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Nalcor Energy – Lower Churchill Project

nalcor energy
LOWER CHURCHILL PROJECT

Gate 2 Project Risk Analysis

LCP-PT-ED-0000-RI-RP-0001-01

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B.3 Westney Report “Risk Analysis Results for the Option of Muskrat Falls First plus the Island Link June-July 2010”

B.4 Westney Report “Results of the Time-Risk and Strategic-Risk Assessments September 2009”

1.0 Purpose

This *Gate 2 Project Risk Analysis* presents the collective results of various risk planning and analysis completed for Nalcor Energy – Lower Churchill Project (NE-LCP or the Project) during Gateway Phase 2. It has been prepared in support of the Gate 2 Decision Support Package.

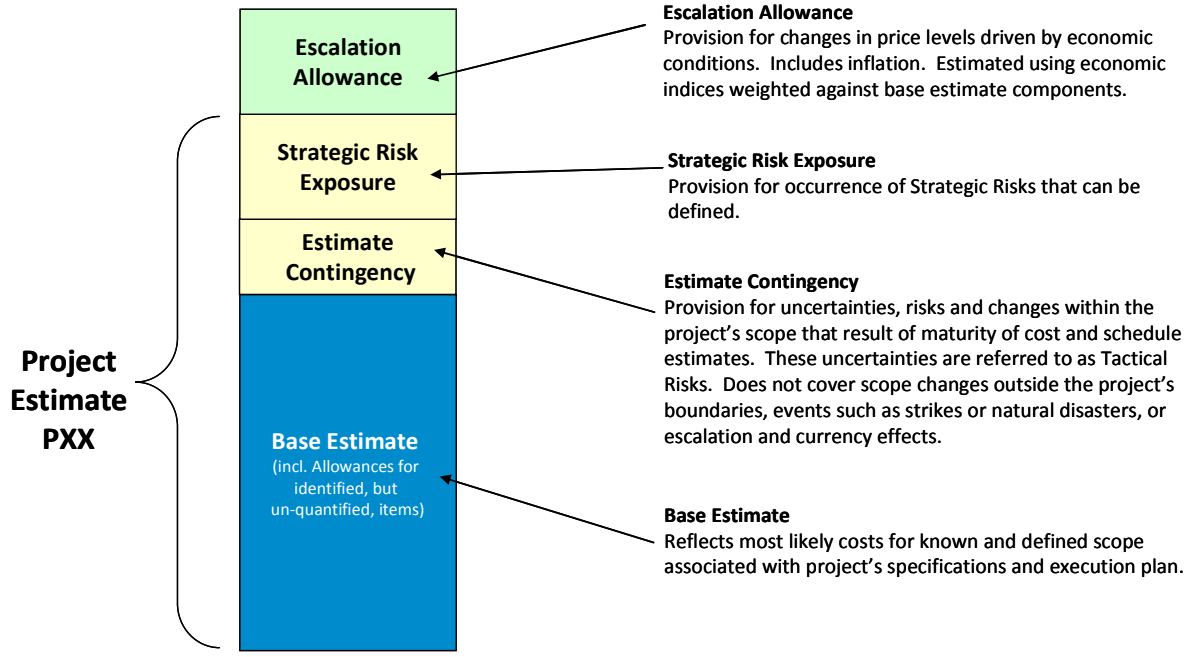
2.0 Scope

Nalcor has implemented a best-in-class risk management program for the Project, which is built upon the lessons learned from other mega-projects. As a key component of Nalcor's project governance structure, this risk management program has effectively allowed Nalcor to work with third party specialist advisors / consultants to identify and manage both tactical and strategic project risks. The fullest application of this program has afforded decision quality assurance through robust risk-based decision making tactics that will help assure the predictability of the outcome of the Project.

This risk analysis results contained within this document are intended to assist with strategic project planning activities as well as support the assessment risk exposure prior to finalizing input parameters into the economic model used for investment evaluation in order to confirm the project development sequencing / phasing at the end of Gateway Phase 2. This *Gate 2 Project Risk Analysis* includes the results of risk analysis for all key components of the Project, including Gull Island, Muskrat Falls, Island Link and Maritime Link.

Figure 1 below illustrates the components of the project cost estimate, including the role of Estimate Contingency and Strategic Risk Exposure, determined through this Project Risk Analysis, in the overall estimate.

Figure 1: Project Cost Estimate Components



3.0 Definitions

Allowance Costs added to the base estimate, based on experience, to cover foreseen but not fully defined elements.

Base Estimate Reflects most likely costs for known and defined scope associated with project's specifications and execution plan.

Decision Gates A Decision Gate is a predefined moment in time where the Gatekeeper has to make appropriate decisions whether to move to the next stage, make a temporary hold or to terminate the project. The option to recycle to the current stage is considered an undesirable option unless caused by changes in business conditions.

Escalation Provision for changes in price levels driven by economic conditions. Includes inflation.

Estimate Contingency Provision made for variations to the basis of an estimate of time or cost that are likely to occur, that cannot be specifically identified at the time the estimate is prepared but, experience shows, will likely occur.

Note: Estimate Contingency does not cover scope changes outside the Project's parameters, events such as strikes or natural disasters, escalation or foreign currency impact, or changes that alter the basis upon which the control point for management of change as been established as captured in key project documents (e.g. basis of design, project execution plan).

Management Reserve Approved capital budget held in reserve and controlled by Gatekeeper, which is used to provide a higher confidence cost level (i.e. comfort factor).

It is often used by Gatekeeper as a mechanism to support scope additions in a project raised as part of the change management process which would not be covered by Estimate Contingency (e.g. changing the transmission line operating voltage to capture monetary value associated with transmission losses). The Management Reserve is also used to handle the impact of strategic risk.

Unlike Estimate Contingency, Management Reserve is not expected to be spent unless the Gatekeeper so directs.

Risk An uncertain event or condition that, if it occurs, has a positive or negative effect on a project's objectives.

Risk Frame	Form used to document Key Risk details, unmitigated risk exposure, risk response / resolution strategy, and status.
Shareholder	For Nalcor Energy, the Shareholder is the Province of Newfoundland and Labrador.
Key Risks	A risk selected to be overseen by the Risk Resolution Team or LCP Executive Committee due to the risk's complex nature and high profile.
Strategic Risk	Identified background risks that are outside of the controllable scope of the project team, typically pertaining to external issues such as enterprise-level issues, governance, financial markets, stakeholders, hyperinflation, and regulatory approvals. Managing these risks requires significant effort and influence by the Gatekeeper with external stakeholders. Strategic risk is also referred to as the risk of failure of the general execution plan.
Strategic Risk Exposure	Probabilistic impact of Strategic Risks that is quantified. Covered by Management Reserve.
Tactical Risk	Refers to risks associated with the base capital cost estimate as a result of uncertainties with the four components of the estimate: (1) project definition and scope omission, (2) construction methodology and schedule, (3) performance factors, and (4) price. It excludes price escalation.

4.0 Abbreviations and Acronyms

AACEI	Association for Advancement of Cost Engineering International
AFE	Authorization for Expenditure
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPC	Engineer, Procure & Construct
EPCM	Engineering, Procurement, and Construction Management
FEL	Front End Loading
HSE	Health, Safety and Environment
IBA	Impacts and Benefits Agreement
LCC	Line Commutated Converter
NE-LCP	Nalcor Energy Lower Churchill Project
NE-LCPMT	Nalcor Energy Lower Churchill Project Management Team
PRIMS™	Project Indicative Modeling System
SOBI	Strait of Belle Isle
VSC	Voltage Source Converter
WBS	Work Breakdown Structure
WCG	Westney Consulting Group

5.0 Reference Documents and/or Associated Forms

LCP-PT-MD-0000-PM-PR-0001-01	Gateway Process
LCP-PT-MD-0000-RI-PL-0001-01	Project Risk Management Plan
MSD-RI-003	Project Execution Risk and Uncertainty Management Guidelines
MSD-RI-004	Risk Management Philosophy
GEN-RI-001	Gate 2A Risk Management Plan
GEN-RI-002	Project Risk Analysis Update – Fall 2009

6.0 Risk Management for the Project

Risk management is a critical governance structure for Nalcor Energy. Specific project-level risk management processes, tools and resources have been implemented for the Project underneath the umbrella of Nalcor's corporate Enterprise Risk Management program.

Consistent with the "Project Influence Curve" shown in Figure 2, Nalcor has made extensive efforts in the early planning phases to identify, evaluate and implement opportunities to capture and maximize value that can be extracted from the Project. Nalcor believes that early risk (both opportunity and threats) planning is the key driving factor in increasing the predictability of the underlying business case for the Project, and has taken extensive steps to ensure the application of best practice for risk planning as illustrated by the basis Plan-Do-Check-Act process cycle illustrated in Figure 3.

