prevalent issue to-date within the Project. |

## Risk Trend and Status Update

- - RISK IS CONSIDERED TO HAVE LIMITED EXPOSURE TO THE PROJECT GIVEN THE EXTENSIVE MITIGATION EFFORTS IMPLEMENTED SINCE 2008.
- Project Governance Plan in draft form, requiring finalization. Project Team working in accordance with this key project document.
- Project Executive Committee established (i.e. Steering Committee) and meeting regularly to address key issues.
- Capital Expenditure Approval Procedure and Procurement Approvals process re-worked to reflect requirements for Gateway Phases 3 & 4, in particular delegating authority down within the organization.
- GM of Finance in-place with designated Project Controller. LCP F&A organization in-place; alignment with SPV structure
- Corporate Integration Manager hired focussed towards effective integration of the various elements of the Project into Nalcor's activities. This role helps facilitate liason with Shareholder.
- Key Management Plans, developed specifically for Project, have been implemented, including supporting organization.
- Sound financial and project control / MOC protocols in place. Well documented.
- Formal agreements in-place with Emera for Maritime Link; further NL agreements in-place.

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LOWER CHURCHILL PROJECT

# Strategic Risk Frame

| Revised | 16-Sep-12 |
|---|---|

| Risk # | R2 | Category | Enterprise | Current Risk Rating | Low |
|---|---|---|---|---|---|

## Risk Details

| | |
|---|---|
| **Lead** | **Gilbert Bennett** |
| **Risk Title** | Time required under Crown Corporation rules to gain approval |
| **Risk Description** | Potential exists that key strategic decisions could be delayed which impact the project schedule as a result of the time required to obtain shareholder approvals. |
| **Specifics and Root Causes** | Approvals from Shareholder may take a significant period of time given the effort required to ensure alignment with the various departments and stakeholders prior to seeking endorsement for a recommendation. This combined with the number of files decision makers are working could cause delays.<br><br>Public perception issues may outweigh schedule delay considerations<br><br>Delayed decisions may lead to:<br>- Schedule slippage and cost increases<br>- Loss of vendor and contractor interest<br>- Loss of team morale |
| **Consequence / Impact** | - Delay in project sanction and making key decisions.<br><br>- This risk is particularly relevant up to Gate 3. |
| **Early Warning Indicator of Risk Materialization** | Timeline for decision making by Shareholder. |

## Risk Response

| | |
|---|---|
| **Management Strategy** | Mitigate this risk by:<br>- Over communicating with shareholder to ensure alignment on issues of critical importance.<br>- Communicate project impact of issue to shareholder and proactively work at the Executive level to ensure Decision making processes and information are available to support timely approvals.<br>- Focus on embedding governance structure and ensuring alignment with Nalcor leadership, Board and Shareholder.<br>- Implement governance structures that are designed to facilitate efficient Decision making and push accountability down within the organization.<br>- Recognize the constraints of a crown corporation and the shareholder in the design of our execution approach.<br><br>An amount of residual risk that cannot be mitigated will have to be accepted by Nalcor LCP given the Shareholder is the Crown and are not use to executing large capital intensive projects. |

| Risk Strategy | ☐ Avoid | ☑ Mitigate | ☐ Transfer | ☑ Accept |
|---|---|---|---|---|

| | |
|---|---|
| **Action Plan** | - Define Nalcor and LCP corporate structure<br>- Increase awareness of impact (communicate to market place)<br>- Establish a Steering Committee and ensure regular communication of key dates and activities to Shareholder. |

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LOWER CHURCHILL PROJECT

# Strategic Risk Frame

| Revised | 16-Sep-12 |
|---|---|

| Risk # | R2 | Category | Enterprise | Current Risk Rating | Low |
|---|---|---|---|---|---|

| Risk Responsibilities (LACTI) | Ed Martin - Accountable<br>Gilbert Bennett - Lead<br>Derrick Sturge - Consult<br>LCPMT - Consult<br>Paul Harrington - Technical |
|---|---|

| Unmitigated Risk Rating Rationalization | An event having significant financial exposure and construction schedule delays as well as potential reputation issues for Nalcor is classified as a Moderate event; the likelihood is rated at 5 (Almost Certain) given experience to-date. |
|---|---|

## Risk Trend and Status Update

- RISK IS CONSIDERED TO HAVE LIMITED EXPOSURE TO THE PROJECT GIVEN THE EXTENSIVE MITIGATION EFFORTS IMPLEMENTED SINCE 2008.
- LCP PMT continue to work with the Gatekeeper to understand the Shareholder's needs and schedule sufficient to address them, while at the same time building confidence / trust with the Shareholder.
- A process of engagement has helped to streamline the decision making process.
- Well-documented approval process proposed, including use of AFE's and increased financial approval levels within the LCP PMT will facilitate the approval process.
- Multiple independent reviews of the Project by various entities (Lender's Engineer, Public Utilities Board, Underwriters, Federal Government) has challenged internal resources, however expect this to end at DG3.
- Significant budget has been approved for 2012, including early works at MF. Team continues to work with Gatekeeper and Shareholder to ensure alignment on critical decisions required prior to Project Sanction.
- Timing risk on Project Schedule that impact overall project delivery schedule is considered low. Gatekeeper will work with Shareholder to ensure key awareness of constraints within project schedule (e.g. award of Mass Excavation contract)

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# Strategic Risk Frame

| Revised | 16-Sep-12 |
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| Risk # | R3 | Category | Financial | Current Risk Rating | Low |
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## Risk Details

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|---|---|
| **Lead** | **Jim Meaney** |
| **Risk Title** | Changes in the financial market |
| **Risk Description** | As a result of changes in the Financial Market, preferred financing instruments may not be available in the quantity and terms desired, leading to additional financing cost. |
| **Specifics and Root Causes** | Driven by global financial markets - some project financed transactions (low risk "availability" structures) have experienced 30 BPS increases in credit spread.<br>Higher valuation of risks by financial markets; reduced lending capacity in the banking sector due to erosion of capital base with sub-prime and other write-downs. |
| **Consequence / Impact** | Risk associated with the terms and conditions associated with financing instruments, including:<br>- Interest rate risk - increased spreads due to financial market unrest<br>- The risk that preferred financing instruments may not be available, or available in the quantities or on terms and conditions projected.<br>- Financial markets require a construction contracting environment (as a precondition to financing) that is higher-cost or otherwise disadvantageous to LCP. |
| **Early Warning Indicator of Risk Materialization** | Debt base rates |

## Risk Response

| | |
|---|---|
| **Management Strategy** | - Monitor financial markets.<br>- Structure all aspects of the Project so as to minimize percieved transfer of risk to the lenders.<br>- Carefully craft and execute Financial Market Sounding.<br>- Engage appropriate expertise.<br><br>IMPORTANT NOTE: Risks associated with financial market unrest cannot be directly affected by Nalcor. The risk strategy seeks to be affected as little as possible by these risks. However, the effect of mitigation is difficult to quantify at this stage. It will be important to structure the project appropriately, to consider the construction contracting strategy and to ensure a significant proportion of high quality off take contracts to support minimizing the impact.<br><br>Demonstrate predictability of our hydro project as compared to other more technically complex projects. This strategy may result in reduced debt-service coverage ratio. |
| **Risk Strategy** | ☐ **Avoid** ☑ **Mitigate** ☐ **Transfer** ☐ **Accept** |
| **Action Plan** | Represents best practice; potentially no cost over and above what Nalcor would seek to do in any case. |

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| **Risk Responsibilities (LACTI)** | Gilbert Bennett - Accountable<br>Mark Bradbury - Lead<br>PwC - Technical<br>Westney - Consult |

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LOWER CHURCHILL PROJECT

# Strategic Risk Frame

| Revised | 16-Sep-12 |
|---|---|

| Risk # | R3 | Category | Financial | Current Risk Rating | Low |
|---|---|---|---|---|---|

| Unmitigated Risk Rating Rationalization | Assume 50 basis points exposure on interest rate, thereby could be classified as a Major Event. Given the uncertainty in the financial market this event is considered possible. |
|---|---|

## Risk Trend and Status Update

- RISK IS CONSIDERED TO HAVE LIMITED EXPOSURE TO THE PROJECT GIVEN THE EXTENSIVE MITIGATION EFFORTS IMPLEMENTED SINCE 2008.
- Government of Canada's commitment for a Loan Gurantee or equivalent combined with the Province's current fiscal capacityhas dramatically altered the profile of this risk.
- Current financial market conditions indicates that debt is cheaper now than assumed at DG2, thus improving the CPW in favour of the Project.
- Shadow credit rating completed in Fall 2011 (without benefit of FLG) indicated a favorable view by 3 rating agencies - Moody's, S&P, DBRS

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# Strategic Risk Frame

| Revised | 16-Sep-12 |
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| Risk # | R4 | Category | Financial | Current Risk Rating | Medium |
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## Risk Details

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|---|---|
| Lead | Jim Meaney |
| Risk Title | Foreign currency exchange risk |
| Risk Description | As a result of foreign currency exchange rate swings, the value of the Canadian Dollar may erode, leading to foreign currency exposure during the purchase of goods and materials. |
| Specifics and Root Causes | - Significant portion of content in non-CAD $ expenditure (e.g. US, Kroner, Euro)<br>- 10% swing in exchange |
| Consequence / Impact | The value of the Canadian Dollar may erode, leading to foreign currency exposure during the purchase of goods and materials. Therefore we have currency risk beyond baseline of estimate. |
| Early Warning Indicator of Risk Materialization | Strength and trend of Canadian Dollar. |

## Risk Response

| | |
|---|---|
| Management Strategy | - Mitigate exposure by developing cost estimating consistent with Nalcor's business planning assumptions for exchange rates.<br>- Transfer risk by implementation of a currency hedging strategy. |

| Risk Strategy | ☐ Avoid | ☑ Mitigate | ☑ Transfer | ☐ Accept |
|---|---|---|---|---|

| | |
|---|---|
| Action Plan | - Establish realistic baseline Fx exchange rates to be used in economic analysis<br>- Establish an overall currency hedging program<br>- Develop an improved forecast of currencies for the overall project estimate |
| Risk Responsibilities (LACTI) | Gilbert Bennett - Accountable<br>Mark Bradbury - Lead<br>PwC - Consult<br>Investment Evaluation - Technical<br>Dave Pardy - Consult |
| Unmitigated Risk Rating Rationalization | Assume 10% swing in rates based upon $1-2B non-CDN expenditure, thereby could be classified as a Major Event. Given the uncertainty in the financial market this event is considered possible. |

## Risk Trend and Status Update

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# Strategic Risk Frame

| Revised | 16-Sep-12 |
|---|---|

| Risk # | R4 | Category | Financial | Current Risk Rating | Medium |
|---|---|---|---|---|---|

- Overall requirement for non-CDN expenditures is somewhere in the range of $500 to $800 million dollars.
- From a contracting / procurement practice, Nalcor assumes Fx exposure.
- LCP foreign currency exposure considered as part of the broader Nalcor Financial Risk Management Strategy, and will be considered as part of the project's plans going forward.

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# Strategic Risk Frame

| Revised | 15-Sep-12 |
|---|---|

| Risk # | R5 | Category | Financial | Current Risk Rating | Low |
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## Risk Details

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|---|---|
| **Lead** | **Lance Clarke** |
| **Risk Title** | Risk Premium for obtaining lump sum contracts |
| **Risk Description** | As a result of the concerns of lenders regarding the creditworthiness of contractors and vendors, lenders may push Nalcor towards negotiating lump sum contracts in order to minimize their perception of risk exposure, which would result in additional capital cost for the Project. |
| **Specifics and Root Causes** | Market shifting from seller's market to buyer's market for contractors and vendors. While contractor's risk appetite is increasing, it is not back to historical levels.<br><br>Contractor and vendor creditworthiness (i.e. risk of default) continues to be a concern for potential financiers. |
| **Consequence / Impact** | Risk that financial market (lenders) may wish to push Nalcor towards negotiating lump sum contracts in order to minimize their perception of risk exposure. |
| **Early Warning Indicator of Risk Materialization** | Risk appetite of financial market. Overall risk spectrum of LCP. |

## Risk Response

| | |
|---|---|
| **Management Strategy** | - Risk brokering / allocation.<br><br>- Increase equity contribution thereby removing risk. |

**Risk Strategy** ☐ **Avoid** ☐ **Mitigate** ☐ **Transfer** ☐ **Accept**

| | |
|---|---|
| **Action Plan** | Avoid and mitigate this risk by:<br>- Focus on risk brokering / allocation arrangement to achieve the most cost effective arrangement for all parties.<br>- Ensure awareness of financial market of latest industry trends w.r.t lump sum contracts<br>- Leverage risk strategy and 3rd party expertise to help sell the LCP approach during market sounding<br>- Engage a shadow engineer and work with them to educate prospective lenders.<br>- Optimize debt to equity structure to remove this risk.<br>- Engage 3rd party partners on Maritime Link who can naturally reduce risk. |
| **Risk Responsibilities (LACTI)** | Paul Harrington - Accountable<br>Lance Clarke - Lead<br>Jason Kean - Consult<br>Lance Clarke - Consult<br>Investment Evaluation - Consult<br>PwC - Consult<br>Westney - Technical |
| **Unmitigated Risk Rating Rationalization** | Assume 6% premium for Lump Sum contracts in worst case, thereby classified as a Major Event. The likelihood of this event is considered Possible given the current uncertainty in the global Financial market. |

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# Strategic Risk Frame

| Revised | 15-Sep-12 |
|---|---|

| Risk # | R5 | Category | Financial | Current Risk Rating | Low |
|---|---|---|---|---|---|

## Risk Trend and Status Update

- Project's contracting strategy is contained in Overarching Contracting Strategy LCP-PT-MD-0000-PM-ST-0002-01 and supported by the Master Package Dictionary.
- In Fall 2011, Credit Rating Agencies viewed our contracting strategy as suitable; however, pointed out that the interface/integration risk exists
- Key exposure on the owner's organization – ability to fulfill owner's role, while SLI pulls away from its commitments under an EPCM arrangement.
- Project's financing strategy, in particular the Commitment Letter from the Province which indicates that the entire out-turn cost will be paid by the raterpayer, signficantly reduces this risk.
- Nalcor, with the Government of Canada's participation, has engaged MWH as the Independent Engineer to review the Project and advise of any concerns.
- RISK IS CONSIDERED CLOSED.

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# Strategic Risk Frame

| Revised | 15-Sep-12 |
|---|---|

| Risk # | R6 | Category | Power Sales and Market Access | Current Risk Rating | Low |
|---|---|---|---|---|---|

## Risk Details

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|---|---|
| **Lead** | **Rob Hull** |
| **Risk Title** | Extra year required to secure long-term PPAs |
| **Risk Description** | As a result of a slow negotiation process, the timeline to secure long-term PPAs for anchor loads may extend, resulting in a deferment of Project Sanction by 1 year. |
| **Specifics and Root Causes** | Concern about time to secure PPAs required to support Financial Close.<br><br>Driven by:<br>- Customers unwilling to sign PPA until certainty exist on how we will get the power to them.<br>- The extended time for negotiations due to a lack of political will within New Brunswick.<br>- Declining load in target markets<br>- Non-alignment of our and customer timelines for delivery of power<br>- Achieving federal alignment and support for the Energy Gateway<br>- Uncertainty on market routing due to a delay in Regie decision on the Quebec OATT as a result of court action. |
| **Consequence / Impact** | - Delay in commencement of early works at Gull Island.<br>- Delay in achieving Financial Close.<br>- Increases the need to inject more equity in order to maintain schedule. |
| **Early Warning Indicator of Risk Materialization** | Engagement activities and pulse with potential anchor load customers. |

## Risk Response

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|---|---|
| **Management Strategy** | Avoid this risk from materializing through:<br>- Agressively focusing Power Sales teams on Atlantic Canada customers.<br>- Selling LCP value proposition to Atlantic Canada customers.<br>- Seeking political alignment on the value of LCP to NS and NB in reducing their GHG problem.<br>- Advancing the Energy Gateway initiative through the Federal Government<br><br>Recognize that this risk is not entirely within Nalcor's control, but depends on counterparties, thus some acceptance of this risk is required.<br><br>Mitigate potential exposure by only awarding Engineering Contract at Gate 2b when clarity on Market Access is available. |
| **Risk Strategy** | ☐ **Avoid** ☐ **Mitigate** ☐ **Transfer** ☐ **Accept** |
| **Action Plan** | - Engage Emera and NB Power to discuss product and pricing<br>- Prepare for Regie hearings for OATT complaints<br>- Prepare fallback strategy if Regie decision is unfavorable<br>- Work the Energy Gateway file on the political front.<br>- Push for clarity on Government of Canada's GHG Policy |
| **Risk Responsibilities (LACTI)** | Gilbert Bennett - Accountable<br>Joanna Harris - Lead<br>Derrick Sturge - Technical<br>Laurie Coady - Technical<br>Paul Harrington - Consult |

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# Strategic Risk Frame

| Revised | 15-Sep-12 |
|---|---|

| Risk # | R6 | Category | Power Sales and Market Access | Current Risk Rating | Low |
|---|---|---|---|---|---|

| Unmitigated Risk Rating Rationalization | An event having some financial exposure (worst case $50 to $60M) is classified as a Minor event; the likelihood is rated at 5 (Almost Certain) given experience to-date. |
|---|---|

## Risk Trend and Status Update

- Phase 1 (MF+IL+ML) Term Sheet with Emera has allowed a Gate 2 decision to be made. Given that MF is being developed to meet the Island's energy needs, PPA requirements are limited to NL Hydro. Hence, risk of delaying in achieving Sanction due to PPA completion schedule is largely considered eliminated.