Figure 2: Project Influence Curve (Westney, 2008)

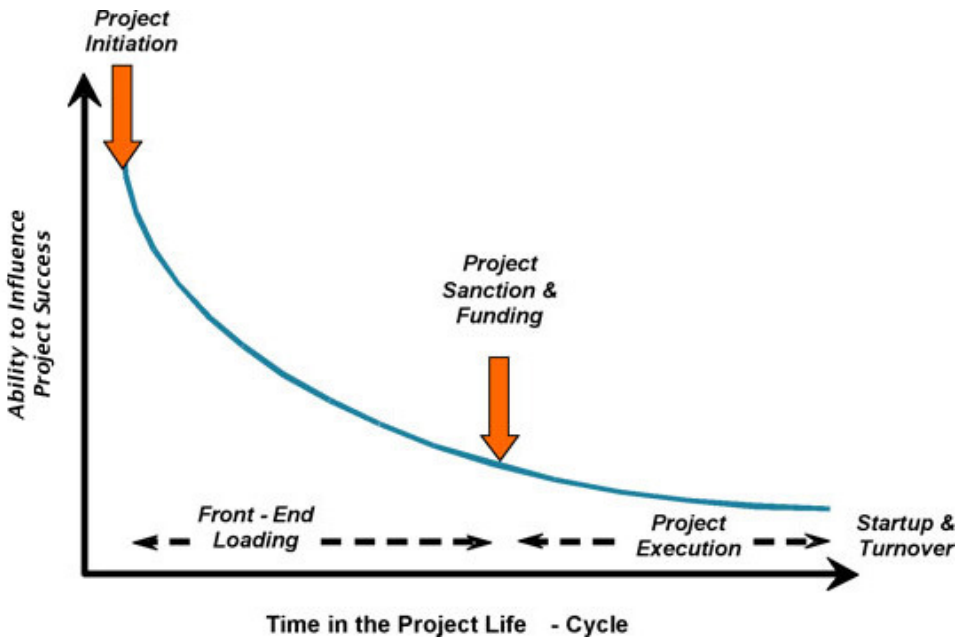
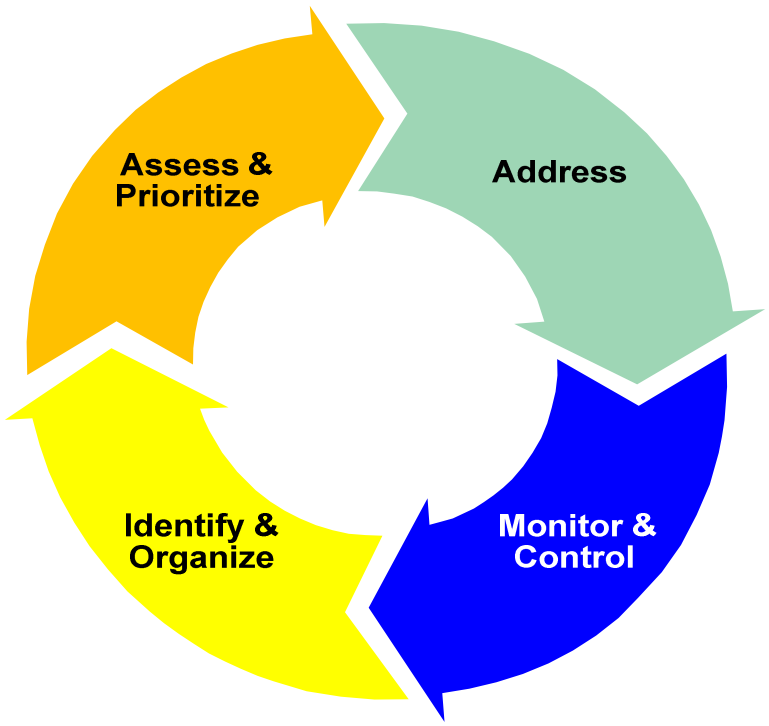


Figure 3: Illustration of Risk Management Process Cycle



To this effect, in 2007 Nalcor engaged Westney Consulting Group to assist with the full implementation of a holistic risk management program with the Project. Westney are well known within the capital project industry for their leading-edge ideologies and approaches to addressing risks as a means to improve the predictability of the investment decision.

As illustrated in Figure 4 Nalcor has adopted Westney's Risk Resolution® methodology to augment the process contained within MSD-RI-003 Project Execution Risk and Uncertainty Management Guidelines. Together they form the backbone of its risk management process for the Project.

Westney's Risk Resolution® methodology represents a departure from the conventional approach to project risk management whereby risk analysis is focused on tactical risks. According to Westney, conventional project risk management fails to consider larger "strategic" risks that have had a predominant influence on mega-projects in recent years. As illustrated in Figure 5, these strategic risks have large levels of volatility and exposure. Attachment B.1 contains a Memo from Richard Westney explaining the application of this methodology to the Lower Churchill Project.

Figure 4: Nalcor's Application of Westney's Risk Resolution Methodology

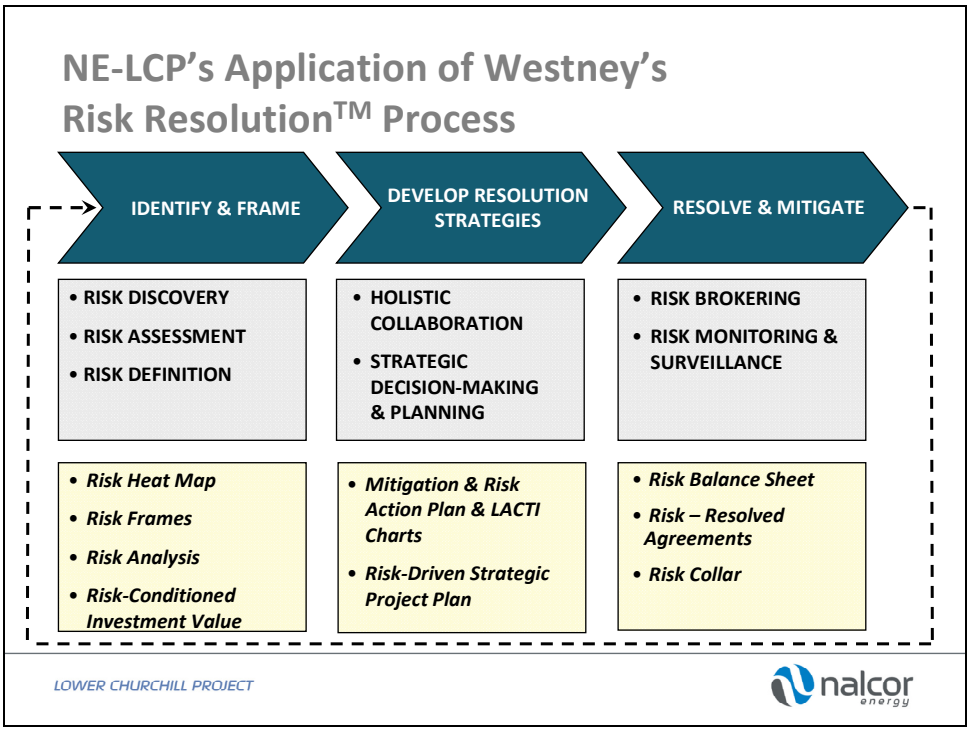
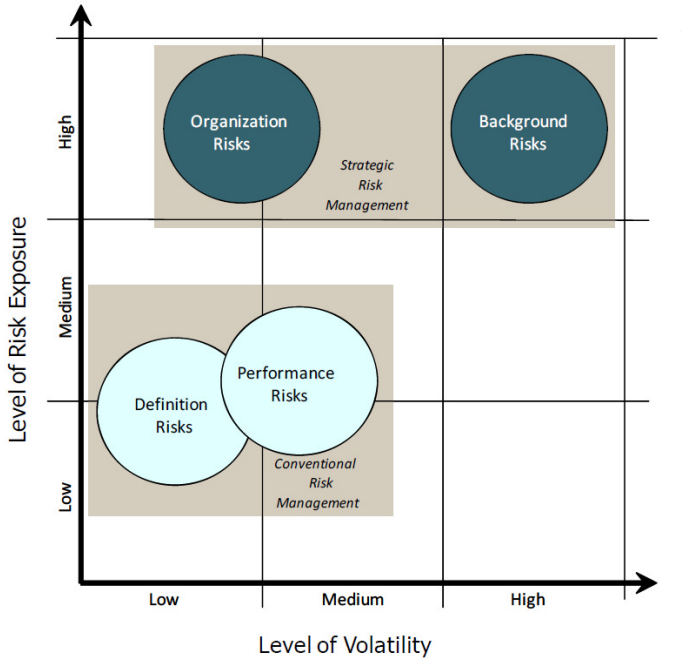


Figure 5: Relationships Between Risk Exposure and Volatility (Westney, 2009)



Tactical risks and strategic risks are differentiated below:

Tactical Risks

- *Definition Risks* – These risks are associated with the degree of design development and planning definition for the given project scope reflected in key project controlled documents (e.g. basis of design, basis of estimate, project execution plan), including such items as quantities, location-driven factors, etc.
- *Performance Risks* – These risks are associated with normal/reasonably expected variations in owner and contractor performance, including such items as construction productivity risk, weather delays, material pricing, etc.

Strategic Risks

- *Background (external) Risks* – These are typically associated with changes in: scope, market conditions, location factors, commercial or partner requirements and behaviours.
- *Organization (internal) Risks* – These risks are typically associated with an asymmetry between size, complexity, and difficulty of projects and the organization's ability to deliver.

Nalcor's strategic risk management activities for the Project are built upon a framework that includes five (5) categories:

- ***Commercial*:** Including risks to how the capital project will produce revenue via power purchase agreements with suppliers, off-takers, transmission access and tariffs, reservoir production rates, etc.

- ***Financial*:** Including risks to how the project's capital investment will be paid for via arrangements with partners, lenders, etc.

- ***Regulatory & Stakeholder*:** Includes risks regarding regulatory approvals, aboriginal negotiations and agreements, stakeholder engagement, etc.

- ***Technical*:** Including risks of the technology to be used to create the facilities required to produce the expected revenue, and the physical scope of those facilities.

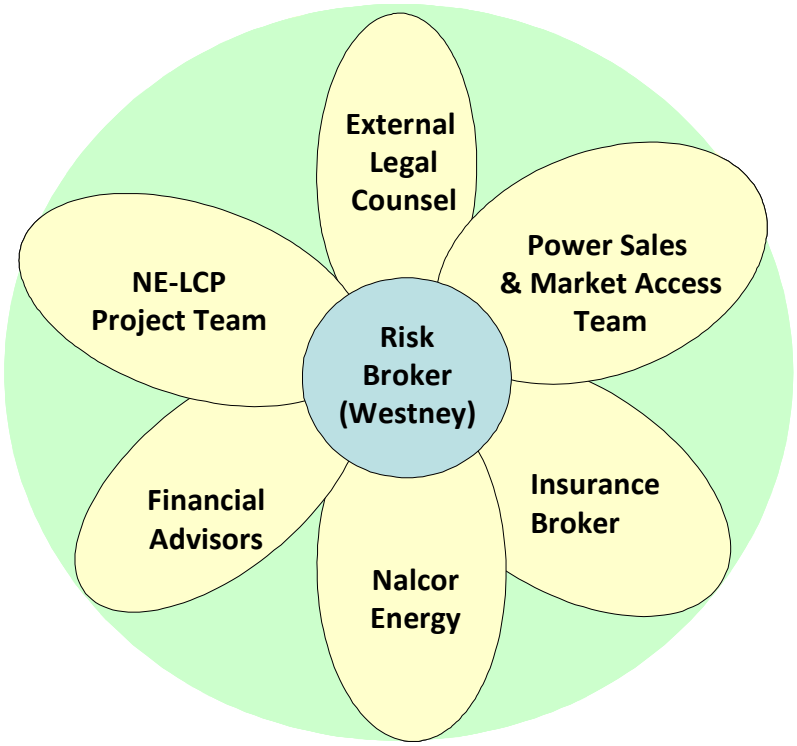
- ***Execution*:** Including risks to the organization and contracting strategies for performing the engineering, procurement, construction, installation and start-up; and the plans for managing those activities.

6.1 Risk Management Philosophy

The underlying risk management philosophy adopted by Nalcor, reference MSD-RI-004 Risk Management Philosophy, has been to package and allocate Project risks to the party who can

most effectively manage the risks. The ability of Nalcor to allocate these risks will be very much dependent on the risk appetite of the various stakeholders (e.g. contractors, off-takers, insurance underwriters, etc.). A Risk Resolution Team was formed in 2007 to determine the optimal resolution strategy for the identified risks. Since then, this multi-faceted and disciplinary team, illustrated in Figure 6, has successfully developed and implemented mitigation strategies and plans for a number of risks to the Project.

Figure 6: Nalcor's Risk Resolution Team for the Project (up to Decision Gate 2)



Nalcor has extensively used risk-informed decision-making techniques to facilitate decision making quality assurance for all aspects of the business case evaluation and project planning. While Nalcor considers it to be impractical to think that it can identify and manage all risks to which the Project may be exposed, the risk-informed decision-making approach facilitates decision analysis that is inclusive of all risk and uncertainty considerations.

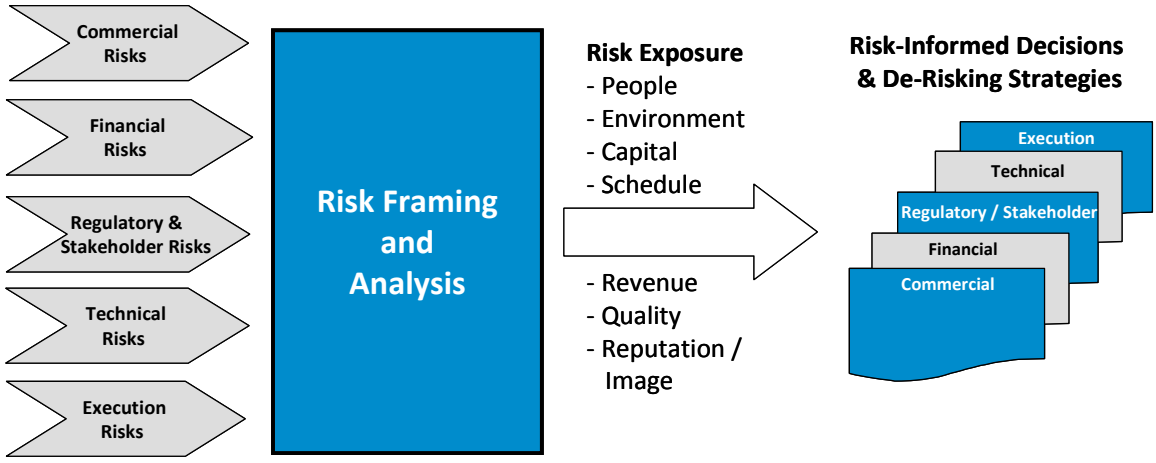
6.2 Risk-Informed Decision Making within the Gateway Process

Quality assurance for decision making, as a mechanism to improve project predictability, has been incorporated within the planning and execution of the Project by implementing Nalcor's structured stage-gate process – the Gateway Process, reference LCP-PT-MD-0000-PM-PR-0001-01 Gateway Process. The Gateway Process divides the lifecycle of the Project into several phases starting at opportunity identification and concluding at start-up of the production

facility. Each Phase has a list of pre-defined deliverables deemed essential to make a risk-informed decision at the end of that Phase, referred to as a Gate.
A due diligence review is required prior to the decision at each Gate. The due diligence review provides an independent review of the status, progress, plans, issues and risks on each the five (5) strategic risk category, then integrates these into the overall assessment of project risk exposure. These results drive risk-informed decisions and plans on each Project Plane.

As illustrated in Figure 7, Nalcor has leveraged the Risk Resolution® methodology as a key component of its process to facilitate risk-informed decision making within the Phases and each Gate of the Gateway Process. This includes the identification, framing and analysis of key project risks in order to make an assessment of risk exposure of key criteria used during investment evaluation of development option screening and selection.

Figure 7: Risk-informed Decision Making Approach



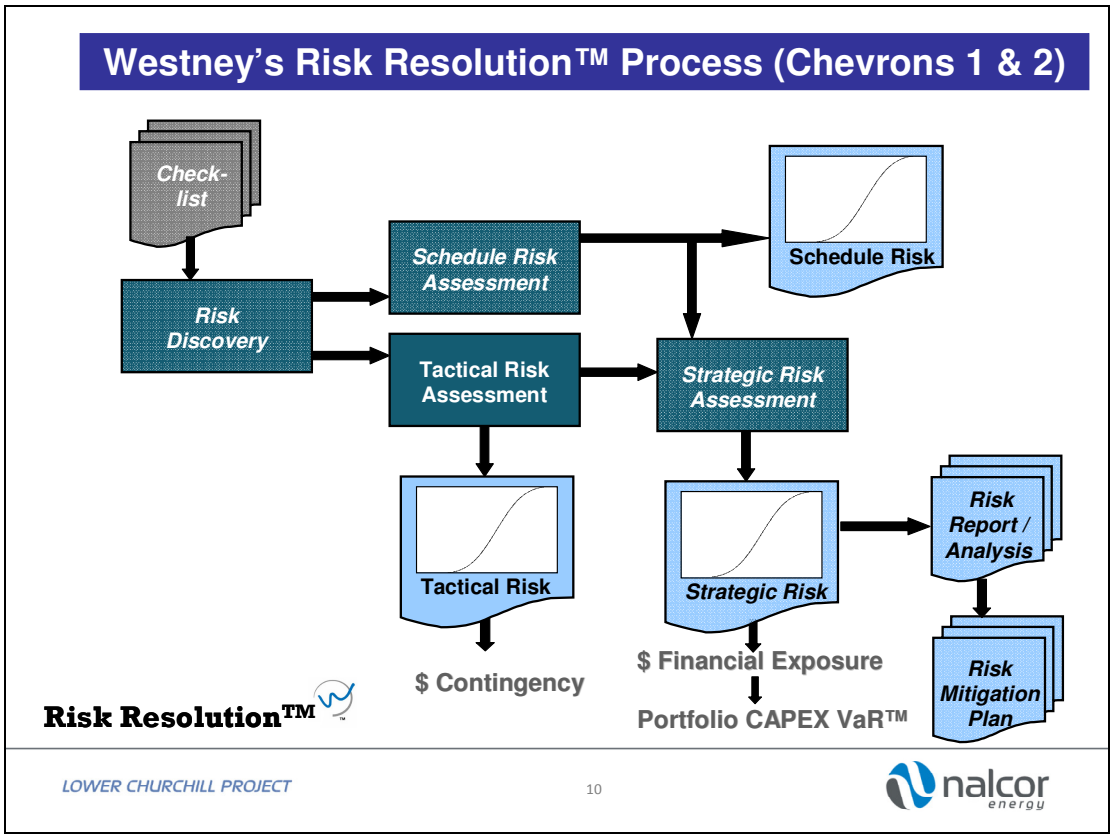
7.0 Risk Analysis Methodology

Application of the Risk Resolution® methodology began when the Project was in its earliest, formative stage and before major business decisions or commercial commitments were made. Consistent with Figures 3 and 8, the implementation of this methodology started with the identification and framing of all business and project risks, both tactical and strategic, with Risk Frames being documented for all identified Key Risks, whether tactical or strategic.