- RISK IS CONSIDERED CLOSED.
- Formal agreements have been executed with Emera, while the Newfoundland agreements are drawing to a conclusion.

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# Strategic Risk Frame

| Revised | 15-Sep-12 |
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| Risk # | R7 | Category | Power Sales and Market Access | Current Risk Rating | High |
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## Risk Details

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|---|---|
| **Lead** | **Auburn Warren** |
| **Risk Title** | Federal government support for generation and transmission projects (OPPORTUNITY) |
| **Risk Description** | As a result of Federal Government financial support for the Project, general public and financial market confidence in the Project would increase, resulting in an exposure reduction for many of the strategic risks faced by the Project. |
| **Specifics and Root Causes** | Federal government visible support of the project in any form would benefit the confidence in the market that the project will proceed - talks with the federal government regarding funding support have not been fully initiated at this point in time but should add value once the Project progresses into Phase 3. |
| **Consequence / Impact** | - Economic modeling is based on no federal funding support, however various scenarios of federal support have been modeled.<br><br>** This could have significant unquantifiable positive impact for the project by increasing underlying market and supplier confidence, thereby reducing several Strategic Risks the Project faces. |
| **Early Warning Indicator of Risk Materialization** | Federal support for "Green" Energy. |

## Risk Response

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|---|---|
| **Management Strategy** | - Active and aggressive pursuit by Executive<br>- Atlantic Canada political alignment on the value of the Energy Gateway and how it will develop each region.<br>- Development of Federal Ask strategy and present to Feds.<br>- Engage opposition parties to maintain support for the Project.<br>- Influence GHG Policy through all vehicles including Canadian Hydropower Association. |
| **Risk Strategy** | ☐ Avoid ☑ Mitigate ☐ Transfer ☐ Accept |
| **Action Plan** | - Lobby Federal government through Summa<br>- Evaluate potential benefits to the Project from carbon credits |
| **Risk Responsibilities (LACTI)** | Ed Martin - Accountable<br>Mark Bradbury - Lead<br>Gilbert Bennett - Consult<br>Investment Evaluation - Technical<br>Steve Goulding - Consult<br>PwC - Consult |
| **Unmitigated Risk Rating Rationalization** | Assume that Federals provide support requested as per Federal Ask the impact could be classified as Major. The likelihood is considered Possible. |

## Risk Trend and Status Update

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# Strategic Risk Frame

| Revised | 15-Sep-12 |
|---|---|

| Risk # | R7 | Category | Power Sales and Market Access | Current Risk Rating | High |
|---|---|---|---|---|---|

- MOU in-place with Government of Canada for FLG, while negotations continue towards finalizing term sheet.
- FLG considered as part the Project's current financing strategy.

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LOWER CHURCHILL PROJECT

# Strategic Risk Frame

| Revised | 15-Sep-12 |
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| Risk # | R8 | Category | Power Sales and Market Access | Current Risk Rating | Low |
|---|---|---|---|---|---|

## Risk Details

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|---|---|
| **Lead** | **P.Humphries/R.Henderso** |
| **Risk Title** | Changes in Project scope resulting from maturing system integration / operation definition |
| **Risk Description** | As a result of limited maturity of the integration of the Island and Maritimes electrical systems with LCP power, significant change in the Project Definition / Scope may occur, leading to schedule delays and additional capital cost. |
| **Specifics and Root Causes** | *This is a project definition / scoping risk. Underlying causes are discussed below:<br><br>- The Power market for this project could influence new routes for power sales and product mix (e.g. Maritime 1000 vs. 800 MW) until solid definition of long-term markets, project needs to remain flexible on market options and final configuration to market.<br><br>- There is also a risk that system reliability requirements for the interconnection of NL to the Maritimes may require additional reliability work to be undertaken in each jurisdiction.<br><br>- Uncertainty also exists as to whether the NB system can handle an 1000MW injection via the Maritime Link. Current NBSO SIS is for 800MW (740MW net) which is viable. There may be a need for additional spinning reserve to go to the 1000MW case - this will cost and thus impact the business case.<br><br>- Finalize the Island upgrades to create the spinning reserve and system stability required for the Infeed in order for the Island system to survive / recover from a fault in the in-feed during service. |
| **Consequence / Impact** | - Delay in securing commercial structure for Maritime Link<br>- Delay in executing LOI for power sales with Maritimes.<br>- Delays and rework during definition phase of project.<br>- Late scope growth<br>- Additional integration complexities.<br>- Cost and schedule growth - erosion of economics<br>- Placing increased demands on resources. |
| **Early Warning Indicator of Risk Materialization** | Number and extent of design changes (i.e. increase in project scope prior to start of engineering.) |

## Risk Response

| | |
|---|---|
| **Management Strategy** | - Avoid risk by engaging counterparties and validate project scope assumptions (i.e. Maritimes integration) ASAP.<br>- Mitigate risk by maintaining commitment to maximize Front-End Loading (i.e. scope definition) prior to sanction. Select final market option prior to proceeding through Gate 2b.<br>- Transfer some of the risks to 3rd parties through the Commerical Construct for Transmission. |

| Risk Strategy | ☑ Avoid | ☑ Mitigate | ☑ Transfer | ☐ Accept |
|---|---|---|---|---|

| | |
|---|---|
| **Action Plan** | - Inform and communicate impact with commercial/markets<br>- Assure alignment between commercial/markets and technical (decision gate assurance process)<br>- Receipt of NBSO Facilities Study for 800MW injection at Salisbury, NB.<br>- Consider the merit of completing a 1000MW System Impact Study with NBSO pending the results of the proceeding.<br>- Kick-off integrated work plan with NB Power and Emera to explore how LCP power will be |

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# Strategic Risk Frame

| Revised | 15-Sep-12 |
|---|---|

| Risk # | R8 | Category | Power Sales and Market Access | Current Risk Rating | Low |
|---|---|---|---|---|---|

integrated and used with their systems.

| Risk Responsibilities (LACTI) | Gilbert Bennett - Accountable<br>Joanna Harris - Lead<br>Paul Harrington - Consult<br>Bob Barnes - Technical<br>Chris Kirby - Technical<br>Paul Humphries - Technical |
|---|---|
| Unmitigated Risk Rating Rationalization | Assume worst case impact of 40 to 50% cost growth, thereby classified as a Major Event. Given the current design and cost basis is reasonably robust and technology opportunities exist (e.g. HVdc light), then this risk is considered Possible. |

## Risk Trend and Status Update

- WHILE THIS RISK REMAINS OPEN, THE EXPOSURE IS CONSIDERED VERY LOW GIVEN THE EXTENSIVE ENGINEERING WORK COMPLETED SINCE DG2.
- AC Integration Studies have verified our planning basis.
- TQ in place to ascertain input of NERC on MF, however cost exposure is considered minimal.
- Decision to avoid converting Holyrood Units 1&2 to synchronous condenser support in lieu of increasing rating of Soldier's Pond units from 150 to 175MVar
- Requirements for integration of LCP power into the existing NL Hydro system continue to be developed. This remains a significant risk for the Project as demonstrated by PCN-014 which subsequently changed the operating voltage from 320 kV to 350 kV, while overload capacity of the system is also now deemed to be a requirement.
- Long-term operations plan must be prepared for the system. System planning will take a more active role with the Project Team, coordinating the interface with Emera on all power system issues.
- Executive Committee has confirmed that LCP PMT with SLI will lead the EPC & Management of the 3 new Synchronous Condensers and Soldier's Pond switchyard, while NL Hydro will address all other requirements.

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# Strategic Risk Frame

| Revised | 15-Sep-12 |
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| Risk # | R9 | Category | HSE | Current Risk Rating | Medium |
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## Risk Details

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| **Lead** | **Jason Kean** |
| **Risk Title** | Good HSE record is critical for project success |
| **Risk Description** | As a result of a lack of a safety culture, HSE performance is poor, which could lead to reputation and financial implications for Nalcor. |
| **Specifics and Root Causes** | - Safety is Priority #1 for Nalcor. Creating a safety culture will be a challenge given the diversity of contractors coming together on this project.<br>- Remote and difficult work sites<br>- Multiple work faces<br>- Potential for contamination of river<br>- Experience of workforce<br>- Lack of safety culture among transient construction workforce |
| **Consequence / Impact** | Cost and reputation concerns related to potential on-site HSEQ issues including, but not limited to:<br>- Poor project safety record, serious injuries or fatality<br>- Substance abuse<br>- River contamination during construction<br>- Severe terrain<br>- Remote site / wilderness / animals |
| **Early Warning Indicator of Risk Materialization** | - Safety Performance Triangle<br>- Leading / Lagging Indicators<br>- HSE Team recruitment and development of Management System. |

## Risk Response

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| **Management Strategy** | Avoid the likelihood of this risk occuring through:<br>- Establishing and implementing a robust, consistent H&S and E management system across the Project.<br>- Early and proactive program to promote and secure labour and contractor commitment to HSE.<br>- Engaging and retaining contractors who are leaders in safety performance and have demonstrated the ability to proactively manage all aspects of HSE performance on remote worksites.<br>- Recognizing HSE performance is imperative and start embedding an HSE culture early in the project. It all starts with management's commitment to safety.<br>- Maintaining team awareness and establish strong & open communication channel on all aspects of HSE. |

| Risk Strategy | ☑ Avoid | ☐ Mitigate | ☐ Transfer | ☐ Accept |
|---|---|---|---|---|

| | |
|---|---|
| **Action Plan** | - Establish safety culture in owner team (attitude and commitment)<br>- Mitigate impact of catastrophic event with insurance (environment)<br>- Incorporate environmental minimization into design<br>- Implement a Behavioural Based Safety Program and a Safety Leadership Program for Supervisors across the Project.<br>- Implement Safety-By-Design concept into the engineering phase.<br>- Design necessary controls into project<br>- Embed HSE within the front-end of the project<br>- Ensure contractor understands roles<br>- HSE processes in-place |

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# Strategic Risk Frame

| Revised | 15-Sep-12 |
|---|---|

| Risk # | R9 | Category | HSE | Current Risk Rating | Medium |
|---|---|---|---|---|---|

- Develop environmental management plan for construction phase
- HSE is to be a key selection criteria for contractors
- Establish training and competency development programs
- Focus efforts on engagement and SWOP reporting of near misses.

**Risk Responsibilities (LACTI)**

Paul Harrington - Accountable
Jason Kean - Lead
Bob Barnes - Consult
Construction Manager - Technical

**Unmitigated Risk Rating Rationalization**

Poor HSE performance resulting in a fatalities could have substantial financial (site shutdown) and reputation implications to Nalcor. The likelihood of occurrence is rated at 3 (possible) given Nalcor's limited safety culture combined with the challenge

## Risk Trend and Status Update

- Decision made to separate H&S and E functions within Nalcor PMT to facilitate stronger linkage of environmental and regulatory compliance function with EA. Environmental Manager transistioning from Generation EA process, hence good linkage. Functional resources now embedded within the Nalcor PMT. Actively recruiting H&S Manager and further functional support.
- The selected EPCM consultant has a best-in-class H&S performance.
- Nalcor Environmental Management Plan in-place, with strong linkages beginning to develop with SLI.
- SLI have mobilized separate H&S and Environmental Managers with supporting team. H&S Management Plan drafted.
- HSE criteria continues to be a key selection criteria for contractors.
- Safety-by-Design work program being developed by SLI.
- "Safety culture" firmly taking hold with Nalcor Project Team, however more focus required within SLI.

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# Strategic Risk Frame

| Revised | 15-Sep-12 |
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| Risk # | R10 | Category | Engineering/Technical | Current Risk Rating | Low |
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## Risk Details

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|---|---|
| **Lead** | **Ron Power** |
| **Risk Title** | Availability of resources to achieve a quality design |
| **Risk Description** | As a result of strong demand for hydro and transmission resources, the Project has challenges attracting the quality and quantity of required resources, resulting in poor and late engineering leading to quality and schedule delays during construction. |
| **Specifics and Root Causes** | - There is currently limited capacity within NL for hydro, resulting in the need to mobilize resources outside the Province.<br>- Our current execution model endeavors to centralize engineering in St. John's, however it may be difficult to convince experienced expats required to achieve a quality design to mobilize here for 1 to 3 years.<br>- Market improving with awards slowed and projects associated with commodity markets put on hold.<br>-Hydro design market level of demand not seen since 1988<br>- Many considerations and reductions in hydro engineering resources in last decade<br>- Prior to this current recession, engineering productivity has been challenged due to strain on experienced resources |
| **Consequence / Impact** | - Poor or late engineering results in quality and schedule delays during construction.<br>- We may have to execute specialized engineering outside of the Province (similar to Hebron) which will increase the effort required to effectively manage interfaces. |
| **Early Warning Indicator of Risk Materialization** | - Track record for other projects - rework and late schedule.<br>- Entry of new players into the marketplace." |

## Risk Response

| | |
|---|---|
| **Management Strategy** | Avoid risk by:<br>- Early and aggressive action to secure required engineering competences and resources required to avoid this risk<br>- Schedule sufficient time for engineering completion prior to start of construction (enabled by requirements for Final Disclosure)<br><br>Mitigate exposure by developing and implementing a project-wide Quality Management System and embed QA requirements in all contracts. |

| Risk Strategy | ☑ Avoid | ☑ Mitigate | ☐ Transfer | ☐ Accept |
|---|---|---|---|---|

| | |
|---|---|
| **Action Plan** | - Divide engineering requirements into areas of specific expertise<br>- Pay a premium for the A-Team<br>- Provide retention incentives<br>- Sell the job as a desirable opportunity<br>- Select contractor on basis of competency of key named persons<br>- Have s strong owners team in place - design / integrity function for checking<br>- Establish design integrity review with expert panel<br>- Combine with insurance and contractor parent company guarantee<br>- Liquidated damages for early removal of key personnel by contractor<br>- Factor productivity into engineering schedule |

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LOWER CHURCHILL PROJECT

# Strategic Risk Frame

| Revised | 15-Sep-12 |
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| Risk # | R10 | Category | Engineering/Technical | Current Risk Rating | Low |
|---|---|---|---|---|---|

| Risk Responsibilities (LACTI) | Paul Harrington - Accountable<br>Ron Power - Lead<br>Bob Barnes - Consult<br>Lance Clarke - Technical<br>Westney - Technical |
|---|---|
| Unmitigated Risk Rating Rationalization | This event would result in a minor financial impact due to a limited capital cost exposure. The likelihood is considered of being Likely given the small marketplace, plus forecasted demand for new Tx and hydro, in particular in Brazil, India and China. |

## Risk Trend and Status Update

RISK IS CONSIDERED CLOSED FOR THE RATIONAL NOTED BELOW:
- SLI awarded EPCM contract for Hydro, transmission and HVDC specialities. Contract included naming of 43 key resources and for completion of engineering in St. John's.
- Overall engineering on the Project is approx. 50% completed.
- Generally, considering we have the A-team for engineering with some noted exceptions that are being addressed.
- Selective work to be done in Montreal to help achieve our target AFC drawings, in particular specialized engineering such as FEA modelling and reinforcement detailing.,
- EPCM Task Force set-up to work with SLI to confirm what Construction Management organization will look like. We do have some person-hour exposure beyond the DG3 estimate - considered tactical risk
- We have to agree upon a Fee Structure with SLI if we cannot agree upon personshours.
- Largest area of concern is SLI's ability to secure resources require to meet MFL requirements, in particular for Construction Management.
- DAN-0022 has been raised to address the increased cost of completing all engineering work in St. John's as required under the Benefits Agreement with the Province.