This risk identification and framing process occurred through the use of interviews, surveys and analyses, from which the major sources of risk and possible mitigation strategies were identified. Risk scenarios were then created to represent the best and worst-case outcomes for each type of risk, and then used as input to purpose-built, Monte-Carlo simulation models for cost and schedule that provide a range of possible values for Risk Exposure as input into risk-informed decision making. For Strategic Risk, Westney's proprietary modeling techniques (PRIMS™) was used to conduct a probabilistic analysis of the total financial exposure due to

Strategic Risks. Attachment B.2 contains the current Key Risk Frames for the Project (as of Decision Gate 2).

Figure 8: Westney's Risk Resolution Process (Westney, 2008)



It is important to note that these Key Risk Frames serve to frame risks for the entire lower Churchill River development, including Muskrat Falls, Gull Island, the Labrador – Island Transmission Link, and the Maritime Link. Both the likelihood of occurrence and potential resulting exposure for these strategic risks varies depending upon the development scenario under consideration.

For instance, consider Key Risk R3 – Financial Market Changes was at the time of the June 2010 analysis considered to be non-applicable for a Muskrat Falls + Labrador – Island Transmission Link development scenario given the strategy for funding the development was based upon the shareholder providing all funding, rather than Nalcor pursuing non-recourse financing. Under this arrangement the Province would finance Muskrat Falls entirely from equity, while debt on the Province's balance sheet would finance the Labrador – Island Transmission Link. As a result this risk has not been considered in the calculation of strategic risk exposure for this development scenario.

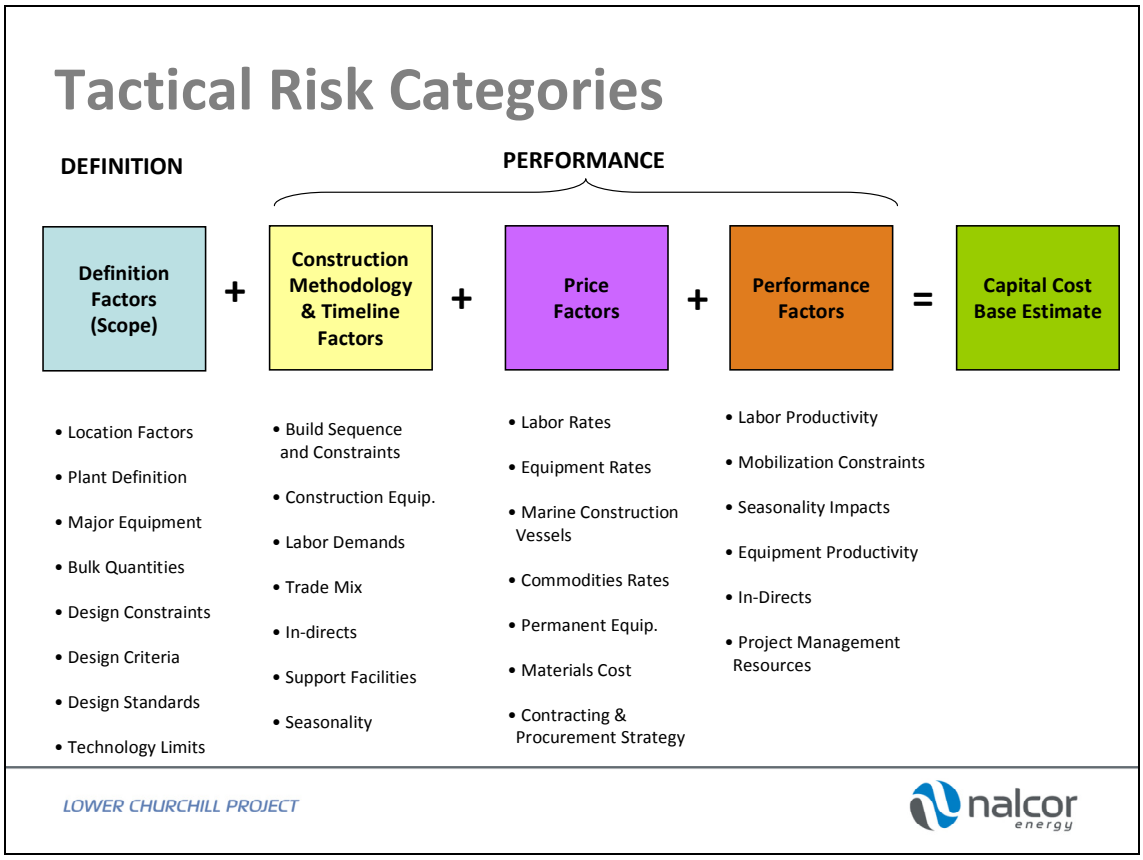
To support the evaluation of schedule risk, a detailed Time-Model for each of the Gull Island and Muskrat Falls scenarios was developed collaboratively by NE-LCP with Westney using the

key dates contained within the associated Target Milestone Schedule and logic contained with the engineering and construction schedules for the various project components. Ranges of key activities for this Time-Model were made by NE-LCP representatives using the Key Risk Frames and knowledge of identified Tactical Risks for the Project.

Similarly to support the determination of Estimate Contingency, a detailed cost model was prepared of the cost estimate. High / low ranges for each line item of the cost model were then assessed based upon identified tactical risks for each of the four key components of the cost estimate: (1) project definition / scope, (2) construction methodology and schedule, (3) performance factors, and (4) price. These are further elaborated upon in Figure 9.

This risk analysis technique provides the means of assessing risk exposure prior to finalizing input parameters into the economic model used for investment evaluation purposes.

Figure 9: Determination of Capital Cost Uncertainty/Tactical Risk Exposure



8.0 Muskrat Falls and Labrador – Island Transmission Link Assessment

In June / July, 2010 Westney were engaged to support the Project Team in completing a review of tactical, strategic and schedule risk analysis. This risk analysis built upon previous risk analysis for the Project, however considers the following:

- the smaller and technically less complex Muskrat Falls plant has replaced the Gull Island plant as Phase 1 of the Project;
- Phase 1 of the Project is no longer envisioned to require non-resource project financing; and
- the assumptions for handling power sales are now different, with the Maritime Link now viewed as a separate project phase.

The Project's first phase option of a smaller size and less complex structure has a significant impact on the results of the risk analyses, with many of the Gull Island strategic risks no longer being applicable or having a smaller exposure for Muskrat Falls. However, it should be noted that because the capital cost and schedule of Muskrat Falls is not as mature as that for Gull Island, the probability distributions chosen for the Muskrat Falls risk analyses reflect the higher levels of uncertainty. The net result is a wider range of outcomes for the tactical risk for Muskrat Falls.

The summary of the results of this review are presented in the following sub-sections, while the detailed report from Westney is contained in Attachment B.3.

8.1 Basis of Assessment

The basis of the assessment was the latest available cost and schedule estimates available at the time of completion of the risk assessment. They were:

Project Components (reference Capital Cost Case 8)

- Muskrat Falls 824 MW Plant
- 600 MW 250kV HVdc Island Link (50-year return period)
- **No Maritime Link**

Base Cost Estimate (2010 CDN $ excluding contingency, escalation and IDC)

• Muskrat Falls Plant	$2,215 million
• Labrador – Island Transmission Link	$1,144 million

Target Project Schedule

• Ready to Start Site Work at Muskrat Falls	19-Jun-2011
• First Power	22-Sep-2016
• Island Link Ready for Power Delivery	7-Feb-2017
• Full Commercial Power	16-May-2017

It must be noted that subsequent to the completion of this risk assessment, the planning basis changed. Changes included:

- Increase in Island Link capacity from 600 to 900 MW
- Increase in the Island Link system voltage from 250 to 320 kV
- Revert back to use of traditional LCC HVdc technology rather than the state-of-the-art VSC technology.

Similarly, subsequent to the completion of this risk assessment the cost and schedule basis for the Muskrat Falls and Island Link projects has matured, in particular our understanding of the key areas of estimate uncertainty. The 2010 field work program at Muskrat Falls as well as the completion of a detailed review of the Owner's team and EPCM consultant's resources under the current EPCM execution model has provided increased confidence in the above planning basis.

8.2 Tactical Risk Assessment

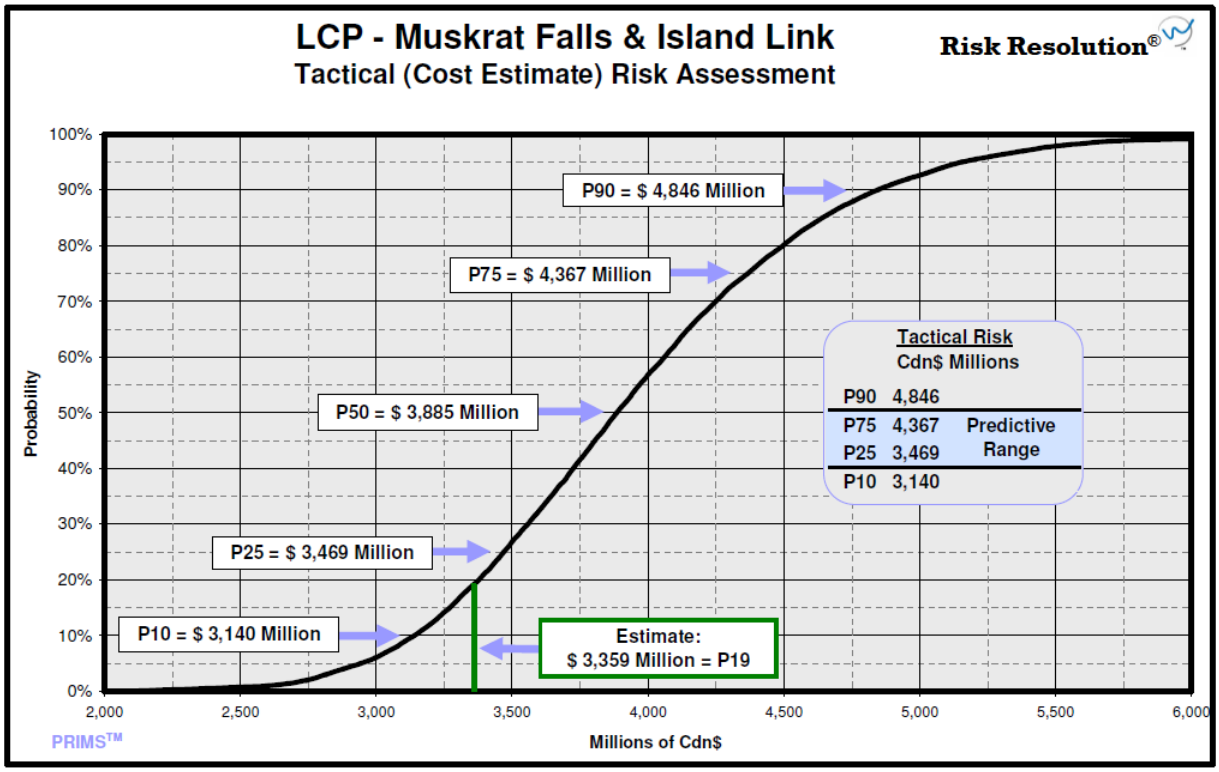
The Tactical Risk Assessment considers the impact of definition and performance risks (i.e. combination of construction methodology and schedule, performance factors, and price risks) on the project cost estimate. Nalcor provided estimates for both the Muskrat Falls and the 600 MW HVdc VSC Island Link (not including any contingency amounts) using its Capital Cost Case 8 assumptions. Each cost estimate was broken down by major category.

NE-LCP met with Westney consultants to discuss the Best and Worst Case ranges around the estimate for each cost category. The final ranging was performed by NE-LCP, but it was vetted and questioned by the Westney participants. Westney selected the probability distributions to use with the ranged data and ran the Monte Carlo simulation.

As indicated above, given that the capital cost and schedule of Muskrat Falls and the current 320 kV HVdc Island Link in June 2010 is not as mature as that for Gull Island and the 450 kV HVdc Island Link, the probability distributions chosen for this current risk analyses reflect this higher levels of uncertainty. The net result is a wider range of outcomes for the tactical risk.

The analysis, illustrated in Figure 10, concluded that approximately $526 million or 16% of base capital was an appropriate P50 Estimate Contingency for Muskrat Falls and the Labrador – Island Transmission Link Projects. This projection reflects the uncertainty with respect to key quantities for major excavations and structures at the Muskrat Falls site. At the time of undertaking the assessment, a number of engineering field investigations and desk top studies identified were underway that were anticipated to help facilitate an improved understanding of these uncertainties, which in turn could reduce the requirement for Estimate Contingency.

Figure 10: Estimate Contingency Analysis



8.3 Schedule Risk Assessment

A very robust Time-Risk model was built for the Muskrat Falls Plant and the Labrador – Island Transmission Link projects using Microsoft Project (see Attachment B.3). The model logic incorporates the dates, durations, and key dependencies (including weather modeling) that are contained in the current project master schedule.

Westney consultants met with Nalcor representatives to discuss possible outcomes for each modeled activity. The final ranging input was performed by the Nalcor team, but it was vetted and questioned by the Westney participants. The modeling simulation was performed by Westney using the @Risk Monte Carlo technique with 10,000 iterations.

The unmitigated modeled results had a predictive range for Full Commercial Power approximately 9 to 16 months after the currently scheduled date of 16-May-2017. These results are driven by modeled delays in several key activities, particularly Powerhouse Excavation and Powerhouse Concreting (Primary and Secondary). The critical path in the simulation included Muskrat Falls construction activities almost 80% of the time.

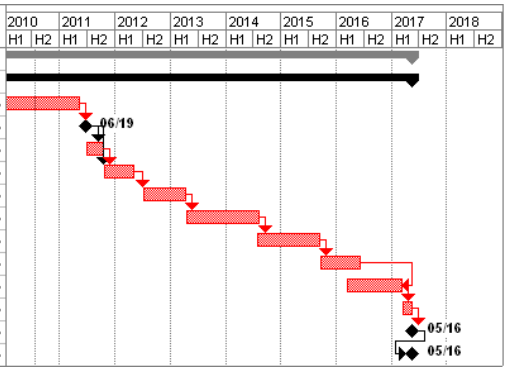
From the analysis the following key schedule drivers were confirmed:

- Gate 2 Approval
- Mobilization of EPCM Contractor
- Completion of Gate 3 Key Deliverables for Sanction
- Access Road and Phase 1 Camp Construction
- Award of the T/G Contract and Delivery of embedment parts for Primary Concrete
- Powerhouse Contracting and Construction – i.e. large concrete scope.

The analysis also revealed the predominate critical path as shown in Figure 11.

Figure 11: Most Common Probabilistic Critical Path

ID	Name	Duration	Start	Finish	@RISK: Critical Index
0	**Nalcor Energy - Lower Churchill Project - June 2010**	**3820 d**	**12/01/06**	**05/16/17**	
12	**Muskrat Falls (824 MW) Plant**	**3820 d**	**12/01/06**	**05/16/17**	**78.81%**
16	Generation Project EA	1620 d	12/01/06	05/08/11	29.83%
18	Readiness to Commence Site Work	0 d	06/19/11	06/19/11	31.24%
19	Access Road & Early Site Roads Infrastructure	120 d	06/20/11	10/17/11	30.67%
20	Phase 1 Camp Construction	200 d	10/18/11	05/04/12	30.93%
29	Powerhouse Excavation (Incl Intake & Tailrace)	280 d	07/04/12	04/09/13	76.61%
31	Intake & Powerhouse Primary Concrete	488 d	04/10/13	08/10/14	76.61%
35	Powerhouse Secondary Concreting for Unit 1	420 d	07/22/14	09/14/15	76.61%
36	Completion of Secondary Concrete for Units 2 - 4	270 d	09/15/15	06/10/16	75.73%
46	T/G - Assembly/Installation Final Unit	365 d	03/08/16	03/07/17	76.35%
51	T/G - Commissioning Final Unit	70 d	03/08/17	05/16/17	78.80%
53	Full Power (Unit 4)	0 d	05/16/17	05/16/17	78.80%
54	**Full Commercial Power**	0 d	05/16/17	05/16/17	100.00%



The analysis has facilitated the identification of a number of de-risking tactics, reference Table 1.0, however a subsequent re-run of the Time- Risk Model with de-risk adjusted ranges was not undertaken. Several of these de-risking activities are currently under implementation, including the issue of a Request for Proposals for Turbine Model Testing. These activity, combined with a decision to issue a mass excavation contract for powerhouse, are considered significant de-risking activities for the schedule.