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LOWER CHURCHILL PROJECT

# Strategic Risk Frame

| Revised | 16-Sep-12 |
|---|---|

| Risk # | R11 | Category | Engineering/Technical | Current Risk Rating | Low |
|---|---|---|---|---|---|

## Risk Details

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|---|---|
| **Lead** | **Greg Fleming** |
| **Risk Title** | Submarine cable crossing of Strait of Belle Isle |
| **Risk Description** | As a result of the many firsts associated with installing a submarine cable across the SOBI, construction and installation challenges may occur, leading to significant cost and schedule exposure. |
| **Specifics and Root Causes** | Many firsts with crossing the SOBI.<br>- Buried shore approaches due to icebergs<br>- Weather window very short<br>- Difficult currents will be a challenge for existing installation vessels<br>- Different submarine terrain<br>- Viability of trenching technology is questionable<br>- Sea currents at 5 to 7 knots will be very challenging<br>- Installation vessels will have to be mobilized from Europe, while there is limited capacity in the world (3 vessels). |
| **Consequence / Impact** | - Technology application for protection, installation & protection cost<br>- Shoreline interface challenges<br>- Delay concerns during installation<br>- Long lead-time for order to delivery and limited supplies<br>- Loss of cable during operations resulting in big impact of repair cost - poor reliability<br>- Confidence of financiers in the feasibility of this crossing may make it difficult to finance<br>- Insurance underwriters unwilling to insure this asset. |
| **Early Warning Indicator of Risk Materialization** | Viability of submarine cable option for SOBI. |

## Risk Response

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|---|---|
| **Management Strategy** | - Recognize the risks and challenges and evaluate all available opportunities as early as possible (pre Gate 2) in order to Avoid / Mitigate the risk. |

| Risk Strategy | ☑ Avoid | ☑ Mitigate | ☐ Transfer | ☐ Accept |
|---|---|---|---|---|

| | |
|---|---|
| **Action Plan** | - Perform due diligence with additional studies, particular on trenching technology<br>- Engage the best consultants available in order to fully understand the subsurface conditions.<br>- Complete a detailed geotechnical program for the area.<br>- Understand the risk of cable loss due to icebergs and fishing activity<br>- Gather more marine data, i.e. currents, bottom survey, geotech., etc<br>- Develop a design with adequate sparing - also have submarine cables in 2 different routes<br>- Identify and minimize installation difficulties<br>- Establish marine specialist capability within Nalcor<br>- Engage 2 suppliers in design competition for the preferred crossing solution and pay for it<br>- Build and test rock trenching equipment. |

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LOWER CHURCHILL PROJECT

# Strategic Risk Frame

| Revised | 16-Sep-12 |
|---|---|

| Risk # | R11 | Category | Engineering/Technical | Current Risk Rating | Low |
|---|---|---|---|---|---|

| Risk Responsibilities (LACTI) | Paul Harrington - Accountable<br>Bob Barnes - Lead<br>AON - Consult<br>Ron Power - Technical<br>Lance Clarke - Consult |
|---|---|
| Unmitigated Risk Rating Rationalization | Assume worst case impact is that cable system can be installed and finally commissioned, however at a substantial cost growth. It is very likely that this event will occur unless circumstances change. |

## Risk Trend and Status Update

RISK IS CONSIDERED CLOSED FOR THE RATIONAL NOTED BELOW:
- Following extensive desk top and field work in 2008-2010, the submarine cable crossing method was chosen over a cable-conduit option.
- Significant field and desktop studies completed since DG2, including ice risk exposure by C-CORE.
- Conceptual design of submarine cable option using HDD tunnels on each side with rock protection covering other exposed areas.
- Further geotechnical data, iceberg tracking and current data collection activities are planned for 2011.
- Contracting & Execution Strategy is based upon owner-managed agreements for: (1) Cable design and installation (EPCI); (2) Rock supply and placement (EPCI), (3) HDD engineering, and (4) HDD drilling
- Decision made to adjust cable installation from original plan of 2015 to 2016, to ensure sufficient manufacturing and installation capacity.
- HDD pilot hole completed in Feb 2012 - distance of ~1.5km.
- 3 bids for Cable Supply & Install were received - decision made to award to 1 prior to Sanction.
- Overall program is well defined.

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# Strategic Risk Frame

| Revised | 15-Sep-12 |
|---|---|

| Risk # | R12 | Category | HVdc Specialities Supply & Install | Current Risk Rating | Low |
|---|---|---|---|---|---|

## Risk Details

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|---|---|
| **Lead** | **Greg Fleming** |
| **Risk Title** | Faults in submarine cable during commissioning and post installation |
| **Risk Description** | As a result of design, fabrication and installation errors, the SOBI submarine cable may fail in-service, leading to/resulting in poor reliability, extensive increase in operating cost, and the requirement to maintain back-up power generation capacity. |
| **Specifics and Root Causes** | - Recent installations in Europe experiencing faults - NorNed<br>- Faults in buried SOBI section extremely expensive to repair.<br>- According to Statnett, cable manufacturers generally lack experienced installation engineering know-how. |
| **Consequence / Impact** | - System reliability implications (potentially caused by installation damages, manufacturing defects...).<br>- Increase in operating cost<br>- Requirement to maintain back-up power generator on the Island. |
| **Early Warning Indicator of Risk Materialization** | - Industry trends re cable failure (e.g. NorNed performance) |

## Risk Response

**Management Strategy**

Avoid risk by:
- Developing and implementing a project-wide Quality Management System and embed QA requirements in all contracts.
- Having significant owner involvement in all technical and construction aspects of the work, including a QC surveillance program at the manufacturing locations.
- Understanding problems on recent installations and avoid risks to degree possible.
- Using a conservative, robust design based upon proven technology.
- Selecting design and contracting strategy that minimizes interfaces.
- Clearly specify technical standards and acceptance criteria as part of all contracts for cable.
- Advance tunnel option thereby removing failure point due to icebergs, fishing and dragged anchors.

Mitigate risk by:
- Keep Holyrood available until HVdc system is proven.
- Maintain capability to repair / replace a failed cable.

Transfer risk by placing a Construction-All-Risk Policy for construction / installation risks.

| Risk Strategy | ☑ Avoid | ☑ Mitigate | ☑ Transfer | ☐ Accept |
|---|---|---|---|---|

**Action Plan**

- Implement manufacturing surveillance program
- Gather lessons learned from Norned and embed within LCP
- Type test cable prior to manufacturing
- Provisions in purchase/installation (EPIC) contract
- Perform FAT
- Include installation standards regarding allowable bending radius / kinking
- Evaluate potential insurance coverage
- Include appropriate provisions in PPA (force majure)
- Attempt to insure post installation from installation contractor

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# Strategic Risk Frame

| Revised | 15-Sep-12 |
|---|---|

| Risk # | R12 | Category | HVdc Specialities Supply & Install | Current Risk Rating | Low |
|---|---|---|---|---|---|

- Understand key hazards and take actions to mitigate
- Include installed spare cable
- Understand cable w.r.t. interfaces and design with required level of redundancy

| Risk Responsibilities (LACTI) | Paul Harrington - Accountable<br>Bob Barnes - Lead<br>Ron Power - Consult<br>AON - Technical<br>PwC - Consult<br>Fasken - Technical |
|---|---|
| Unmitigated Risk Rating Rationalization | An event which would result in substantial financial losses and operation interruptions is considered a Major impact; the likelihood is rated at 3 (possible) given the track record HVdc cables once in operation as well as the design including 1 spare cab |

## Risk Trend and Status Update

RISK IS CONSIDERED CLOSED FOR THE RATIONAL NOTED BELOW:
- LCP cable will have no subsea joints, while cable will be Mass Impregnated design rather than less proven XLPE
- We will (test) from termination to termination
- Spare cable will be installed with capacity for high speed switching
- Minimal exposure from rock-dumping
- Consider that there is a low probability of a cable fault due to internal cable failure. Highest risk is pull-in tension, however the pull-in loads are considered acceptable by all 3 cable suppliers.

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# Strategic Risk Frame

| Revised | 15-Sep-12 |
|---|---|

| Risk # | R13 | Category | Engineering/Technical | Current Risk Rating | Low |
|---|---|---|---|---|---|

## Risk Details

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|---|---|
| **Lead** | **Bob Barnes** |
| **Risk Title** | System reliability during commissioning and start-up |
| **Risk Description** | As a result poor design and construction practices, overall reliability of the power system may be less than expected, resulting in extended period for start-up, performance degradation and / or rework during the operating phase. |
| **Specifics and Root Causes** | - Poor design, equipment selection, and construction practices<br>- Many hydro projects have had reliability issues in recent years (generator inefficiencies, water availability).<br>- Major issue for Transmission system. |
| **Consequence / Impact** | - Performance degradation and/or re-work adding cost and schedule delays or increase OPEX. |
| **Early Warning Indicator of Risk Materialization** | |

## Risk Response

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|---|---|
| **Management Strategy** | Avoid risk by enacting the following<br>- Implement an overall project-wide Quality Management System and supporting programs.<br>- Engage experience Engineering contractors who have a good track record for equipment specification and selection<br>- equipment selection through Life Cycle Analysis<br>- Early commissioning and operability planning<br>- Material and component testing<br>- Optimization System design based upon design Life, cost and reliability performance specifications.<br>- Utilize M/C and Commissioning system with experienced team.<br><br>Consider transferring risk through:<br>- Commercial insurance products - e.g. delayed start-up, production insurance<br>- Performance incentatives in major supply contracts linked to start-up and year 1 of operations. |

| Risk Strategy | ☑ Avoid | ☐ Mitigate | ☑ Transfer | ☐ Accept |
|---|---|---|---|---|

| | |
|---|---|
| **Action Plan** | - Negotiate a Water Management agreement with CF(L) Co. to increase production flexibility<br>- Bring operation team representative on early as possible to influence key design decisions<br>- Build simulator to facilitate commissioning and start-up<br>- Engage existing operation staff for lessons learned<br>- Negotiate in PPA to minimize cost impact of initial start-up and full load demands issues<br>- Consider Negotiate performance incentives in equipment supply contracts<br>- System redundancy considered in initial design<br>- Establish and implement life-cycle design philosophy<br>- Turbine - Generator supply with or w/o Balance of Plant to be determined.<br>- Complete design review of overland Tx in order to optimize reliability requirements.<br>- Conduct FAT and SAT on all control software / hardware<br>- Evaluate available insurance products that could reduce our exposure should this risk occur. |

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LOWER CHURCHILL PROJECT

# Strategic Risk Frame

| Revised | 15-Sep-12 |
|---|---|

| Risk # | R13 | Category | Engineering/Technical | Current Risk Rating | Low |
|---|---|---|---|---|---|

| Risk Responsibilities (LACTI) | Paul Harrington - Accountable<br>Lance Clarke - Consult<br>Bob Barnes - Lead<br>Ron Power - Consult<br>Faskens - Technical |
|---|---|

| Unmitigated Risk Rating Rationalization | An event which would result in significant financial losses and operation interruptions is considered a Moderate impact; the likelihood is rated at 3 (possible) given the track record of many hydro projects in recent years. |
|---|---|

## Risk Trend and Status Update

RISK EXPOSURE IS CONSIDERED LOW DUE TO THE FOLLOWING:
- SLI HVDC system engineering function has been established with experienced resources.
- Overland transmission design will be based upon 1/50 year reliability period with additional reinforcement in selected areas as viewed by meterological testing and field data collection (e.g. LRM)
- 3rd parties being used for design reviews, incl. Transgrid for converter station specs.
- Decision made to install spare submarine cable with separate routing across SOBI in order to provide increased reliability.
- SOBI cable will be designed with ~10 min temporary current overload capacity to facilitate switch over to spare cable and running in monopole mode.
- System will be based upon use of proven LCC HVdc technology

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# Strategic Risk Frame

| Revised | 16-Sep-12 |
|---|---|

| Risk # | R14 | Category | Environmental Assessment | Current Risk Rating | High |
|---|---|---|---|---|---|

## Risk Details

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|---|---|
| **Lead** | **Stephen Pellerin** |
| **Risk Title** | Securing generation project release from Environmental Assessment |
| **Risk Description** | As a result of a lack of information in the Generation EIS, a legal challenge to the EA by Hydro Quebec, or Aboriginals claiming insufficient consultation, could result in a schedule slippage for achieving EA release and hence a delay in Project Sanction. |
| **Specifics and Root Causes** | Target date for release of Generation Project from EA does not reflect probable schedule risk. There are 4 principle causes:<br>1.) Lack of resources within the EA team to manage the process and associated risk introduces delays and missed opportunities.<br>2.) EIS contains missing information and we are unable or unwilling to provide this information.<br>3.) Legal challenge by HQ on EA, Aboriginals claiming insufficient consultation, or Quebec Innu claiming project splitting of the Tx and Generation Projects.<br>4) Inaction, indecision and political interference as a result of conflicts between Nalcor and Province's mandates. We are encumbered.<br><br>EA process is largely outside of LCP control...thus may become highly problematic:<br>- Regulators decision making process<br>- Use of process to protest project<br>- Alternatives requested<br>- Multiple legislative jurisdictions which are not all defined<br>- Navigable Waters Act impact on reservoir clearing |
| **Consequence / Impact** | - Cost of delay and legal challenge. If this occurs prior to EA release, greater exposure to the Project and Nalcor.<br>- Not achieving EA release from the Panel. |
| **Early Warning Indicator of Risk Materialization** | -# of Information Requests submitted to the Panel.<br>- Messages received during Consultation process.<br>- Monitoring of topics and discussions taking place during all Environmental Assessment Hearings; |

## Risk Response

| | |
|---|---|
| **Management Strategy** | Avoid this risk by:<br>- Focus on ensuring quality information is provided to the EA Panel.<br>- Step up consultation efforts, in particular with Aboriginal groups.<br>- Bolster team resources to allow for efficient management and support of the EA process.<br><br>Mitigate this risk by seeking Executive and Shareholder alignment on using 1980 EARP decision as a fallback measure. |

| Risk Strategy | ☑ Avoid | ☑ Mitigate | ☐ Transfer | ☐ Accept |
|---|---|---|---|---|

| | |
|---|---|
| **Action Plan** | - Advance planning for technical sessions for Generation Project.<br>- Prepare quality and complete answers to IRs<br>- Push panel to meet all deadlines<br>- Identify and fill information gaps<br>- Prepare for hearings<br>- Educate and engage stakeholders and regulators<br>- Develop detailed plan to obtain permits with mitigating actions to accelerate<br>- Public awareness campaign at various levels (appropriate timing is critical) |

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# Strategic Risk Frame

| Revised | 16-Sep-12 |
|---|---|

| Risk # | R14 | Category | Environmental Assessment | Current Risk Rating | High |
|---|---|---|---|---|---|

- Strong owner's team direction and accountability
- Lobby regulators through appropriate government ministries.
- Mobilize required EA team resources to manage process.

| Risk Responsibilities (LACTI) | Gilbert Bennett - Accountable<br>Paul Harrington - Consult<br>Steve Pellein - Lead |
|---|---|

| Unmitigated Risk Rating Rationalization | An event having significant reputation damage and some financial exposure for Nalcor is classified as a Moderate event; the likelihood is rated at 5 (Almost Certain) given statements made by each of HQ and Quebec Aboriginals to this effect. |
|---|---|

## Risk Trend and Status Update

RISK IS CLOSED - Generation Project was released from EA in March 2012.
- Condiitons of EA release are being managed by Nalcor with SLI under the leadership of a Regulatory Compliance function. Management Plan for EA Commitments in-place.
- Costs associated with EA commitments and conditions of release are included in the Base Estimate for DG3.

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# Strategic Risk Frame

| Revised | 15-Sep-12 |
|---|---|

| Risk # | R15 | Category | Environmental Assessment | Current Risk Rating | Low |
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## Risk Details

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|---|---|
| Lead | **Stephen Pellerin** |
| Risk Title | Environmental process impact on design |
| Risk Description | As a result of the outcome of the Generation Environmental Assessment, late changes to the design or project scope may be required, resulting in cost and schedule impact. |
| Specifics and Root Causes | - Design changes may be required as a result of environmental concessions necessitated by EA process findings/ruling (e.g. HADD compensation).<br>- Commitments made during the EA (e.g. expropriation of cabins and land, compensation for traditional hunting and trapping, etc.) increase capital cost and operating cost. |
| Consequence / Impact | Cost and schedule impact of late design changes / additions. |
| Early Warning Indicator of Risk Materialization | - Commitments made as part of the EA process. |

## Risk Response

**Management Strategy**

Avoid risk by:
- Working to understand environmental issues and accommodate realistic solutions early in the design process to minimize downstream effects on procurement and construction.
- Preparing a strong, defensible positions on each recommended option contained in the EIS - convince the Panel that our basis and assumptions are the most pragmatic. Ensure alignment and communicate any policy decisions and potential impact prior to making a commitment as part of the EA process.
- Verifying potential impacts of commitments made during the EA process with all disciplines of the Project Team prior to making such commitments.

Mitigate risk by:
- Complete early concept desktop studies on potential scope / design changes that the EA could recommend in order to be in a better position to react if such changes are requied to secure EA release.
- Tracking commitments and concessions made during the EA process and communicate within Project Team to allow for effective management of any implications on the design, construction, start-up and operation phases.

This risk cannot be entirely avoided or mitigated given its nature, thus residual risk must be accepted as a part of doing business.

| Risk Strategy | ☑ Avoid | ☑ Mitigate | ☐ Transfer | ☑ Accept |
|---|---|---|---|---|

| | |
|---|---|
| Action Plan | - Quantify financial commitments being considered prior to making them.<br>- Develop an early warning system to forecast potential conditions imposed by the EA Panel / process. |

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# Strategic Risk Frame

| Revised | 15-Sep-12 |
|---|---|

| Risk # | R15 | Category | Environmental Assessment | Current Risk Rating | Low |
|---|---|---|---|---|---|

| Risk Responsibilities (LACTI) | Paul Harrington - Accountable<br>Steve Pellerin - Lead<br>Ron Power - Consult<br>Bob Barnes - Technical |
|---|---|

| Unmitigated Risk Rating Rationalization | This event would result in a minor financial impact due to a limited capital cost exposure. The likelihood is considered of be Unlikely. |
|---|---|

## Risk Trend and Status Update

RISK IS CLOSED - Generation Project was released from EA in March 2012.