Table 1.0: Schedule De-Risking Priorities

Schedule Threat	Potential De-Risking Strategy
1. Delayed Readiness for Gate 2	• Lock-down Project Definition. • Expedite decision on SOBI crossing option. • Timely conclusion of field program and analysis to validate layout and quantities.
2. Late Mobilization of EPCM and impact on completion of design to support construction.	• Split out Turbine Model Testing scope. Will expedite civil design information to EPCM to complete its design on water passage, powerhouse and draft tube . • Issue a separate contract for mass excavation of powerhouse in lieu of completion of detailed civil drawings • Implement readiness to commence construction initiative – be ready to start site work in Spring 2011. • Prepare plans for tendering of Infrastructure and Reservoir Clearing activities by year-end.
3. Bow Wave Effect Moving Towards Gate 3	• Understand schedule priorities and work to pragmatically advance key activities.

This analysis did not include a probabilistic completion analysis for each activity in the Time-Risk Model. However a Tornado Diagram, reference Figure 12, has been constructed from the analysis to identify activities that are having the primary impact on the project critical path.

Figure 12: Time Risk Tornado Chart – Muskrat Falls + Island Link

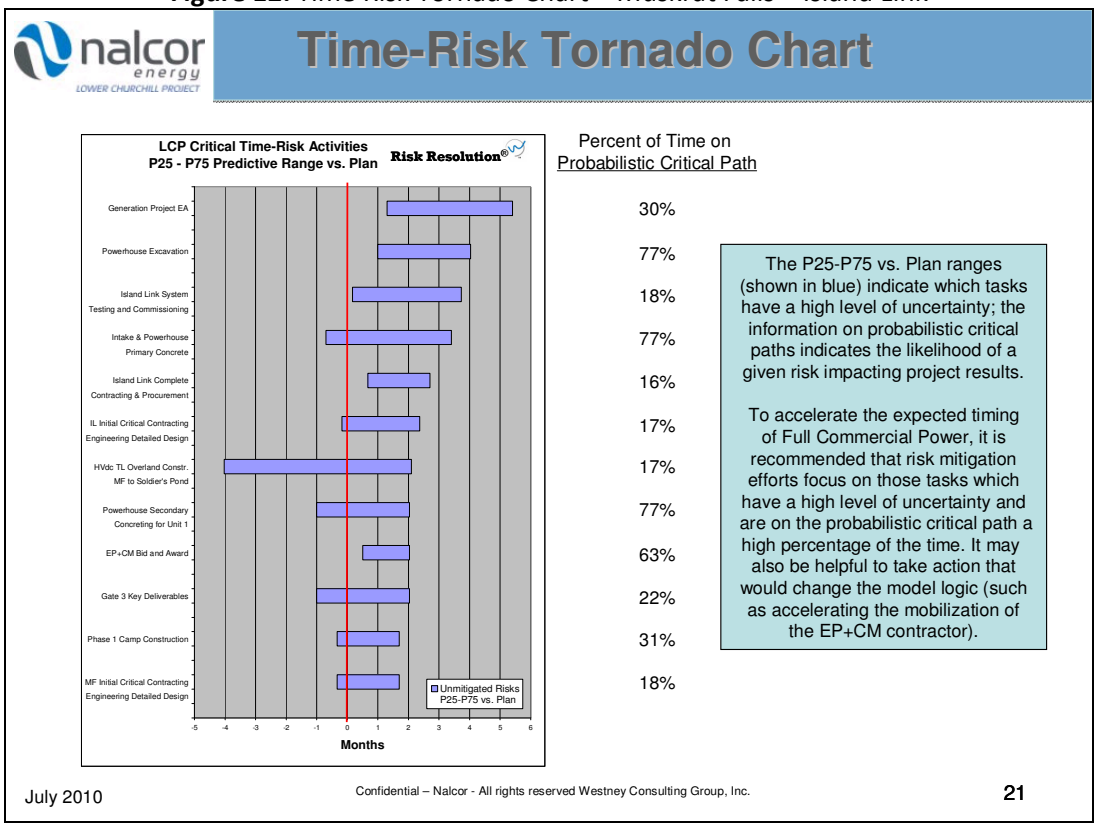
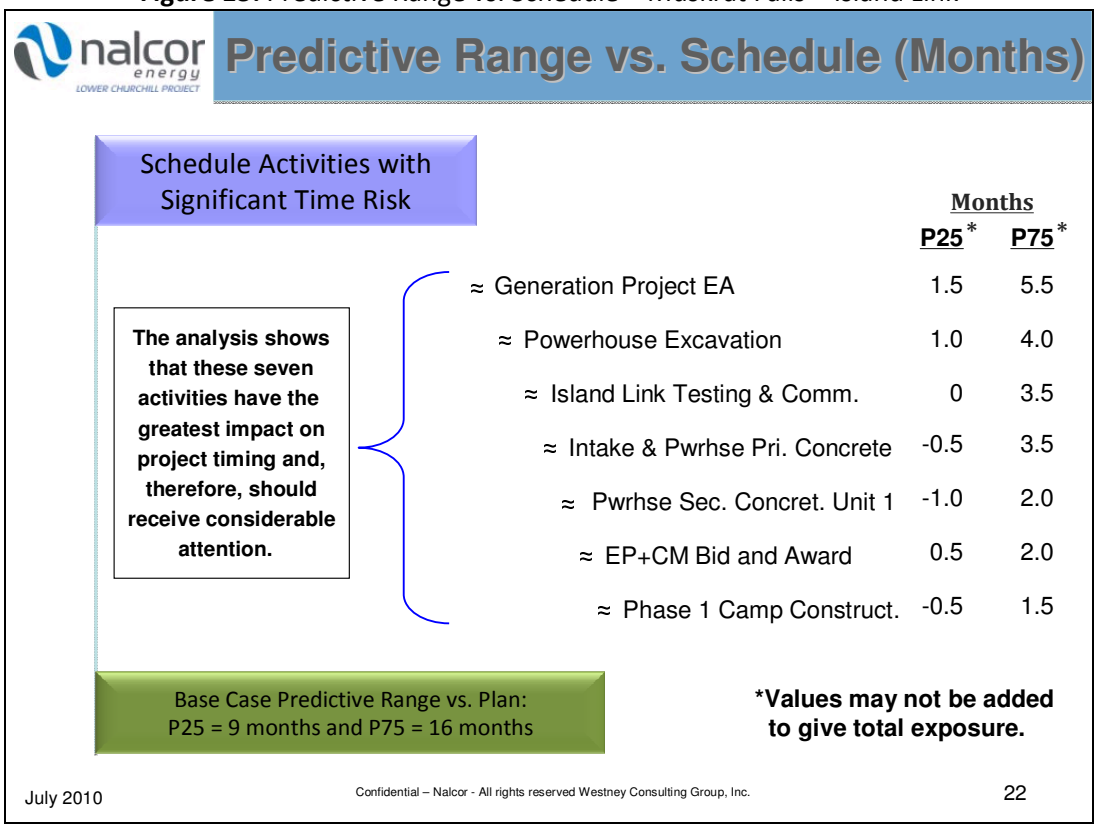


Figure 13: Predictive Range vs. Schedule – Muskrat Falls + Island Link



8.4 Strategic Risk Assessment

The assessment of Strategic Risk Exposure for the Project builds upon the detailed Strategic Risk Frames prepared in Fall 2009 (reference Attachment B.1). These Risk Frames were reviewed by the Risk Resolution Team during the June 2010 risk workshop, at which time adjustments were agreed to reflect the nature of the Muskrat Falls and smaller Island Link project configuration. These adjustments included the voiding of several risk frames as they were considered not applicable for this project development scheme. These relevant changes to the Strategic Risks are contained in the Heat Map of Attachment B.3, while the Strategic Risk Frames held in Attachment B.1 reflect the analysis of Gull Island + Island Link + Maritime Link of Fall 2009.

The assessment revealed that the predictive range for the Unmitigated Risk Exposure is $490 million to $852 million; the predictive range for the Mitigated Risk Exposure drops to $187 million to $413 million. Westney recommended that a P75 reserve be established to cover the Mitigated Risk Exposure level of $413 million. This Strategic Risk Exposure amount is in addition to the Estimate Contingency and equates to approximately 12% of the Base Estimate.