- Condtions of EA Release and commitments by Nalcor documented in a Commitments Plan and being stewarded by Regulatory Compliance function. No major concerns.
- Detailed design for Fish HADD underway by Stantec.

- Working to secure a Scallop Dragging restriction for SOBI.

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# Strategic Risk Frame

| Revised | 15-Sep-12 |
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| Risk # | R16 | Category | Environmental Assessment | Current Risk Rating | Low |
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## Risk Details

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|---|---|
| Lead | Stephen Pellerin |
| Risk Title | Unanticipated design changes impact environmental assessment process |
| Risk Description | As a result of design evolution, there may be differences between the design assessed within the EA and the current design, resulting in schedule slippage due to the need to assess the impact of the design changes. |
| Specifics and Root Causes | As a result of design evolution, there may be differences between the design assessed within the EA and the current design, resulting in schedule slippage due to the need to assess the impact of the design changes. |
| Consequence / Impact | Cost and schedule impact of late design changes / additions. |
| Early Warning Indicator of Risk Materialization | # of Design Change Notices from the Gate 2 Basis of Design |

## Risk Response

**Management Strategy**

Avoid risk by:
- Where uncertainty exists multiple concepts / options to be assessed as part of the EA process in order to increase flexibility (e.g. tunnel versus submarine cable for SOBI).
- Early screening for issues and try to work acceptable solutions that avoid schedule impact.

Mitigate risk by leveraging Project Change Management Process to include approval of design changes by EA Manager in order to avoid surprises within the EA Process.

| Risk Strategy | ☑ Avoid | ☑ Mitigate | ☐ Transfer | ☐ Accept |
|---|---|---|---|---|

**Action Plan**

- Clarify what is in each EA to anticipate impact
- Communicate and adjust plan to involved stakeholders
- Diligence on clear internal alignment on potential business impact and plan adjustment as EA evolves
- Validation of concept through further studies
- Lay-out multiple options (if applicable) in a EA registration for each project component

**Risk Responsibilities (LACTI)**

Paul Harrington - Accountable
Steve Pellerin - Lead
Bob Barnes - Technical
Ron Power - Consult

**Unmitigated Risk Rating Rationalization**

An event having some financial impact on the Project ($100M - worst case). Likelihood is considered Unlikely given that system rarely operates in this mode.

## Risk Trend and Status Update

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LOWER CHURCHILL PROJECT

# Strategic Risk Frame

| Revised | 15-Sep-12 |
|---|---|

| Risk # | R16 | Category | Environmental Assessment | Current Risk Rating | Low |
|---|---|---|---|---|---|

RISK IS CONSIDERED TO HAVE LOW EXPOSURE DUE TO GENERATION PROJECT HAS BEEN RELEASED FROM EA, WHILE LITL EA CURRENTLY WELL-PROGRESSED WITH RELEASE ANTICIPATED IN Q1-2013. NO DESIGN CHANGES EXPECTED FOR LITL GIVEN OVERALL DESIGN IS SIGINFICANTLY ADVANCED.

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# Strategic Risk Frame

| Revised | 15-Sep-12 |
|---|---|

| Risk # | R17 | Category | Stakeholder | Current Risk Rating | Low |
|---|---|---|---|---|---|

## Risk Details

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|---|---|
| **Lead** | **Gilbert Bennett** |
| **Risk Title** | Schedule impact due to delay in ratification of IBA by Labrador Innu Nation |
| **Risk Description** | As a result of an inability to reach agreement on the IBA and related agreements, the IBA and related agreements are not ratified, leading to/resulting in the project not proceeding to sanction. |
| **Specifics and Root Causes** | - Ratification delay due to non-alignment within the Innu community (multiple factions).<br>- Bundling of IBA with other agreements may make it unachievable to ratify the IBA.<br>- Land claims deal may be challenged by other Aboriginal groups. |
| **Consequence / Impact** | - Required prior to start of construction hence delay and loss of 2011 construction season.<br>- Note: Non-ratification of the IBA would likely result in a project termination. |
| **Early Warning Indicator of Risk Materialization** | Progress of IBA discussions; demonstrated dissatisfaction with the process from various Aboriginal groups. |

## Risk Response

| | |
|---|---|
| **Management Strategy** | Avoid risk by:<br>- Maintain close ties with Aboriginal leaders - be responsive to the needs of various Aboriginal groups.<br>- support the communication of accurate information on the arrangement.<br>- Accelerate Federal Government activities on Land Claims file.<br>- Maintain a good working relationship with the Innu Nation.<br>- Strengthen consultation activity with other Aboriginal groups. |

| Risk Strategy | ☑ Avoid | ☑ Mitigate | ☐ Transfer | ☐ Accept |
|---|---|---|---|---|

| | |
|---|---|
| **Action Plan** | - Conclude IBA, Redress and Land Claims agreements<br>- Continue to disseminate facts into the community on the Project. |
| **Risk Responsibilities (LACTI)** | Gilbert Bennett - Accountable<br>Steve Pellerin - Lead<br>Mary Hatherly - Technical<br>Paul Harrington - Consult<br>Lance Clarke - Consult |
| **Unmitigated Risk Rating Rationalization** | An event which would cause the Project not to proceed to sanction is considered an extreme impact. Likelihood is considered Unlikely given that an IBA, Land Claim, and Upper Churchill Redress agreements are nearly concluded. |

## Risk Trend and Status Update

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# Strategic Risk Frame

| Revised | 15-Sep-12 |
|---|---|

| Risk # | R17 | Category | Stakeholder | Current Risk Rating | Low |
|---|---|---|---|---|---|

- STRATEGIC RISK IS CLOSED - IBA HAS BEEN RATIFIED BY INNU NATION (2011)

- Some Tactical Risk remains, largely with respect to cost for implementation of commitments in IBA. Team has a IBA Commitments Lead mobilized, while 2 supporting resources as defined unde the IBA have yet to be hired.
- Reputation risk exposure remains as well as tactical cost risk exposure associated with premiums for IBA preferenced packages (e.g. accommodations complex, catering, etc.)

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# Strategic Risk Frame

| Revised | 15-Sep-12 |
|---|---|

| Risk # | R18 | Category | Stakeholder | Current Risk Rating | Low |
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## Risk Details

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|---|---|
| **Lead** | **Stephen Pellerin** |
| **Risk Title** | Lack of support from other Aboriginal groups |
| **Risk Description** | As a result of a perceived lack of consultation by other Aboriginal groups, EA process may be challenged, which could lead to a delay in the EA process and other demonstrations. |
| **Specifics and Root Causes** | - Other Aboriginal groups (Quebec Innu, NunatuKavut) may claim a lack of consultation during the project EA process which may result in the EA process being stayed.<br>- Court challenge of the EA process on grounds of Project Splitting (Generation and Tx) - this happened by La Romaine<br>- May also resist Labrador Innu Land Claim deal<br>- Groups may claim land use rights for the areas in question (e.g. Island Link transmission right-of-way) and demand negotiation of an IBA |
| **Consequence / Impact** | - Delay in EA process by court challenge<br>- Bad media coverage<br>- Permitting intervention causing delay<br>- Demonstration/work stoppage (unlikely and considered impractical) |
| **Early Warning Indicator of Risk Materialization** | Demonstrated dissatisfaction with the process from various Aboriginal groups. |

## Risk Response

| | |
|---|---|
| **Management Strategy** | Avoid risk by:<br>- Aggressive engagement and consultation of all potentially impacted Aboriginal groups.<br>- Add additional consultation resources to ensure consultation is addressed.<br>- Negotiate some sort of compensation agreement with the other Aboriginal groups. |

| Risk Strategy | ☑ Avoid | ☐ Mitigate | ☐ Transfer | ☐ Accept |
|---|---|---|---|---|

| | |
|---|---|
| **Action Plan** | - Establish consultation agreements with each of NunatuKavut, Labrador Inuit and 6 Quebec Innu bands.<br>- Seek a mandate to negotiate a compensation agreement with these groups.<br>- Increased consultations and communications with parties<br>- Ensure compliance with EA Guidelines and Terms of Reference<br>- Ensure Crown complies with fiduciary requirements<br>- Proactive engagement with government to ensure they are aware of this risk and work with us to manage it.<br>- Seek training opportunities under ASEP<br>- Understand their claims and traditional use of the land |
| **Risk Responsibilities (LACTI)** | Paul Harrington - Accountable<br>Lance Clarke - Consult<br>steve Pellerin - Lead<br>Mary Hatherly - Consult<br>Gail Warren - Technical<br>Maria Moran - Consult<br>Dawn Dalley - Consult |

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LOWER CHURCHILL PROJECT

# Strategic Risk Frame

| Revised | 15-Sep-12 |
|---|---|

| Risk # | R18 | Category | Stakeholder | Current Risk Rating | Low |
|---|---|---|---|---|---|

| Unmitigated Risk Rating Rationalization | An event having some financial and reputation impact for Nalcor is classified as a Minor event; the likelihood is rated at Very Likely. |
|---|---|

## Risk Trend and Status Update

- Generation Project has been released from EA in March 2012
- 2 legal challenges to the EA process have been made - largely litigation cost exposure since we view our position as very strong. Include tactical risk exposure of $20 to $30 million (worse case) to address litigation cost.

- Strong focus on Aboriginal consultation and engagement by Nalcor. Workplan with supporting resources in-place / being implemented.
- In Sept-10, Nalcor submitted an Aboriginal consultation summary to the JRP, which should reduce the likelihood of this risk materializing.
- Consultation agreement signed with Pakua Shipi (a Quebec Innu group) on April 30, 2010 for the Generation EA.
- Consultation agreements signed with Pakua Shipi on Nov 24, 2010 and NunatuKavut on Jan 19, 2011 for the Island Link EA.
- Consultation agreement near signing with Unamen Shipu (a Quebec Innu group) for the Island Link EA.

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# Strategic Risk Frame

| Revised | 15-Sep-12 |
|---|---|

| Risk # | R19 | Category | Stakeholder | Current Risk Rating | Low |
|---|---|---|---|---|---|

## Risk Details

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|---|---|
| **Lead** | **Dawn Dalley** |
| **Risk Title** | Non-governmental organization / stakeholder protest |
| **Risk Description** | As a result of a lack of proactive stakeholder engagement, stakeholders may be misinformed on matters relevant to them, leading to/resulting in adverse community relations and protest against the Project. |
| **Specifics and Root Causes** | - As a result of a lack of proactive stakeholder engagement, stakeholders may be misinformed on matters relevant to them, leading to/resulting in adverse community relations.<br>- Protest could come at critical stage of construction, or it could come during the EA process when power sales and market access negotiations are underway.<br>- Primary concern is transmission - there are precedents in Canada where community has opposed routing. |
| **Consequence / Impact** | - Negative media and public perception causing delay in making key decisions required to maintain the project schedule.<br>- Poor community relations<br>- Court challenge at EA release delaying permitting<br>- Demonstration or work stoppage.<br>- Community opposition to Tx line routing may delay engineering |
| **Early Warning Indicator of Risk Materialization** | Opinion and media articles featuring the views of NGOs |

## Risk Response

| | |
|---|---|
| **Management Strategy** | - Develop and fully implement a stakeholder communication and consultation plan.<br>- Focus on getting Nalcor's message out on the benefits of the Project (i.e. sell the project in order to leverage public support).<br>- Convince our "silent" supporters to speak-out for the Project.<br>- Monitor public and media pulse and focus strategic messages accordingly.<br>- Leverage Quebec versus NL debate to rally support for this venture. |
| **Risk Strategy** | ☑ **Avoid** ☑ **Mitigate** ☐ **Transfer** ☑ **Accept** |
| **Action Plan** | Avoid risk through:<br>- Develop and fully implement a stakeholder communication and consultation plan.<br>- Monitoring public and media pulse and focus strategic messages accordingly.<br><br>Mitigate impact by:<br>- Focusing on getting Nalcor's message out on the benefits of the Project (i.e. sell the project in order to leverage public support).<br>- Convincing our "silent" supporters to speak-out for the Project.<br>- Leverage Quebec versus NL debate to rally support for this venture.<br><br>Accept the fact that Nalcor will recieve some negative attention for undertaking a project like LCP. |

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LOWER CHURCHILL PROJECT

# Strategic Risk Frame

| Revised | 15-Sep-12 |
|---|---|

| Risk # | R19 | Category | Stakeholder | Current Risk Rating | Low |
|---|---|---|---|---|---|

| Risk Responsibilities (LACTI) | Gilbert Bennett - Accountable<br>Paul Harrington - Consult<br>Consultation Lead - Technical<br>Dawn Dalley - Lead |
|---|---|

| Unmitigated Risk Rating Rationalization | An event having some reputation impact that could be considered as minor and of no lasting consequence. Likelihood is considered Possible based upon the quick and significant negative response regarding the routing the Hvdc Tx Line through GMNP. |
|---|---|

## Risk Trend and Status Update

- Concern is not really wrt to NGOs, rather public support. Risk must be monitored for trends.

HISTORICAL NOTES:
- The Project has not received substantial bad press from International NGOs, however 1 of 2 current legal challenge against Generation EA has been led by Sierra Club. It is not apparent that the Sierra Club wish to minimize the amount of its financial resources challenging this Project. Routing of Tx line through GMNP created quite a stir leading to significant protest.
- Recently the Province has faced significant critism regarding whether LCP is the solution to meet the Island's long-term energy needs, in particular are been challenged on the basis of their assumptions. These developments have predicated the current review of DG2 decision by the Public Utilities Board as well as an Independent 3rd Party - Navigant.
- Facebook site opposing GMNP Tx line is an example of the potential negative publicity this can create.
- Meeting with BCTC and Manitoba Hydro in Oct-09 to collect lessons learned from their experiences (Mother's Against Power Poles)
- Sea Electrode issue could fit into this category - however no public outcry during recent meetings with communities on Labrador South Shore

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# Strategic Risk Frame

| Revised | 16-Sep-12 |
|---|---|

| Risk # | R20 | Category | Hydro Construction | Current Risk Rating | Low |
|---|---|---|---|---|---|

## Risk Details

| | |
|---|---|
| **Lead** | **Scott O'Brien** |
| **Risk Title** | Availability of experienced hydro contractors |
| **Risk Description** | As a result of the strong demand for new hydro, industry consolidation, and a lack of hydro over the past 20 years, there is a limited availability of experienced hydro contractors, which could result in less than expected number of qualified contractors being interested. |
| **Specifics and Root Causes** | Industry consolidation and lack of hydro activity for 20 years has limited available and viable contractors. Key considerations:<br>- Willingness to bid<br>- Ability to perform<br>- Fair lump sum price / Transparency / Risk Premium<br>- Level of Aggregate Guarantee<br>- Level of Completion Risk Guarantee<br>- Conforming Contract<br>- Creditworthiness<br><br>-Market and contractor market improving in late 2009 due to weakening demand, as a result the premium to pay for experience is decreasing (i.e. lower profit margins for contractors). |
| **Consequence / Impact** | - Split contracts into manageable pieces<br>- Number of qualified contractors interested may be more limited than expected. |
| **Early Warning Indicator of Risk Materialization** | Global and Canadian construction trends. |

## Risk Response

| | |
|---|---|
| **Management Strategy** | Avoid risk by:<br>- Engaging worldwide market and "sell the project" to stimulate interest.<br>- Developing an Innovative contracting strategy to make project attractive to contractors with risk/benefit balance.<br><br>Accept that this risk is not entirely avoidable and cover additional contingency to mitigate it. |

| Risk Strategy | ☑ Avoid | ☐ Mitigate | ☐ Transfer | ☑ Accept |
|---|---|---|---|---|

| | |
|---|---|
| **Action Plan** | - Obtain market intelligence<br>- Early engagement of qualified contractors<br>- Evaluate and make decision on contract package configuration<br>- Convey to contractors that the Project is "real"<br>- Provide sufficient on-site oversight<br>- Obtain completion guarantee |
| **Risk Responsibilities (LACTI)** | Paul Harrington - Accountable<br>Bob Barnes - Technical<br>Lance Clarke - Lead<br>Fasken - Technical<br>AON - Consult<br>Ron Power - Technical |

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# Strategic Risk Frame

| Revised | 16-Sep-12 |
|---|---|

| Risk # | R20 | Category | Hydro Construction | Current Risk Rating | Low |
|---|---|---|---|---|---|

Pat Hussey - Technical

| Unmitigated Risk Rating Rationalization | An event having significant financial impact on the Project ($100M - worst case). Likelihood is considered Possible given the current uncertainty in how the construction market will rebound from the current Recession. |
|---|---|

## Risk Trend and Status Update

RISK EXPOSURE IS CONSIDERED LOW, DUE TO THE FOLLOWING:
- We have significant interest in firms to pre-qualifiy for CH0007 - at the end end 4 bidders were pre-qualified - 3 are international / global firms
- Our key exposure remains construction labor productivity .
- Our contract terms and conditions and performance secuirity requirements are considered too heavy handed - we will have to manage this our risk that we will not have bidders or very high prices.
- Suggest that we still have $40 to $50 million of expsoure for CH0006, 7 & 8.