Figure 14: Strategic Risk Exposure Analysis

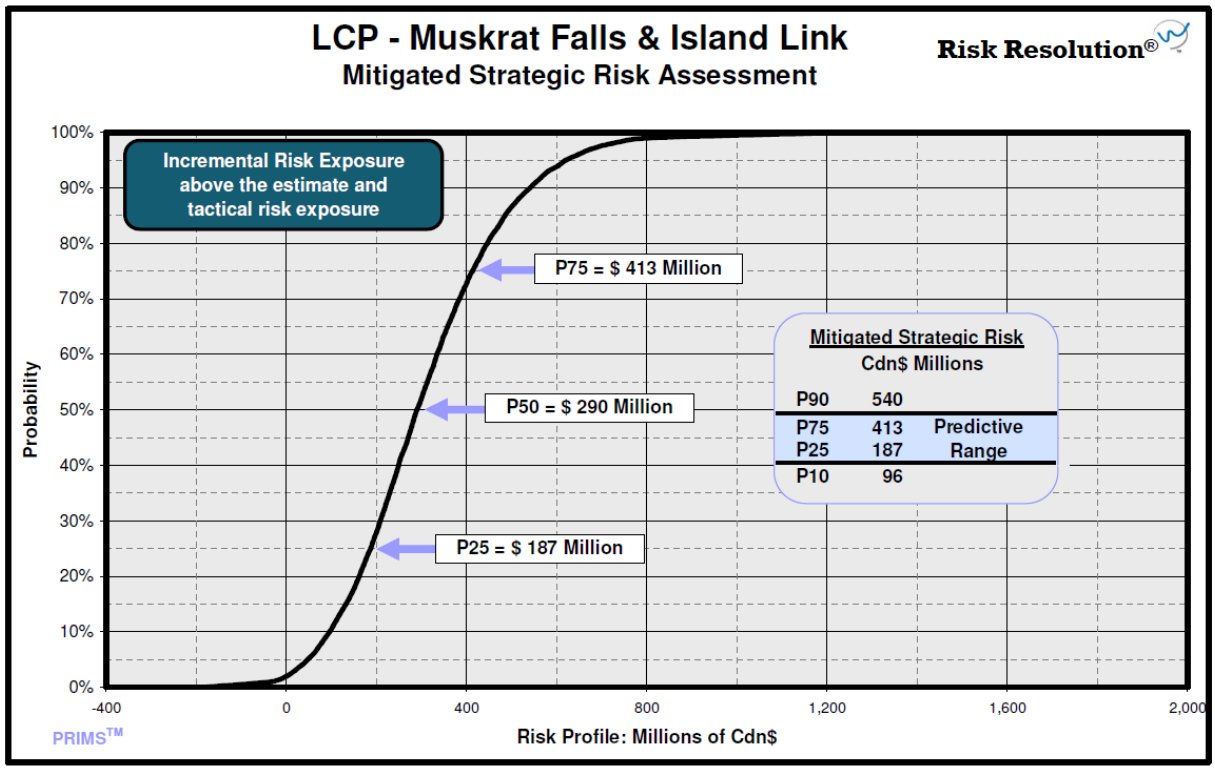


Figure 15 provides a Tornado Chart to illustrate the unmitigated and mitigated ranges for those Strategic Risks with the largest financial exposure, while Figure 16 provides a step chart to illustrate the cumulative exposure of these Strategic Risks.

Figure 15: Strategic Risk Tornado Chart – Muskrat Falls + Island Link

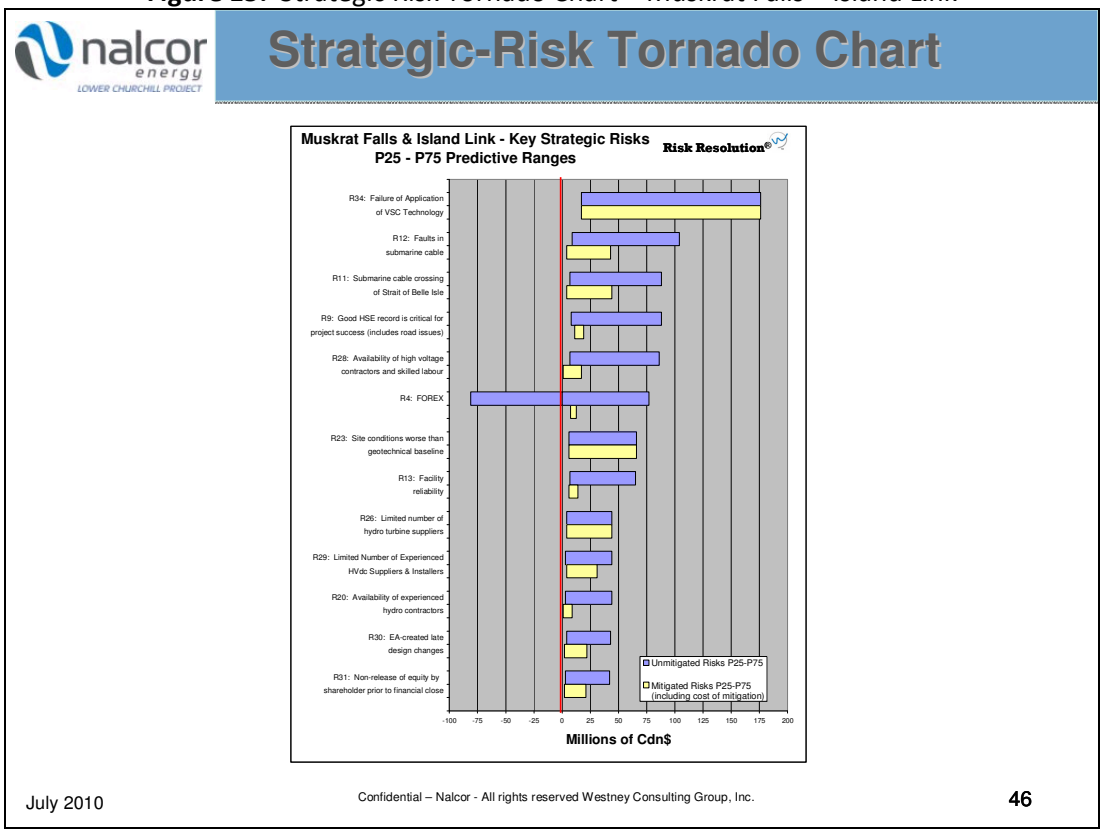
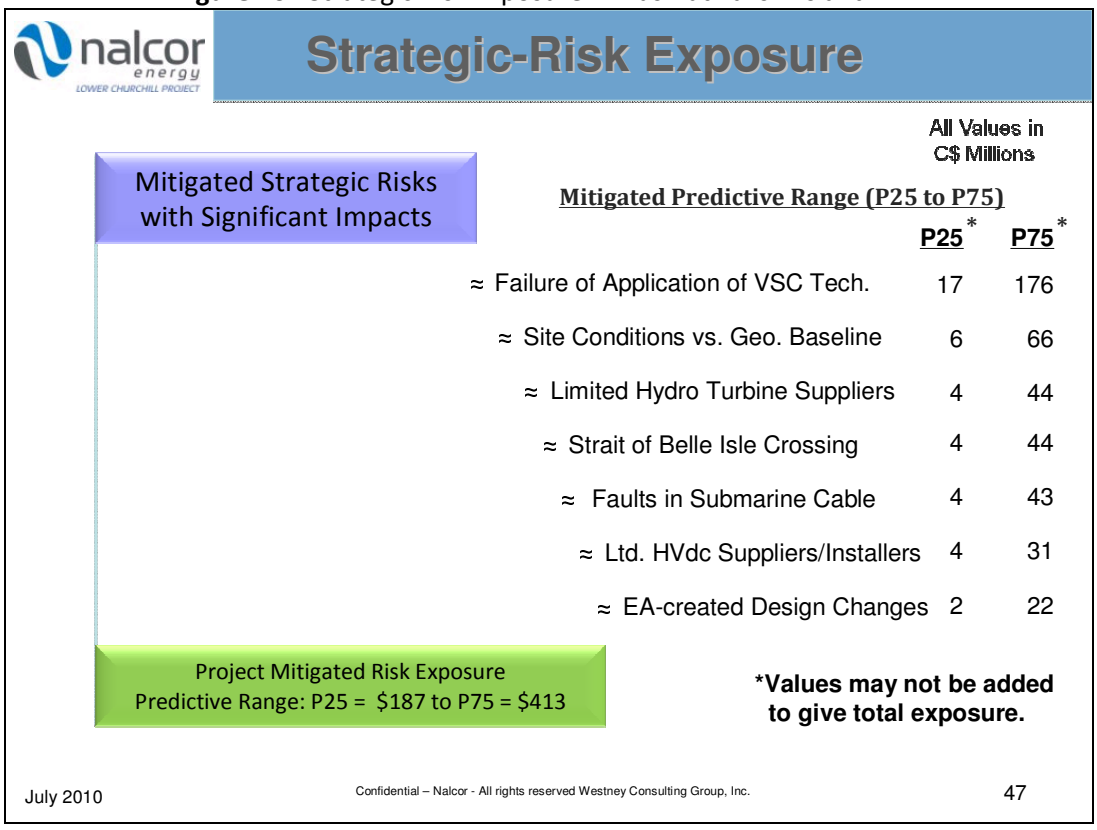


Figure 16: Strategic Risk Exposure – Muskrat Falls + Island Link



8.5 Nalcor Recommendations

Considering the above results in light of present understanding (i.e. September 2010) of the project and the status of schedule de-risking activities and reduced uncertainties surrounding the estimate and schedule, a recommendation for Estimate Contingency, Schedule Contingency and Strategic Risk Exposure was made for the purposes of Decision Gate 2 economic modelling.

It must be noted that subsequent to the completion of this risk assessment, the planning basis changed (Capital Cost 11OL). Changes included:

- Increase in Island Link capacity from 600 to 900 MW
- Increase in the Labrador – Island Transmission Link system voltage from 250 to 320 kV
- Revert back to use of traditional LCC HVdc technology rather than the state-of-the-art VSC technology.
- Development of a standalone Maritime Link from Bottom Brook, NL to Lingan, NS

Subsequent to the June 2010 Risk Assessment, Nalcor placed significant effort on developing and implementing a de-risking strategy for the delivery schedule. Mitigation activities have included preparing to issue a Bulk Excavation Contract Package to facilitate an early commencement of Powerhouse Excavation, and late 2010 award of 3 separate contracts for Turbine Model Testing in an effort to de-risk the overall turbine component delivery schedule, which is critical to maintain the planned Powerhouse concrete schedule.