HISTORICAL NOTES:
- Market and contractor market improving in late 2009 due to weakening demand, as a result the premium to pay for experience is decreasing (i.e. lower profit margins for contractors).
- Stable environment, big enough to generate interest from engineering contractors - we now have SNC-Lavalin as our EPCM Consultant
- SLI as our EPCM Consultant have excellent insight into this market.
- SLI are evaluating the package strategy in consideration of attracting large civil contractors - proposing one large package for spillway, intake and powerhouse
- Low commodities level is impacting this group more than the any stimulus money is adding.
- Federal Government support for the Project will likely significantly reduce this risk.

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LOWER CHURCHILL PROJECT

# Strategic Risk Frame

| Revised | 15-Sep-12 |
|---|---|

| Risk # | R21 | Category | Hydro Construction | Current Risk Rating | Low |
|---|---|---|---|---|---|

## Risk Details

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|---|---|
| Lead | Lance Clarke |
| Risk Title | Ability to use Newfoundland & Labrador contractors due to lack of creditworthiness |
| Risk Description | As a result of the conditions of non-recourse project finance, our ability to use NL-based contractors due to their lack creditworthiness could lead to Nalcor having to backstop the inherent risks of using these contractors. |
| Specifics and Root Causes | Desire to support local economies by utilizing local contractor capacity, however due to size of work scope, may be difficult due to following considerations:<br>- Creditworthiness<br>- Level of Completion Risk Guarantee<br>- Ability to perform<br><br>- The conditions of non-recourse project finance will demand contractors be credit worthy for value of scope, otherwise Nalcor will have to backstop any risks (lenders won't accept the risk of default). |
| Consequence / Impact | - Possible general contractor "wrap," but very unlikely in current market<br>- Federal or provincial support/guarantee. |
| Early Warning Indicator of Risk Materialization | |

## Risk Response

| | |
|---|---|
| Management Strategy | Miitgate by:<br>- Work with local contractors to find suitable partners or underwriters.<br>- Initiate discussions with Atlantic Canada Opportunities Agency (ACOA) to educate them on this risk and work with them to help mitigate this risk.<br>- Consider this risk in the contract package definition. |
| Risk Strategy | ☐ Avoid ☐ Mitigate ☐ Transfer ☐ Accept |
| Action Plan | - Proactive program to educate contractors and supplies on issue<br>- Potentially develop regional vendor data base<br>- Encourage teaming or partnering arrangements for local companies<br>- Consider insurance program to backstop this exposure<br>- Develop creditworthiness assessment guidelines |
| Risk Responsibilities (LACTI) | Paul Harrington - Accountable<br>Lance Clarke - Lead<br>Fasken - Consult<br>Charles Cook - Technical<br>PwC - Technical<br>Dawn Dalley - Consult<br>Pat Hussey - Technical |
| Unmitigated Risk Rating Rationalization | This event would result in a minor financial impact due to a limited capital cost exposure. The likelihood is considered to be Possible, but will be driven by the risk-appetite of the Financial Markets and overall project risk portfolio. |

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# Strategic Risk Frame

| Revised | 15-Sep-12 |
|---|---|

| Risk # | R21 | Category | Hydro Construction | Current Risk Rating | Low |
|---|---|---|---|---|---|

## Risk Trend and Status Update

RISK IS CLOSED DUE TO THE FOLLOWING:
- We have no particular requirement to use NL contractors from a benefits perspective, rather our packaging strategy is largely aligned with using larger national/ international contractors
- We have defined our performance security requirements.

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# Strategic Risk Frame

| Revised | 15-Sep-12 |
|---|---|

| Risk # | R22 | Category | Hydro Construction | Current Risk Rating | Low |
|---|---|---|---|---|---|

## Risk Details

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|---|---|
| **Lead** | **Ron Power** |
| **Risk Title** | Availability of qualified construction management / supervision |
| **Risk Description** | As a result of competition from other projects around the globe, the project may be unable to source the required qualified construction management and supervision, resulting in poor labor productivity, cost growth and schedule slippage. |
| **Specifics and Root Causes** | - Worldwide construction at historic high with peak early next decade, however current Economic Recession is resulting in a forecasted slowdown for the short to medium term.<br><br>- On a project of this size and complexity, the major cost and schedule risk is productivity - the key to productivity will be the 200 to 300 front line to top construction supervisors/managers.<br><br>Key issues for productivity:<br>- Accommodations complex conditions<br>- Rotation / Transportation<br>- Career goals and opportunity<br>- Pride for Newfoundlanders – Coming home from Alberta?<br>- Correct skill sets<br>- Competitive Compensation |
| **Consequence / Impact** | - Cost growth and poor productivity<br>- High turnover rates<br>- Potential schedule slippage |
| **Early Warning Indicator of Risk Materialization** | Global and Canadian construction trends. |

## Risk Response

| | |
|---|---|
| **Management Strategy** | - |

| Risk Strategy | ☑ Avoid | ☐ Mitigate | ☐ Transfer | ☑ Accept |
|---|---|---|---|---|

| | |
|---|---|
| **Action Plan** | - Make work location/employment attractive (quality of accommodation/resort complex, transportation, family benefits, vacation)<br>- Sell the project as an opportunity for NL<br>- Consistent employment deals where possible<br>- Maintain some control of benefit distribution<br>- Include provisions in contracts and labor agreements<br>- Consider alignment with other mega projects being executed in province<br>- Consider incentives with contractors to achieve labor objectives<br>- Consider that some qualified supervision may be French Canadian |

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# Strategic Risk Frame

| Revised | 15-Sep-12 |
|---|---|

| Risk # | R22 | Category | Hydro Construction | Current Risk Rating | Low |
|---|---|---|---|---|---|

| Risk Responsibilities (LACTI) | Paul Harrington - Accountable<br>Lance Clarke - Lead<br>Dawn Dalley - Consult<br>Fasken - Consult |
|---|---|

| Unmitigated Risk Rating Rationalization | An event having some financial impact on the Project ($90M - worst case). Likelihood is considered Possible given the current uncertainty in how the construction market will rebound from the current Recession. |
|---|---|

## Risk Trend and Status Update

- The Project Contracting Strategy is to maximze the using of lump sum or fixed price contracting strategies where the contractor assumes the performance risk. Under this approach the contractor is naturally incentived to put quality supervision on the job.
- The labor agreements under negotation with the RDC includes the provision for contractors to name-hire supervision from the union hall.
- DG3 wage rates for supervision are considered attractive.
- Planned accommodations and recreation facilities at MF will be competitive with Western Canada, however will be difficult to compete on wages.
- Securing CM personnel for the EPCM will be a large challenge.

- While not closed, the residual risk exposure is considered to be low.

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# Strategic Risk Frame

| Revised | 15-Sep-12 |
|---|---|

| Risk # | R23 | Category | Hydro Construction | Current Risk Rating | Low |
|---|---|---|---|---|---|

## Risk Details

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|---|---|
| Lead | **Scott O'Brien** |
| Risk Title | Site conditions worse than geotechnical baseline |
| Risk Description | As a result of geotechnical and design uncertainties at Muskrat Falls, scope increases due to increased civil work scopes, results in added cost and schedule slippage. |
| Specifics and Root Causes | - Contractors will not take unknown geotechnical risk without prohibitive risk premiums<br>- Potential unknowns (i.e. faults) at site of the dam may lead to considerable excavation and/or grouting in excess of expectations |
| Consequence / Impact | - Scope increases result in added cost and schedule slippage.<br>- Contingency erosion<br>- Delay in First Power |
| Early Warning Indicator of Risk Materialization | Detection of uncertainties in geotechnical surveys. |

## Risk Response

| | |
|---|---|
| Management Strategy | Mitigate the risk by maximizing geotechnical investigations to determine conditions as well as possible before bidding. Residual risk will have to be accepted by Nalcor since contracts will not accept it. |

| Risk Strategy | ☐ Avoid | ☑ Mitigate | ☐ Transfer | ☑ Accept |
|---|---|---|---|---|

| | |
|---|---|
| Action Plan | - Collect data and perform studies in order to develop comprehensive geotechnical baseline<br>- Optimize plant layout using the findings from 2010 geotechnical program prior to the start of detailed engineering and contracting.<br>- Consider commercial structure of contract to minimize impact (unit prices)<br>- Establish owner's representatives (preferably on-site) to monitor contractor performance<br><br>Negotiate construction contracts that considers residual, immitigable geotechnical risk. |
| Risk Responsibilities (LACTI) | Paul Harrington - Accountable<br>Bob Barnes - Lead<br>Ron Power - Consult<br>Dave Brown - Technical |
| Unmitigated Risk Rating Rationalization | An event having significant financial exposure and construction schedule delays classified as a Moderate event; while it might occur thus is rated as Possible. |

## Risk Trend and Status Update

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# Strategic Risk Frame

| Revised | 15-Sep-12 |
|---|---|

| Risk # | R23 | Category | Hydro Construction | Current Risk Rating | Low |
|---|---|---|---|---|---|

- RISK RANKING IS CONSIDERED LOW GIVEN SIGNIFICANT MITIGATION ACTIVITIES SINCE DG2

- Field programs conducted in 2010 have established a Geotechnical Baseline for Muskrat Falls - resulted in re-orientation of powerhouse/Intake by 30 degrees
- Findings from 2010 program have been incorporated into MF plant layout optimization working completed by SLI under WTO MF1340, including the development of a 3D model of the physical structures in CATIA software. This has allowed for the more accurate determination of major excavation and concrete quantities.
- May 2011 desktop analysis of the potential geotechnical exposure based upon the existing data limitations have indicated the potential of some exposure in river, however NPV of completing a field program in 2011 is consider negative, hence no rationale for undertaking work.
- Largest risk exposure remains in North Spur - geotechnical program planned for spring 2013 - exposure covered under Tactical Risk
- Geotechnical surveys completed in spring / summer 2012 for switchyards - favourable results considerd in Tactical Risk exposure
- Residual risk is being considered in the development of the construction schedule.

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# Strategic Risk Frame

| Revised | 15-Sep-12 |
|---|---|

| Risk # | R24 | Category | Hydro Construction | Current Risk Rating | High |
|---|---|---|---|---|---|

## Risk Details

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|---|---|
| **Lead** | **Lance Clarke** |
| **Risk Title** | Availability and retention of skilled construction labour |
| **Risk Description** | As a result of competition from other provinces (Alberta), the Project may have challenges recruiting and retaining skilled, experienced trades, resulting in poor productivity, cost growth and schedule slippage. |
| **Specifics and Root Causes** | - Current worldwide peak construction over Q2 2011 and demand will reduce accordingly.<br>- Need to start communicating the project in areas of high concentration of the skilled work force required to target these resources - experienced equipment operators will likely be the largest demand.<br><br>Key issues:<br>- Accommodations complex conditions<br>- Compensation & competition with Alberta<br>- Rotation / Transportation<br>- Pride for Newfoundlanders – coming home from Alberta?<br>- Productivity<br><br>Other considerations:<br>- Union attitude on training and development<br>- Foreign workers<br>- NL is largely a micro-economy within Canada, forecasting significant growth during the coming years. |
| **Consequence / Impact** | - Cost growth and poor productivity<br>- High turnover rates<br>- Potential schedule slippage |
| **Early Warning Indicator of Risk Materialization** | - Increased sick leave amongst the older demographic<br>- Rates of current enrolment in various applicable trades programs<br>- Out-migration to oil jobs in Alberta continues. |

## Risk Response

| | |
|---|---|
| **Management Strategy** | Avoid risk by:<br>- Recognize competition threat for labour and proactively manage.<br>- Making the work and work site appealing to Newfoundlanders (e.g. attractive camp, compensation, rotation and transportation) and actively recruit NLs working afar<br>- Actively recruit workforce currently commuting to Western Canada from Newfoundland and Labrador and Atlantic Canada – leverage the "legacy" theme to entice end of career experienced supervisors & labour back home.<br><br>Mitigate the exposure by:<br>- Developing a construction schedule based upon achievable labor productivities<br>- Negotiating a labor agreement that supports trade flexibility<br>- Implement a constructability focus at the start of engineering to ensure plant can be efficiently constructed.<br>- Tap into traditionally under-represented groups such as women and aboriginals by encouraging training and education initiatives. |

| Risk Strategy | ☑ Avoid | ☑ Mitigate | ☐ Transfer | ☐ Accept |
|---|---|---|---|---|

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LOWER CHURCHILL PROJECT

# Strategic Risk Frame

| Revised | 15-Sep-12 |
|---|---|

| Risk # | R24 | Category | Hydro Construction | Current Risk Rating | High |
|---|---|---|---|---|---|

| | |
|---|---|
| **Action Plan** | - Make work location/employment attractive (quality of accommodations, transportation, family benefits, vacation)<br>- Consistent employment deals where possible<br>- Maintain some control of benefit distribution<br>- Structure labor strategy that does not impair engaging local labor<br>- Develop a construction schedule based upon achievable labor productivities<br>- Develop a dynamic labor supply and demand model in order to understand this issue.<br>- Labor strategy that considers lessons learnt for other projects incl. demarkation and composite crewing. |
| **Risk Responsibilities (LACTI)** | Paul Harrington - Accountable<br>Lance Clarke - Lead<br>Jason Kean - Consult<br>Steve Goulding - Technical<br>Maria Moran - Technical<br>Debbie Molloy - Technical<br>Westney - Consult |
| **Unmitigated Risk Rating Rationalization** | An event having significant financial impact on the Project ($100M - worst case). Likelihood is considered Possible given the current uncertainty in how the construction market will rebound from the current Recession. |

## Risk Trend and Status Update

- THIS REMAINS THE KEY RISK FOR THE PROJECT. MITIGATION STATUS:
- DG3 labor strategy considered this risk and baked mitigation measures into plans, including labor rate in a competitive environment and a 20/8 rotation.
- Collective agreement negotations underway with the RDC - concept of "work teams" has been embraced.
- Planned accommodations and recreation facilities at MF will be competitive with Western Canada, however will be difficult to compete on wages.
- If we Sanction in fall 2012, we should good for the next 12 months given a slowing of activity in Western Canada, however our current schedule puts is aligned with Hebron hence large competition for workers.
- Key concern is availability of contractor's non-union supervisors.
- Labor supply and demand model prepared - we understand the key shortfalls for LCP - expect Quebec workforce can be leveraged.
- Evaluate opportunities for helicopter construction on transmission line - will reduce labor demand.
- Productivity Action Plan developed and being gradually implemented within the actions for Nalcor and SLI.
- Labrador Aboriginal Training Partnership established with $15M in training funding - great success to-date.
- EPCM Services Agmt with SLI includes a strong focus on construction planning prior to Project Sanction.

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# Strategic Risk Frame

| Revised | 16-Sep-12 |
|---|---|

| Risk # | R25 | Category | Hydro Construction | Current Risk Rating | Low |
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## Risk Details

| | |
|---|---|
| **Lead** | **Lance Clarke** |
| **Risk Title** | Availability of unskilled construction labour |
| **Risk Description** | As a result of the Western Canada oil boom, the project may have challenges recruiting and retaining unskilled labor, resulting in poor productivity, cost growth and schedule slippage. |
| **Specifics and Root Causes** | - Remote jobsite and less desirable work<br>- In an effort to support local economies, need to work to focus training efforts in areas of lower employment, i.e. target availability of unskilled resources<br><br>Key issues:<br>- Accommodations complex conditions<br>- Compensation & competition with Alberta<br>- Rotation / Transportation<br>- Opportunities / Training |
| **Consequence / Impact** | ** There is very minimal exposure for this risk in the current marketplace.<br><br>- Cost growth and poor productivity<br>- High turnover rates<br>- Potential schedule slippage |
| **Early Warning Indicator of Risk Materialization** | - Increased sick leave amongst the older demographic<br>- Rates of current enrolment in various applicable trades programs<br>- Out-migration to oil jobs in Alberta continues. |

## Risk Response

| | |
|---|---|
| **Management Strategy** | Avoid risk by:<br>- Providing competitive opportunities for locals.<br>- Promoting opportunity for training and advancement of local unskilled workforce.<br>- Leveraging under-utilized labor pools (e.g. Aboriginal and other visible minority groups). |

| Risk Strategy | ☑ Avoid | ☐ Mitigate | ☐ Transfer | ☐ Accept |
|---|---|---|---|---|

| | |
|---|---|
| **Action Plan** | - Make work location/employment attractive (quality of accommodation/resort complex, transportation, family benefits, vacation)<br>- Make the worksite attractive for the local residents (daily commute options, etc.)<br>- Develop a diversity plan<br>- Promote in recruitment plan<br>- Consistent employment deals where possible<br>- Maintain some control of benefit distribution<br>- Include provisions in contracts and labor agreements<br>- Structure labor strategy that does not impair engaging local labor<br>- Leverage ASEP program to train Aboriginals |
| **Risk Responsibilities (LACTI)** | Paul Harrington - Accountability<br>Lance Clarke - Lead<br>Steve Goulding - Technical<br>Maria Moran - Technical |

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# Strategic Risk Frame

| Revised | 16-Sep-12 |
|---|---|

| Risk # | R25 | Category | Hydro Construction | Current Risk Rating | Low |
|---|---|---|---|---|---|

| Unmitigated Risk Rating Rationalization | This risk is considered to have minimal financial impact given current economic situation. Similarly risk likelihood is considered Unlikely. |
|---|---|

## Risk Trend and Status Update

REFERENCE STATUS UPDATES FOR R24
- People working in Western Canada commute & send money home to Newfoundland; most Newfoundlanders working in Western Canada would prefer to be in NL.
- Labor supply and demand model prepared - we understand the key shortfalls for LCP.
- Labrador Aboriginal Training Partnership established with $15M in training funding - great success to-date.
- Unskilled workers are the first to be let go in a rotation, hence currently this risk should be minimal. But where will it be in 2011-17?

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# Strategic Risk Frame

| Revised | 15-Sep-12 |
|---|---|

| Risk # | R26 | Category | Hydro Construction | Current Risk Rating | Low |
|---|---|---|---|---|---|

## Risk Details

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|---|---|
| **Lead** | **Scott O'Brien** |
| **Risk Title** | Limited number of creditworthy hydro turbine suppliers |
| **Risk Description** | As a result of significant industry consolidations and limited activity within North America, there is a limited number of creditworthy hydro-turbine suppliers, which could lead to longer delivery lead times, and increased cost. |
| **Specifics and Root Causes** | - Significant industry consolidations and work in North America limited<br>- Industry presently busiest since "Golden years" of 83 to 92<br>- In last 5 years increasingly "sellers" market - order books full for 2010<br>- North America declining in importance as market – GE exits North America for Brazil and China<br>- Complex international supply chain<br>- Only remaining North American supplier is Alstom - they are busy<br>Key Considerations:<br>- Willingness to bid<br>- Ability to deliver / reliability<br>- Installation competency<br>- Fair lump sum price / Transparency / Risk Premium<br>- Level of Aggregate Guarantee<br>- Level of Performance Guarantee / Testing acceptance<br>- Warranty – Latent defects<br>- Level of Completion Risk Guarantee<br>- Conforming Contract<br>- Creditworthiness |
| **Consequence / Impact** | - Longer lead times required and earlier commitments<br>- Fewer suppliers = less competition<br>- Increased cost due to demand factor despite downturn in commodities |
| **Early Warning Indicator of Risk Materialization** | - Global demand for hydro.<br>- # of creditworthy suppliers |

## Risk Response

| | |
|---|---|
| **Management Strategy** | Mitigate the risk by:<br>- Engaging 2 existing "bankable" suppliers and explore contracting model and risk allocation strategy.<br>- Early strategy decision and selection of supplier.<br>- Enhanced oversight during design and manufacture phases.<br><br>Residual risk will have to be accepted since cost will be driven by underlying global demand. |

| Risk Strategy | ☐ Avoid | ☑ Mitigate | ☐ Transfer | ☑ Accept |
|---|---|---|---|---|

| | |
|---|---|
| **Action Plan** | - Gather market intelligence and monitor marketplace<br>- Early engagement of qualified vendors<br>- Evaluate and make decision on turbine package configuration<br>- Convey to vendors that project is "real"<br>- Provide sufficient factory oversight<br>- Potential insurance to cover unexpected perils during manufacture<br>- Obtain performance guarantee on efficiency (exclude run-a-way test) |

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# Strategic Risk Frame

| Revised | 15-Sep-12 |
|---|---|

| Risk # | R26 | Category | Hydro Construction | Current Risk Rating | Low |
|---|---|---|---|---|---|

| Risk Responsibilities (LACTI) | Paul Harrington - Accountable<br>Bob Barnes - Technical<br>Pat Hussey - Technical<br>Lance Clarke - Lead<br>Fasken - Technical<br>AON - Technical |
|---|---|
| Unmitigated Risk Rating Rationalization | An event having some financial exposure classified as a Minor event; while it likely that this event will occur thus is rated as Likely. |

## Risk Trend and Status Update

RISK IS CLOSED - CONTRACT AWARDED TO ANDRITZ CANADA

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# Strategic Risk Frame

| Revised | 15-Sep-12 |
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| Risk # | R27 | Category | Financial | Current Risk Rating | Low |
|---|---|---|---|---|---|

## Risk Details

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|---|---|
| **Lead** | **Jason Kean** |
| **Risk Title** | De-escalation / hyper-inflation risks |
| **Risk Description** | As of result of global demand for construction goods and materials, the project may be exposed to hyper-inflation , resulting in significant increase in capital cost. |
| **Specifics and Root Causes** | - Driven by global demand<br>- There has been significant upswing and downswing on commodities since late 2004 resulting in significant increase in build cost.<br>- Future is difficult to predict - best we can practically hope for is a reasonable view for the next 2 years<br>- We need to consider Hyper-inflation due to continued world demand, combined with significant barriers to entry for new players in the specialty supply marketplace. |
| **Consequence / Impact** | - Threat or opportunity? If threat, could erode significant shareholder value.<br>- Hyper-inflation, resulting in significant increase in capital cost. |
| **Early Warning Indicator of Risk Materialization** | Market indices for raw and finished products. |

## Risk Response

| | |
|---|---|
| **Management Strategy** | Avoid risk by:<br>- Monitoring market and understand supply / demand balance for goods and materials.<br>- Developing an escalation forecasting model specific for LCP in order to translate market intelligence into an educated assessment of likely exposure to this risk.<br><br>Transfer residual risk by:<br>- Consider commodity hedging strategy to reduce exposure.<br>- Consider commerically pushing some of this risk to offtakers as part of the PPAs rather than pricing the associated cost uncertainty into power rates. |

| Risk Strategy | ☑ Avoid | ☐ Mitigate | ☑ Transfer | ☐ Accept |
|---|---|---|---|---|

| | |
|---|---|
| **Action Plan** | - Escalation will be applied by project components (turbine, labor, etc)<br>- Consider core escalation plus market specific escalation<br>- Obtain external benchmarking on escalation<br>- Consider foreign currency and exchange assumptions<br>- Continue to obtain market intelligence on supply & demand of key equipment (e.g. T/G's) |
| **Risk Responsibilities (LACTI)** | Derrick Sturge - Accountable<br>Rob Hull - Consult<br>Jason Kean - Lead<br>Steve Goulding - Technical<br>Pat Hussey - Consult<br>Fasken - Consult<br>PWC - Consult<br>Westney - Consult |

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# Strategic Risk Frame

| Revised | 15-Sep-12 |
|---|---|

| Risk # | R27 | Category | Financial | Current Risk Rating | Low |
|---|---|---|---|---|---|

| Unmitigated Risk Rating Rationalization | An event having substantial financial impact on Nalcor. Based upon historical trend and prices contained in the Gate 2A estimate it is considered unlikely the event would be of significant enough nature to cause a substantial impact to Nalcor. |
|---|---|

## Risk Trend and Status Update

RISK EXPOSURE IS CONSIDERED LOW

- Detailed escalation model prepared which formed the basis of DG3 escalation recommendations. From this analysis, risk exposure is considered low.
- Nalcor continues to monitor market through Global Insight and PowerAdvocate. Recently commodity upswing having an impact on the price of steel, conductor, etc. for transmission.
- DG3 includes an investigation of major currency exposure based upon cash flow analysis - some, but limited exposure to US, NOK, and Euro.
- Contracting strategy for major manufacturered components (submarine cable and TGs) includes consideration of this risk - decision to be made on who is best able to manage the risk.

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LOWER CHURCHILL PROJECT

# Strategic Risk Frame

| Revised | 15-Sep-12 |
|---|---|

| Risk # | R28 | Category | Transmission Construction | Current Risk Rating | Low |
|---|---|---|---|---|---|

## Risk Details

**Lead**: Kyle Tucker

**Risk Title**: Availability of experienced high-voltage contractors and skilled labour

**Risk Description**: As of result of the limited availability of qualified overland Tx contractors and linespersons in North America and the strong demand for such services in the US, the Project may have challenges securing qualified contractors, leading to cost growth and schedule slippage.

**Specifics and Root Causes**:

- Limited number of qualified transmission contractors especially in North America (approximately 4 available) - the size of the scope will require multiple contractors.

- US grid reinforcements is strongly influencing this risk.

- Resource requirements very large compared to supply for key skill sets such as line workers

- Increasing risk as demand for HV contractors increases with the investment in wind power.

- Key Considerations:
  - Willingness to bid
  - Ability to perform
  - Fair lump sum price / Transparency / Risk Premium
  - Level of Aggregate Guarantee
  - Level of Completion Risk Guarantee
  - Conforming Contract
  - Creditworthiness

**Consequence / Impact**: - Inability to secure the quantity of skilled persons required could lead to quality issues, added cost, and schedule slippage/delay.

**Early Warning Indicator of Risk Materialization**:

- Global build of new transmission
- # of linepersons graduating from college in Canada.

## Risk Response

**Management Strategy**: Mitigate this risk by:

- Commercial ownership construct for the Island Link and Maritime Link should be configured to reduce this risk (i.e. select partners who have the ability to reduce this risk).
- Split into 5 to 6 smaller contracts for cost and scheduling reasons
- Actively pursue potential suppliers and expand to worldwide considerations
- Phase the transmission build in order to flatter resource demands
- Actively support the training of linespersons.

Residual risk will have to be accepted.

**Risk Strategy**: ☐ Avoid ☑ Mitigate ☐ Transfer ☑ Accept

**Action Plan**:

- Obtain market intelligence
- Select equity / ownership partners who are able to reduce this risk.
- Package scope into manageable segments/spreads
- Ensure contractor has adequate line resources
- Train resources to improve quality and increase supply base

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LOWER CHURCHILL PROJECT

# Strategic Risk Frame

| Revised | 15-Sep-12 |
|---|---|

| Risk # | R28 | Category | Transmission Construction | Current Risk Rating | Low |
|---|---|---|---|---|---|

- Union labor agreements may be able to help provide resources
- Break contract into sequence of erection (material, towers, line installation, etc)
- Identify availability of critical transmission equipment

| Risk Responsibilities (LACTI) | Paul Harrington - Accountable<br>Lance Clarke - Lead<br>Bob Barnes - Technical<br>Fasken - Technical<br>Ron Power - Technical<br>Steve Goulding - Consult<br>Maria Moran - Consult |
|---|---|
| Unmitigated Risk Rating Rationalization | This event would result in significant impact given the potential capital cost exposure; while the materialization is this event is Almost Certain to occur given global demand for new Tx and skilled constructors and labor limitations. |

## Risk Trend and Status Update

RISK EXPOSURE HAS REDUCED SINCE DG2.

- Base Estimate is considered very solid, while basic exposure can be considered Tactical Risk
- A wide range of contractors have expressed interest in our project.
- Use of helicopters is very likely, which will reduce labor requirement
- Collective Agreement will be a wall-to-wall agreement with IBEW, and include provisions for import of foreign labor.
-Productivity exposure due to quality of labor. 3M hours @ $5 – 10/hr = $15 - $30 M

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# Strategic Risk Frame

| Revised | 15-Sep-12 |
|---|---|

| Risk # | R29 | Category | HVdc Specialities Supply & Install | Current Risk Rating | Medium |
|---|---|---|---|---|---|

## Risk Details

| | |
|---|---|
| **Lead** | **Darren Debourke** |
| **Risk Title** | Limited number of HVdc specialties suppliers and installers |
| **Risk Description** | As a result of the limited number of HVdc specialties suppliers and installers, the Project may have challenges securing manufacturing and installation capacity, resulting in additional cost and schedule slippage. |
| **Specifics and Root Causes** | - Basically two big suppliers and installers of sub sea cable (ABB and Nexans)<br>- 3 main suppliers of HVdc equipment - Areva, Siemens and ABB<br>- Location, especially Strait of Belle Isle, is challenging<br>- Tight weather window for installation<br>- Cabot Strait and SOBI combined would place tremendous demands on cable supply |
| **Consequence / Impact** | - Unavailability of cable installation vessels<br>- Unavailability of factory slots for cable<br>- Schedule delays<br>- Cost premium to secure and maintain factory slots for cable and installation vessels |
| **Early Warning Indicator of Risk Materialization** | - Market demand for HVdc technology<br>- Market consolidation or entry of new players<br>- Financial strength of existing Market players |

## Risk Response

| | |
|---|---|
| **Management Strategy** | Mitigate this risk by:<br>- Optimization of packaging strategy of HVdc specialties equipment and services to entice key players<br>- Early selection and engagement to ensure availability<br><br>Acceptance of risk residual by paying a premium to get the best. |

| Risk Strategy | ☐ Avoid | ☑ Mitigate | ☐ Transfer | ☑ Accept |
|---|---|---|---|---|

| | |
|---|---|
| **Action Plan** | - Evaluate potential alternatives for marine installation vessels<br>- Further understand the market and its dynamics.<br>- Reassess execution and contract packaging for this scope to align with market intelligence and mitigation of this risk. |
| **Risk Responsibilities (LACTI)** | Paul Harrington - Accountable<br>Lance Clarke - Lead<br>Bob Barnes - Technical<br>Faskens - Consult<br>Ron Power - Consult |
| **Unmitigated Risk Rating Rationalization** | This event would result in a minor financial impact due to a limited capital cost exposure. The likelihood is considered of be Likely given the small marketplace, plus forecasted demand for new transmission. |

## Risk Trend and Status Update

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# Strategic Risk Frame

| Revised | 15-Sep-12 |
|---|---|

| Risk # | R29 | Category | HVdc Specialities Supply & Install | Current Risk Rating | Medium |
|---|---|---|---|---|---|

- Currently 3 main HVdc equipment suppliers (ABB, Alstrom & Siemens) have been engaged and all are interested in the LCP. SLI Component 3 Team has good, recent experience dealing with these vendors and understand the marketplace.
- Key concern is getting the RFP out the door to allow for award prior to Financial Close
- Strategic opportunity for sourcing synergies with Emera to be further explored
- Confirmation of contracting strategy for AC Switchyards remains - EPCM model or EPC. Key risk for us is our EPCM managing E&I delivery scope →Uncertainty is risk premium.

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# Strategic Risk Frame

| Revised | 15-Sep-12 |
|---|---|

| Risk # | R30 | Category | Environmental Assessment | Current Risk Rating | Low |
|---|---|---|---|---|---|

## Risk Details

| | |
|---|---|
| Lead | **Stephen Pellerin** |
| Risk Title | Island Link EA results in late design changes |
| Risk Description | As a result of the outcome of the Island Link and Maritime Link Environmental Assessment, late changes to the design or project scope may be required, resulting in cost and schedule impact. |
| Specifics and Root Causes | As a result of the outcome of the Island Link and Maritime Link Environmental Assessment, late changes to the design or project scope may be required, resulting in cost and schedule impact.<br><br>Potential Threats:<br>- Sea return electrode - have faced challenges in other jurisdictions - protest from NGOs and other groups due to the inability to predict long-term effects (i.e. pipeline corrosion, gas generation, effects on magnetic compasses, etc.)<br>- There have been significant public concerns raised regarding the access route for the electrode line to Lake Mellville / Mud Lake.<br>- Impact of line routing in Labrador and over the Long Range Mountains on Woodland Caribou mitigation and protection.<br>- Habitat destruction in the SOBI due to submarine cable. Significant compensation required. |
| Consequence / Impact | - Mitigation costs for alternate design solution. E.g. route Labrador section of Island Link closer to TLH, use beach electrode.<br>- Potential schedule slippage resulting from additional time to find alternative solution. |
| Early Warning Indicator of Risk Materialization | - Issues raised during consultation<br>- Extent of media interest and tone of coverage<br>- EIS Guidelines - how it addresses these issues |

## Risk Response

| | |
|---|---|
| Management Strategy | Avoid risk by:<br>- Working to understand environmental issues and accommodate realistic solutions early in the design process to minimize downstream effects on procurement and construction.<br>- Preparing a strong, defensible position on each recommended option contained in the EIS - convince the Panel that our basis and assumptions are the most pragmatic. Ensure alignment and communicate any policy decisions and potential impact prior to making a commitment as part of the EA process.<br>- Verifying potential impacts of commitments made during the EA process with all disciplines of the Project Team prior to making such commitments.<br><br>Mitigate risk by:<br>- Complete early concept desktop studies on potential scope / design changes that the EA could recommend in order to be in a better position to react if such changes are requied to secure EA release.<br>- Tracking commitments and concessions made during the EA process and communicate within Project Team to allow for effective management of any implications on the design, construction, start-up and operation phases.<br><br>This risk cannot be entirely avoided or mitigated given its nature, thus residual risk must be accepted as a part of doing business. |

| Risk Strategy | ☑ Avoid | ☑ Mitigate | ☐ Transfer | ☑ Accept |
|---|---|---|---|---|

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LOWER CHURCHILL PROJECT

# Strategic Risk Frame

| Revised | 15-Sep-12 |
|---|---|

| Risk # | R30 | Category | Environmental Assessment | Current Risk Rating | Low |
|---|---|---|---|---|---|

| | |
|---|---|
| **Action Plan** | - Establish expert panel on the subject and undertake investigation of the optimal electrode type for LCP considering our operational requirements and public perception.<br>- Develop a communications strategy that focus on the key message that our system is bi-pole, mono-pole is only utilized as back-up for emergency situation (hours per annum).<br>- Consider alternate arrangements for electrode rather than in a marine environment (e.g. beachside, or near-shore pond)<br>- Evaluate the economic and technical merit of routing the Labrador Tx line closer to the TLH and present a strong justification for selected route as part of the EIS. |
| **Risk Responsibilities (LACTI)** | Paul Harrington - Accountable<br>Bob Barnes - Technical<br>Steve Pellerin - Lead<br>Steve Bonnell - Technical<br>Dawn Dalley - Consult |
| **Unmitigated Risk Rating Rationalization** | This event could result in a Major financial impact if re-routing of the Tx line in Labrador was required. The likelihood is considered to be Possible. |

## Risk Trend and Status Update

- Key concerns are related to avifauna, caribou calving grounds and ROW clearing restrictions in June & July due to nesting birds.
- Some concern re Outfitters - claim that we may be disrupting their business.
- Work to-date has not identified any surprises, however there will likely be construction restrictions coming out of the EA approval (e.g. nesting Songbirds hampering clearing operations, Woodland caribou birthing season on the Norhtern Pennisula).
- LIL originating at MF rather than Gull Island reduces the amount of interior Labrador to be traversed - less disruption as now following TLH for half of Labrador line section.
- Significant effort has been placed into consultation, however Spring 2011 cross-province consultation workshops were cancelled part way through due to a lack of attendance / public interest.
- Shore-type electrode has been selected over sea-electrode. Location selected at Dowden`s Pt, CBS and Lanse Diablo, Labrador.
- Registration for Lab - Island Link has been revised to reflect known changes to design such as electrode site and type of electrode, SOBI cable crossing routing and landing points.
- EIS guidelines not received until Q2-11, hence delaying EIS submittal. A number of component studies have been issued, however complete EIS not to be submitted until Q4 2011, with a decision on the Island Link EA anticipated in Q1 2013.
- Scallop dragging restriction being sought for SOBI cable area.

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# Strategic Risk Frame

| Revised | 16-Sep-12 |
|---|---|

| Risk # | R31 | Category | Enterprise | Current Risk Rating | Medium |
|---|---|---|---|---|---|

## Risk Details

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|---|---|
| **Lead** | **Gilbert Bennett** |
| **Risk Title** | Unwillingness of Shareholder to fund early construction on equity defers construction |
| **Risk Description** | As a result of an unwillingness of the Shareholder to fund early construction activities prior to Financial Close, the planned execution approach and timeline for start of construction would change, resulting in a significant slippage of the target First Power date. |
| **Specifics and Root Causes** | Current engineering and construction schedule is predicated upon substantial equity injection ($2 to $3B) prior to Financial Close in 2013. Major go/no-go decision of equity spend is in 2011 with start of Early Works at Gull Island and awarding contracts for T/G sets. This is concurrent with the timing of the next provincial election (Oct 11, 2011) - risk of unwillingness to commit during election campaign. |
| **Consequence / Impact** | - Change in strategy - no construction or issue of purchase orders pre-Financial Close.<br>- Delay in start of construction until post 2011 election.<br>- Slippage of first power date. |
| **Early Warning Indicator of Risk Materialization** | Approval of capital expenditure program for 2010 and start of engineering on early infrastructure works, award of main engineering contract, issue PO for bridge and camp. |

## Risk Response

| | |
|---|---|
| **Management Strategy** | Avoid risk by:<br>- Ensuring early and on-going alignment with the Shareholder on all aspects of the project.<br>- Confirming Province's appetite for equity injection pre-Financial Close and validate the availability of equity from Shareholder is aligned with the proposed execution schedule.<br>- Seek early commitment and release of capital for 2010 activities.<br><br>Mitigate this risk by executing engineering and contracting in a scale-down fashion availing of the longer time time. |

| Risk Strategy | ☑ Avoid | ☑ Mitigate | ☐ Transfer | ☐ Accept |
|---|---|---|---|---|

| | |
|---|---|
| **Action Plan** | - Confirm equity injection capacity from the Province prior to Decision Gate 2 and adjust execution plan accordingly.<br>- Regular briefings provided by Project Team to Executive Leadership on pending decisions for the next 90 days.<br>- Regular communication on key messages between Nalcor and Shareholder.<br>- Ensure clarity on overall project schedule and financial commitment curve. |
| **Risk Responsibilities (LACTI)** | Ed Martin - Accountable<br>Gilbert Bennett - Lead<br>Mark Bradbury - Technical<br>Rob Hull - Technical<br>Paul Harrington - Technical<br>Jason Kean - Consult |
| **Unmitigated Risk Rating Rationalization** | An event having significant financial impact on the Project ($100M - worst case). Likelihood is considered Possible given the current uncertainty in how the construction market will rebound from the current Recession. |

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# Strategic Risk Frame

| Revised | 16-Sep-12 |
|---|---|

| Risk # | R31 | Category | Enterprise | Current Risk Rating | Medium |
|---|---|---|---|---|---|

## Risk Trend and Status Update

RISK IS CONSIDERED CLOSED DUE TO THE FOLLOWING:

- We have strong equity commitment from the Province - $665 million approved for 2012 works
- Province approved the commencement of MF Early Infrastructure works prior to Sanction.
- Legislative and regulatory framework changes on-going
- Commitment Letter from GNL in-place

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# Strategic Risk Frame

| Revised | 15-Sep-12 |
|---|---|

| Risk # | R32 | Category | Environmental Assessment | Current Risk Rating | Low |
|---|---|---|---|---|---|

## Risk Details

| | |
|---|---|
| **Lead** | **Stephen Pellerin** |
| **Risk Title** | Delay in the release of the Island Link from EA |
| **Risk Description** | As a result of a delay in a decision of the type and level of federal EA required, a delay in the Island Link release from EA may occur, which could lead to an overall slippage on the target First Power date. |
| **Specifics and Root Causes** | -Federal government decisions on type and level of federal EA required have not yet been made, due to the fact that Nalcor Energy has not yet responded to Parks Canada's May 4 2009 letter. Risk that this will result in further process delays and/or calls for a Panel Review.<br>- Uncertainty re type and location of electrodes<br>- Uncertainty re conduit or sub sea option for SOBI<br>- Limited Aboriginal consultation<br>- Challenge of Project Splitting<br><br>- Additionally if federal funding support is obtained for any component of the Project, then it will trigger a comprehensive study at that point thereby risking schedule slippage. |
| **Consequence / Impact** | - Recycle part way through the EA process.<br>- Schedule delay as a result of delay in EA Release<br>- Potential court action re lack of consultation and Project Splitting<br>- Slippage of first power date. |
| **Early Warning Indicator of Risk Materialization** | Timing of issue of EA Guidelines. |

## Risk Response

| | |
|---|---|
| **Management Strategy** | Avoid risk by:<br>- Making a strategic decision to go with a Comprehensive Review rather than a Screening Study to avoid recycle and schedule slippage.<br><br>Mitigate overall exposure by:<br>- Leveraging the 1980 EARP Panel Approval<br>- Strategically manage the EA process leveraging lessons learned from Generation EA<br>- Increasing stakeholder consultation activities |

| Risk Strategy | ☑ Avoid | ☑ Mitigate | ☐ Transfer | ☐ Accept |
|---|---|---|---|---|

| | |
|---|---|
| **Action Plan** | - Respond to CEAA's letter re GMNP.<br>- Consider merit of rolling the Island Link in with the Generation Project EA process.<br>- Increase consultation resources<br>- Execute consultation agreements as req'd. |
| **Risk Responsibilities (LACTI)** | Gilbert Bennett - Accountable<br>Paul Harrington - Responsible<br>Steve Pellerin - Lead<br>Steve Bonnell - Technical |

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# Strategic Risk Frame

| Revised | 15-Sep-12 |
|---|---|

| Risk # | R32 | Category | Environmental Assessment | Current Risk Rating | Low |
|---|---|---|---|---|---|

| Unmitigated Risk Rating Rationalization | An event having some financial impact due to schedule slippage. Likelihood is Unlikely given it would take substantial schedule slippage for impact to First Power. |
|---|---|

## Risk Trend and Status Update

RISK IS CONSIDERED TO HAVE LOW EXPOSURE

- EA Release expected by April 2013
- Need an Purpose has been addressed at Generation EA and PUB review, while public debate prior to DG3 should clear other issues.
- No JRP – removes interim decision
- Environmental effects are much less than for Generation

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# Strategic Risk Frame

| Revised | 13-Jul-11 |
|---|---|

| Risk # | R33 | Category | Enterprise | Current Risk Rating | Low |
|---|---|---|---|---|---|

## Risk Details

| | |
|---|---|
| Lead | **Gilbert Bennett** |
| Risk Title | Uncertainty on commercial structure for transmission |
| Risk Description | As a result of the uncertainty of the commercial construct for the Maritime Link, delay in the EA process, financial market sounding, and PPA negotiations may arise, leading to an overall project schedule slippage. |
| Specifics and Root Causes | - Ownership philosophy for the Maritime Link or Island Link not determined. Emera and NB Power are potential equity partners, while lobbying for the Government of Canada is on-going.<br>- Uncertainty also exists as to whether this will be a merchant or regulated asset.<br>- Finalization of this philosophy to allow for securing the necessary partners is considered to take considerable amounts of time.<br>- JV partners must be locked down pre Financial Market Sounding planned for September 2011. |
| Consequence / Impact | - Schedule delay in PPA negotiations as a result of uncertainty of the commercial construct.<br>- Schedule delay pre Market Sounding given the need to have all JV partners onboard prior to this occurring.<br>- Delay in registration of the Maritime Link for EA and subsequent delay in EA release impacting Financial Close timelines. |
| Early Warning Indicator of Risk Materialization | Pulse of negotiations on Maritime Link. |

## Risk Response

| | |
|---|---|
| Management Strategy | Avoid risk by:<br>- Strategically identify and evaluate all plausible options and develop recommendation based on alignment with Nalcor's and the Province's strategic objectives. Seek early clarity and alignment on recommendation. Developing supporting strategy and execute.<br>- Aggressive engage Emera and NB Power - Nalcor to champion link.<br><br>Mitigate exposure risk by:<br>- Evaluating options for Nalcor led EA for Maritime Link |

| Risk Strategy | ☑ Avoid | ☑ Mitigate | ☐ Transfer | ☐ Accept |
|---|---|---|---|---|

| | |
|---|---|
| Action Plan | - Verify preferred option with Steering Committee.<br>- Develop a strategy to progress selected option.<br>- Develop EA strategy for Maritime Link.<br>- Develop Aboriginal consultation plan for Maritime Link. |
| Risk Responsibilities (LACTI) | Ed Martin - Accountable<br>Gilbert Bennett - Lead<br>Laurie Coady - Technical<br>Rob Hull - Technical<br>Steve Pellerin - Technical<br>Derek Sturge - Consult |
| Unmitigated Risk Rating Rationalization | An event which would result in significant losses to Nalcor due to schedule slippage is considered a Moderate impact; the likelihood is rated at 5 (Almost Certain) given that this has been an prevalent issue to date within the management of the Project |

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# Strategic Risk Frame

| Revised | 13-Jul-11 |
|---|---|

| Risk # | R33 | Category | Enterprise | Current Risk Rating | Low |
|---|---|---|---|---|---|

## Risk Trend and Status Update

RISK IS CONSIDERED NO LONGER APPLICABLE, HENCE IS CLOSED.

HISTORICAL NOTES:
- Term Sheet for development of the Muskrat Falls, Labrador-Island Transmission Link signed with Emera on November 28, 2010. JOA currently under development / negotiation.
- Key uncertainty at present regarding the approach to be used for implementation of the Maritime Link (e.g. integrated Emera – Nalcor team).
- Emera will lead the EA process, however based upon current progress it is anticipated that it will be challenging to have the Maritime Link ready to accept Muskrat Falls power by May 2017.
- All commerical agreements required for development of Project have been identified and are being championed by a designated Senior Mgmt rep.

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# Strategic Risk Frame

| Revised | 15-Sep-12 |
|---|---|

| Risk # | R34 | Category | Financial | Current Risk Rating | Low |
|---|---|---|---|---|---|

## Risk Details

| | |
|---|---|
| Lead | Jim Meaney |
| Risk Title | Required debt or equity capital not available due to loss of credit worthiness |
| Risk Description | As a result of a loss of credit worthiness, required debt or equity capital may not be available, leading to/resulting in the Project not proceeding to sanction. |
| Specifics and Root Causes | |
| Consequence / Impact | |
| Early Warning Indicator of Risk Materialization | D/E ratio and Credit Rating. |

## Risk Response

| | |
|---|---|
| Management Strategy | Mitigate this risk by taking steps to ensure a credit rating that is investment grade. This will engender confidence in investors including the Province (equity infusion/backstopping) and debtholders. It will also instil confidence in the Federal Govt. thereby supporting the federal loan guarantee decision. The accomplshment of this objective entails strategies that secure the ultimate cash flows of the project such as; effective project execution capability, cost and schedule certainty, contingent equity, regulatory certainty, recovery of and return on rate base, effective transmission capability and FERC compliance. |

| Risk Strategy | ☑ Avoid | ☑ Mitigate | ☐ Transfer | ☐ Accept |
|---|---|---|---|---|

| | |
|---|---|
| Action Plan | |
| Risk Responsibilities (LACTI) | |
| Unmitigated Risk Rating Rationalization | An event which would cause the Project not to proceed to sanction is considered an extreme impact. Likelihood of this risk occuring is very low since the Federal governmeent is expected to guarantee project debt, coupled with contingent equity commitment |

## Risk Trend and Status Update

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# Strategic Risk Frame

| Revised | 15-Sep-12 |
|---|---|

| Risk # | R34 | Category | Financial | Current Risk Rating | Low |
|---|---|---|---|---|---|

RISK IS CONSIDERED TO HAVE LOW EXPOSURE DUE TO THE EXISTANCE OF A COMMITMENT OF A FEDERAL LOAN GUARANTEE.

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# Strategic Risk Frame

| Revised | 15-Sep-12 |
|---|---|

| Risk # | R35 | Category | Financial | Current Risk Rating | Medium |
|---|---|---|---|---|---|

## Risk Details

| | |
|---|---|
| Lead | **Jim Meaney** |
| Risk Title | Required debt or equity capital not available due to the discontinuation of shareholder investment |
| Risk Description | As a result of the discontinuation of shareholder investment, required debt or equity capital may not be available, leading to/resulting in the Project not proceeding to sanction. |
| Specifics and Root Causes | |
| Consequence / Impact | |
| Early Warning Indicator of Risk Materialization | Willingness of the provincial government to make equity funding available. |

## Risk Response

| | |
|---|---|
| Management Strategy | Mitigate this risk by ensuring the continuation of the Provincial Government Debt guarantee; and continue to pursue project investment based on the guarantee. A residual exposure will have to been accepted as a fact of doing business. |

| Risk Strategy | ☐ Avoid | ☑ Mitigate | ☐ Transfer | ☑ Accept |
|---|---|---|---|---|

| | |
|---|---|
| Action Plan | |
| Risk Responsibilities (LACTI) | |
| Unmitigated Risk Rating Rationalization | An event which would cause the Project not to proceed to sanction is considered an extreme impact; the likelihood is rated at 1 (very low) due to the Shareholder's stated public commitment for the Project as well as the potential availability of alternate |

## Risk Trend and Status Update

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# Strategic Risk Frame

| Revised | 15-Sep-12 |
|---|---|

| Risk # | R35 | Category | Financial | Current Risk Rating | Medium |
|---|---|---|---|---|---|

RISK IS CONSIDERED CLOSED WITH THE EXISTANCE OF THE COMMITMENT LETTER FROM THE PROVINCE OF NL.

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# Strategic Risk Frame

| Revised | 15-Sep-12 |
|---|---|

| Risk # | R36 | Category | Power Sales | Current Risk Rating | Low |
|---|---|---|---|---|---|

## Risk Details

| | |
|---|---|
| Lead | **Gilbert Benneft** |
| Risk Title | Default of a major customer on its commitments under PPA contract |
| Risk Description | As a result of default of a major customer on its commitments under PPA contract, the company is unable to fund its obligations. |
| Specifics and Root Causes | |
| Consequence / Impact | |
| Early Warning Indicator of Risk Materialization | Off takers financial strength and historical business dealings. |

## Risk Response

| | |
|---|---|
| Management Strategy | Avoid risk by strategically aligning interest by negotiating commercial construct on the Maritime Link to monetize value of Muskrat Falls resources not required for the Island. Some acceptance of residual risk will be required. |

| Risk Strategy | ☑ Avoid | ☑ Mitigate | ☐ Transfer | ☑ Accept |
|---|---|---|---|---|

| | |
|---|---|
| Action Plan | |
| Risk Responsibilities (LACTI) | |
| Unmitigated Risk Rating Rationalization | An event which would result in substantial financial losses and suspension of the construction program is considered a Major impact; the likelihood is rated at 1 (very low). |

## Risk Trend and Status Update

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# Strategic Risk Frame

| Revised | 15-Sep-12 |
|---|---|

| Risk # | R36 | Category | Power Sales | Current Risk Rating | Low |
|---|---|---|---|---|---|

RISK IS NOT APPLICABLE FOR LCP PHASE I

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# Strategic Risk Frame

| Revised | 15-Sep-12 |
|---|---|

| Risk # | R37 | Category | Financial | Current Risk Rating | Medium |
|---|---|---|---|---|---|

## Risk Details

| | |
|---|---|
| Lead | Jim Meaney |
| Risk Title | LCP unable to access required debt capital as a result of a lack of recovery/liquidity in capital markets |
| Risk Description | As a result of a lack of recovery/liquidity in capital markets, LCP may be unable to access required debt capital, leading to increased demand for equity and/or delay. |
| Specifics and Root Causes | |
| Consequence / Impact | |
| Early Warning Indicator of Risk Materialization | Market indices (S&P, TSX, DJIA, NASDAQ) |

## Risk Response

| | |
|---|---|
| Management Strategy | Mitigate risk through close monitoring of market indices and progress on the environmental assessment; acquisition of power purchase agreements and debt capital upon finalization of the environmental assessment process. Also take steps to solidify comitments made by the Feds re the guarantee and those made in the Commitment Letter...legislative means preferred by financiers. |

| Risk Strategy | ☐ Avoid | ☑ Mitigate | ☐ Transfer | ☐ Accept |
|---|---|---|---|---|

| | |
|---|---|
| Action Plan | |
| Risk Responsibilities (LACTI) | |
| Unmitigated Risk Rating Rationalization | Would not expect a delay of more than a year. In view of the promise of a Federal guarantee, the likelihood is rated at 2 (unlikely). A second consideration is province's commitment letter that provides assurances as to certainty around regulated returns. |

## Risk Trend and Status Update

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# Strategic Risk Frame

| Revised | 15-Sep-12 |
|---|---|

| Risk # | R37 | Category | Financial | Current Risk Rating | Medium |
|---|---|---|---|---|---|

RISK IS CONSIDERED CLOSED GIVEN THE EXISTANCE OF THE FEDERAL LOAN GUARANTEE AND THE PROVINCE`S STRONG FINANCIAL POSITION.

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# Strategic Risk Frame

| Revised | 15-Sep-12 |
|---|---|

| Risk # | R38 | Category | Financial | Current Risk Rating | Low |
|---|---|---|---|---|---|

## Risk Details

| | |
|---|---|
| Lead | Jim Meaney |
| Risk Title | Shareholder not able to contribute required equity capital as a result of low oil prices |
| Risk Description | As a result of low oil prices, the shareholder may not be able to contribute required equity capital, leading to/resulting in the Project not proceeding to sanction. |
| Specifics and Root Causes | |
| Consequence / Impact | |
| Early Warning Indicator of Risk Materialization | Reduced oil royalties could result in deficit provincial budgets; decrease in oil exploration |

## Risk Response

| | |
|---|---|
| Management Strategy | The presence of the federal guarantee and the provincial commitments with resepct to cost recovery from ratepayers will allow for greater leverage and less reliance on equity. |

| Risk Strategy | ☐ Avoid | ☑ Mitigate | ☐ Transfer | ☐ Accept |
|---|---|---|---|---|

| | |
|---|---|
| Action Plan | |
| Risk Responsibilities (LACTI) | |
| Unmitigated Risk Rating Rationalization | An event which would lead to a greater than 12 month delay is considered an extreme impact; the likelihood is rated as posible. |

## Risk Trend and Status Update

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# Strategic Risk Frame

| Revised | 15-Sep-12 |
|---|---|

| Risk # | R38 | Category | Financial | Current Risk Rating | Low |
|---|---|---|---|---|---|

THIS RISK IS TO MONITORED. THE RATING COULD GO INCREASE IF THE PRICE OF OIL DROPS DRAMATICALLY.

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# Strategic Risk Frame

| Revised | 15-Sep-12 |
|---|---|

| Risk # | R39 | Category | Power Sales | Current Risk Rating | |
|---|---|---|---|---|---|

## Risk Details

| | |
|---|---|
| Lead | LCP PS & MA Manager |
| Risk Title | Unablility to secure power purchase agreements |
| Risk Description | As a result of the inability to secure transmission access, the Project may be unable to secure power purchase agreements, leading to/resulting in the Project not proceeding to sanction. |
| Specifics and Root Causes | |
| Consequence / Impact | |
| Early Warning Indicator of Risk Materialization | Number of jurisdictions expressing an interest in the purchase of Lower Churchill Power. |

## Risk Response

| | |
|---|---|
| Management Strategy | Application for transmission of larger blocks of power under Quebec OATT into Ontario & the US; continue to explore possible Labrador industrial loads |

| Risk Strategy | ☐ Avoid | ☐ Mitigate | ☐ Transfer | ☐ Accept |
|---|---|---|---|---|

| | |
|---|---|
| Action Plan | |
| Risk Responsibilities (LACTI) | |
| Unmitigated Risk Rating Rationalization | An event which would cause the Project not to proceed to sanction is considered an extreme impact; the likelihood is rated at 3 (possible) due to the size of current existing transmission lines and the contemplation of the Maritime Transmission Route. |

## Risk Trend and Status Update

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# Strategic Risk Frame

| Revised | 15-Sep-12 |
|---|---|

| Risk # | R39 | Category | Power Sales | Current Risk Rating | |
|---|---|---|---|---|---|

NOT APPLICABLE FOR LCP PHASE I SINCE THE CPW IS DONE ON THE BASIS OF SUPPLYING THE ISLAND ONLY AND THE REMAINDER IS CONSIDERED SPILL.

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# Strategic Risk Frame

| Revised | 15-Sep-12 |
|---|---|

| Risk # | R40 | Category | Power Sales | Current Risk Rating | Medium |
|---|---|---|---|---|---|

## Risk Details

| | |
|---|---|
| Lead | **LCP PS & MA Manager** |
| Risk Title | Loss of hydro-electric price advantage as a result of and extended depression in oil prices |
| Risk Description | As a result of and extended depression in oil prices. a change in the long term outlook for oil prices might occur during construction which could point to a loss of hydro-electric price advantage and thus lead to challenges of the Government's commitments regarding cost recovery. |
| Specifics and Root Causes | |
| Consequence / Impact | |
| Early Warning Indicator of Risk Materialization | - Oil and natural gas price forecast.- price of Carbon |

## Risk Response

| | |
|---|---|
| Management Strategy | Mitigate this risk by moving forward with legislative changes that confirm cost recovery in accordance with the Provincial Commitment Letter providing still least cost and no rate shock. |

| Risk Strategy | ☑ Avoid | ☑ Mitigate | ☐ Transfer | ☑ Accept |
|---|---|---|---|---|

| | |
|---|---|
| Action Plan | |
| Risk Responsibilities (LACTI) | |
| Unmitigated Risk Rating Rationalization | If cost recovery is questioned, at worst the impact would be equivalent to the differential between the two alternatives which in present value terms, should be limited to something less than $100 m. The likelihood of this becoming an issue is considered |

## Risk Trend and Status Update

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# Strategic Risk Frame

| Revised | 15-Sep-12 |
|---|---|

| Risk # | R40 | Category | Power Sales | Current Risk Rating | Medium |
|---|---|---|---|---|---|

RISK IS CONSIDERED CLOSED. DG3 CPW MODELLING INDICATES A VERY POSITIVE CPW BENEFIT FOR LCP OVER THE ISOLATED ISLAND SCENARIO.

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# Strategic Risk Frame

| Revised | 15-Sep-12 |
|---|---|

| Risk # | R41 | Category | Financial | Current Risk Rating | |
|---|---|---|---|---|---|

## Risk Details

| | |
|---|---|
| Lead | LCP PS & MA Manager |
| Risk Title | Project revenues may not be sufficient to support debt servicing and operating requirements |
| Risk Description | As a result of LCP not being able to wheel smaller quantities of power through Quebec (300-500 MW), project revenues may not be sufficient to support debt servicing and operating requirements, leading to/resulting in the Project not achieving the envisioned economic rent. |
| Specifics and Root Causes | |
| Consequence / Impact | |
| Early Warning Indicator of Risk Materialization | - OATT Applications- Recall power sales |

## Risk Response

| | |
|---|---|
| Management Strategy | Mitigate this risk by:<br>- OATT applications and associated challenges to the Regie<br>- Exploring the development of the Maritime Link at 1000MW capacity. Accept risk as work power sales strategy to mitigate it as best as possible. |

| Risk Strategy | ☐ Avoid | ☐ Mitigate | ☐ Transfer | ☐ Accept |
|---|---|---|---|---|

| | |
|---|---|
| Action Plan | |
| Risk Responsibilities (LACTI) | |
| Unmitigated Risk Rating Rationalization | An event which would result in substantial losses to Nalcor due to loss opportunity is considered an Major impact; the likelihood is rated at 2 (Unlikely) given the small amount of energy, recent success with Recall and available capacity booking, as well |

## Risk Trend and Status Update

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# Strategic Risk Frame

| Revised | 15-Sep-12 |
|---|---|

| Risk # | R41 | Category | Financial | Current Risk Rating | |
|---|---|---|---|---|---|

Regie Hearing scheduled for January 2010 to hear Nalcor complaints. Recent success with application to push Recall power through PQ has resulted in firm booking that has available capacity for some Gull power.

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# Strategic Risk Frame

| Revised | 15-Sep-12 |
|---|---|

| Risk # | R42 | Category | Environmental Approval | Current Risk Rating | Medium |
|---|---|---|---|---|---|

## Risk Details

| | |
|---|---|
| Lead | Stephen Pellerin |
| Risk Title | Delay in environmental assessment process |
| Risk Description | As a result of legislative changes, the environmental assessment process may be delayed by several years, leading to/resulting in the Project not proceeding to sanction. |
| Specifics and Root Causes | |
| Consequence / Impact | |
| Early Warning Indicator of Risk Materialization | Close monitoring of environmental legislative changes at both the Provincial and Federal levels; timely assessment of the impact of the changes on the Project. |

## Risk Response

| | |
|---|---|
| Management Strategy | Mitigate impact of risk by:<br>- Closely monitor any proposed and/or enacted legislative changes; quickly assess the impact these changes may have on the environmental assessment process, and affect any possible strategy changes.<br><br>Residual risk will still require acceptance.<br>Advent of FLG should reduce likelihood.<br>- Embed Provincial commitment for pass thru of cost increases to rates in legislation provided still least cost and no rate shock. . |

| Risk Strategy | ☐ Avoid | ☑ Mitigate | ☐ Transfer | ☑ Accept |
|---|---|---|---|---|

| | |
|---|---|
| Action Plan | |
| Risk Responsibilities (LACTI) | |
| Unmitigated Risk Rating Rationalization | The impact is rated at 5 (extremer) as there could be an extended delay, but not permanent failure; the likelihood is rated at 2 (unlikely) due to the inability to predict government actions. |

## Risk Trend and Status Update

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LOWER CHURCHILL PROJECT

# Strategic Risk Frame

| Revised | 15-Sep-12 |
|---|---|

| Risk # | R42 | Category | Environmental Approval | Current Risk Rating | Medium |
|---|---|---|---|---|---|

THIS RISK IS CONSIDERED CLOSED SINCE GENERATION PROJECT HAS BEEN RELEASED FROM EA.

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# Strategic Risk Frame

| Revised | 15-Sep-12 |
|---|---|

| Risk # | R43 | Category | | Current Risk Rating | Low |
|---|---|---|---|---|---|

## Risk Details

| | |
|---|---|
| Lead | Paul Harrington |
| Risk Title | Challenges attracting and retaining quality required Owner's team resources as a result of competing local mega-projects |
| Risk Description | As a result of a number of competing mega-projects occuring locally, the Project has challenges attracting and retaining the quality of required Owner's team resources, resulting in the inability to adequately perform the Owner's oversight / management role. |
| Specifics and Root Causes | |
| Consequence / Impact | |
| Early Warning Indicator of Risk Materialization | - Turnover among team - Market rates |

## Risk Response

| | |
|---|---|
| Management Strategy | Avoid risk by:<br>- Structuring an overall team effectiveness program that includes a retention scheme mechanism.<br>- Make Nalcor LCP the Project of Choice<br>- Recruit and develop younger talent.<br><br>Mitigate risk by being very competitive in the market. |

| Risk Strategy | ☑ Avoid | ☑ Mitigate | ☐ Transfer | ☐ Accept |
|---|---|---|---|---|

| | |
|---|---|
| Action Plan | |
| Risk Responsibilities (LACTI) | |
| Unmitigated Risk Rating Rationalization | This event would result in a moderate financial impact due to a limited capital cost exposure. The likelihood is considered of be Likely given the small marketplace, plus anticipated demand for skilled individuals in NL over the coming months. |

## Risk Trend and Status Update

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LOWER CHURCHILL PROJECT

# Strategic Risk Frame

| Revised | 15-Sep-12 |
|---|---|

| Risk # | R43 | Category | | Current Risk Rating | Low |
|---|---|---|---|---|---|

- Risk is considered to have a low rating given that the team is largely mobilization and turnover has been minimal. Largest exposure relates to SLI`s ability to attract CM resources. Mitigation efforts to include Completion Bonus.
- Deliotte engaged to implement Team Functionality work-plan.

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# Strategic Risk Frame

| Revised | |
|---|---|

| Risk # | R44 | Category | | Current Risk Rating | High |
|---|---|---|---|---|---|

## Risk Details

| | |
|---|---|
| Lead | Gerry Brennan (Emera) |
| Risk Title | Estimate uncertainty as a result of limited engineering and design definition for the current 320kV Maritime Link |
| Risk Description | As a result of limited engineering and design definition for the current 320kV Maritime Link and the high-level cost estimate available, there is a significant amount of estimate uncertainty (tactical risk), results in added cost and schedule slippage. |
| Specifics and Root Causes | |
| Consequence / Impact | |
| Early Warning Indicator of Risk Materialization | - Cost growth against target- Number of design changes / deviations from Gate 2 Basis of Estimate |

## Risk Response

| | |
|---|---|
| Management Strategy | - Mitigate the risk by completing a bottom-up review of the cost estimate for the overhead transmission<br>- Completion of third party benchmarking<br>- Some amount of uncertainty will remain which will have to be accepted. |

| Risk Strategy | ☐ Avoid | ☑ Mitigate | ☐ Transfer | ☑ Accept |
|---|---|---|---|---|

| | |
|---|---|
| Action Plan | |
| Risk Responsibilities (LACTI) | |
| Unmitigated Risk Rating Rationalization | An event having significant financial exposure and construction schedule delays classified as a Extreme event; while it might occur thus is rated as Possible. |

## Risk Trend and Status Update

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LOWER CHURCHILL PROJECT

# Strategic Risk Frame

| Revised | |
|---|---|

| Risk # | R44 | Category | | Current Risk Rating | High |
|---|---|---|---|---|---|

Recent market intelligence has confirmed the significant risk of cost growth for overhead transmission lines.

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# Strategic Risk Frame

| Revised | 15-Sep-12 |
|---|---|

| Risk # | R45 | Category | | Current Risk Rating | Low |
|---|---|---|---|---|---|

## Risk Details

| | |
|---|---|
| Lead | **LCP PS & MA Manager** |
| Risk Title | Low water inflows to reservoirs leading to hydroelectric facilities unable to produce sufficient revenue |
| Risk Description | As a result of climate change driven drought, low water inflows to reservoirs may occur, which could lead to the hydroelectric facilities being unable to produce sufficient revenue. |
| Specifics and Root Causes | |
| Consequence / Impact | |
| Early Warning Indicator of Risk Materialization | Reservoir levels at Churchill Falls. |

## Risk Response

| | |
|---|---|
| Management Strategy | Understand hydrology and evaluate economics using a Stress Test with water spillage or low water levels. Base firm power sales on conservative water inflows. Accept risk. |

| Risk Strategy | ☐ Avoid | ☐ Mitigate | ☐ Transfer | ☑ Accept |
|---|---|---|---|---|

| | |
|---|---|
| Action Plan | |
| Risk Responsibilities (LACTI) | |
| Unmitigated Risk Rating Rationalization | An event which would result in substantial financial losses and operation interruptions is considered a Major impact; the likelihood is rated at 1 (rare or improbable) given our 40 + year knowledge of the Churchill river hydrology. |

## Risk Trend and Status Update

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LOWER CHURCHILL PROJECT

# Strategic Risk Frame

| Revised | 15-Sep-12 |
|---|---|

| Risk # | R45 | Category | | Current Risk Rating | Low |
|---|---|---|---|---|---|

Reservoir levels has remained consistent with historical trends. Not considered a capital risk.

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# Strategic Risk Frame

| Revised | 15-Sep-12 |
|---|---|

| Risk # | R45 | Category | | Current Risk Rating | Low |
|---|---|---|---|---|---|