Similarly, subsequent to the completion of the June 2010 Risk Assessment the cost and schedule basis for the Muskrat Falls and Labrador – Island Transmission Link projects has matured, in particular our understanding of the key areas of estimate uncertainty. Capital Cost 11OL used for Decision Gate 2 passage, include has a Base Estimate = $3,760 million for both projects combined, while the target full power is May 2017.

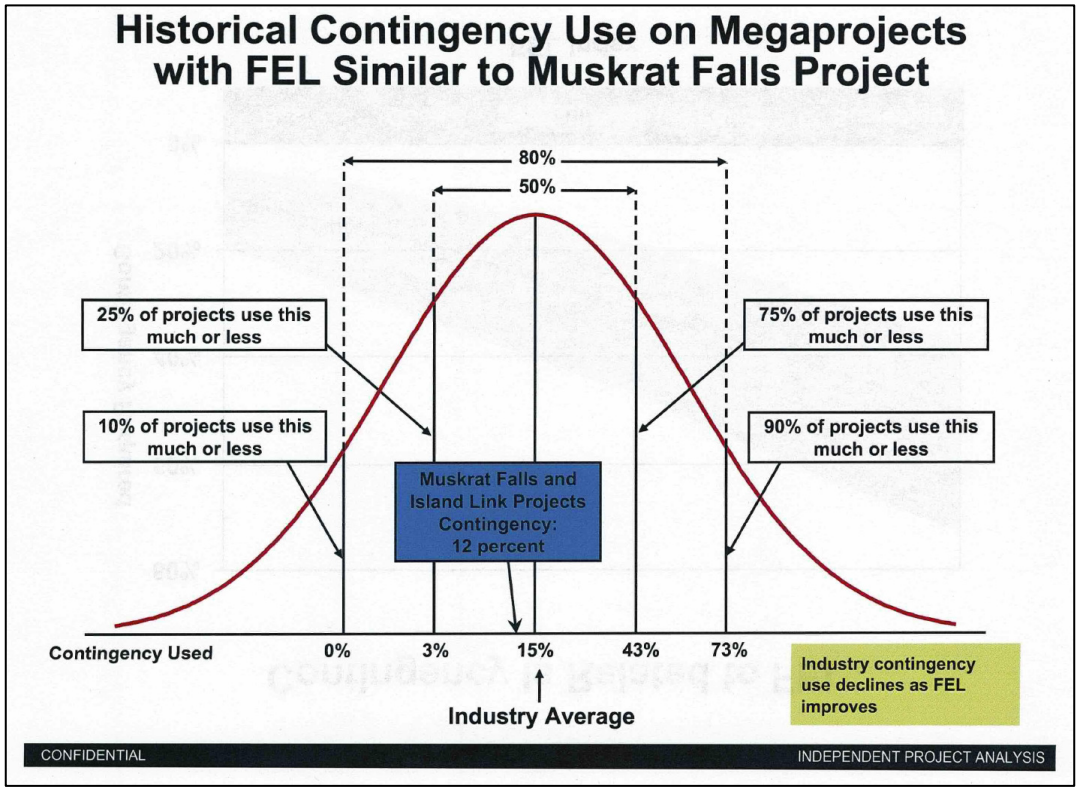
Key insights influencing the suggested Estimate Contingency are:

- Completion of the SOBI work plan and a recommendation to use Horizontal Direction Drilling (HDD) and rock dumping for cable protection.
- Confirmation that the submarine cables can withstand the pull-in loads sustained during pull-in through the HDD conduits.
- Completion of additional estimate reviews and benchmarking.
- Completion of a high-level planning workshop in late July which has facilitated confirmation of the deterministic critical path.
- Kick-off of several activities (e.g. turbine model testing, planning for a bulk excavation contract for the powerhouse) which have the ability to significantly de-risk the construction schedule (i.e. EA release to Full Power).
- More certainty on the timing for Gate 2 and EPCM RFP process.
- Positive preliminary results from the Muskrat Falls geotechnical program.

Based upon the understanding of the project's cost estimate and tactical risk exposure as of September 2010 and using the results of the contingency assessment completed by Independent Project Analysts Inc. during its Pacesetter Prospective Evaluation on the Project during the week of 30-Aug-2010 (see Figure 17), it was decided to prudently use 15% as a reasonable P50 proxy for Estimate Contingency for Capital Cost Case 11OL. (Note: Figure 17 indicates that 12% was being used, in fact 16% was being carried at the time of the IPA review).

Many of the tactical risks identified and quantified in the June 2010 analysis have since been incorporated in the Base Estimate which has increased from the then $3,359 million to the current $3,760 million, an increase of approximately $400 million.

Figure 17: IPA Contingency Evaluation



With respect to Strategic Risk Exposure, the June 2010 analysis indicated:

- P50 = 290 million (or 7.7% of current Base Estimate $3,760 million)
- P75 = 413 million (or 10.9% of current Base Estimate $3,760 million)
- **Exposure significantly driven by the use of VSC HVdc technology (see Figure 16)**

When considering the level of the financial reserve to address potential strategic risk exposure, Nalcor executive considered progress made on mitigating and/or eliminating the strategic risk exposures, which it considered as substantial. For the reasons set out below, the following two (2) were of particular importance:

R7 – Federal government support for generation and transmission investment

Negotiations with the federal government regarding support for the Project, either in the form of a loan guarantee or support through the P3 Canada Fund, were ongoing through 2010. A loan guarantee had the potential to reduce the present value of project financing costs by over $600 million, so considering this from a probabilistic view, the P50 value of the federal support could reasonably be in the order of -$300 million dollars. This risk was not quantified in the initial analysis by the Project team in June 2010.

R34 – Application of VSC technology on Island Link

While Voltage Source Converter (VSC) technology was identified as a potential technical solution for the Labrador-Island Transmission Link, modelling completed at DG 2 indicated that conventional Line Commutated Converter (LCC) technology offered equivalent performance. As a result, the technology risk (and up to $200 million exposure) was retired. Eliminating this risk could reasonably be valued at -$100 million on a P50 basis.

With the extent of the mitigation activities, reference Project's Key Risk Status Report, undertaken and in progress, and possible cost reductions in the order of -$400 million being available and a P50 strategic exposure of $290 million (in the range of $187 million (P25) to $413 million (P75)), Nalcor executive determined that it was not appropriate to create a positive or negative financial reserve provision at DG 2. These factors were also considered in establishing Estimate Contingency at 15%.

Nalcor executive recognizes that the strategic risks identified for the development of Muskrat Falls and Labrador-Island Transmission Link also transcend both other alternatives being explored to meet the Island's energy requirements, thus work continues to ensure a thorough and diligent approach to risk management and mitigation in the alternative business case. For example, Nalcor is closely following the oil price forecast which represents a considerable strategic risk in the Isolated Island scenario, and similarly is closely monitoring the potential for near term greenhouse gas costs as a result of emissions regulation.

Summary

In summary, following Nalcor executive recommendation, Decision Gate 2 economic modelling parameters utilized were a P50 proxy / representative as indicated below:

- Estimate Contingency 15%
- Strategic Risk Exposure Nil
- Full Power Date June 2017

It must be emphasized that these parameters were for Decision Gate 2 purposes only, and prior to Project Sanction must be thoroughly reviewed and reassessed for suitability considering the design maturity of the Project as well as Nalcor's risk appetite.

9.0 Gull Island + Labrador – Island Transmission Link + Maritime Link Assessment

In early fall 2009, a detailed schedule risk and strategic risk review was completed for the Gull Island Generation Facility with the 800 MW Island Link and 1000 MW Maritime Link transmission infrastructure. This following has been extracted from the report GEN-RI-002 Project Risk Analysis Update – Fall 2009.

Note: The dates and cost estimates discussed in the following are based upon the understanding of the Project in August / September 2009 and reflect a Gull Island prior to Muskrat Falls development scenario.

9.1 Basis of Assessment

Project Components (reference Capital Cost Cases 1 & 2)

- Gull Island 2,250 MW plant with 735 kV interconnect with Churchill Falls
- 1,800 MW 450 kV LCC HVdc Island Link with 5 mass impregnated submarine cables (150-year return period)
- 1,000 MW 450 kV LCC HVdc Maritime Link with 2 mass impregnated submarine cables

Base Cost Estimate (2008 CDN $ excluding contingency, escalation and IDC)

- Total Plant * $6.935 billion (as of January 1, 2008)

* Note: Extracted from Gate 2A Risk Management Plan

Target Project Schedule

- Ready to Start Early Works Construction 16-Jan-2011
- Full Commercial Power 30-Jun-2018

9.2 Tactical Risk Assessment

Estimate Contingency assessment due to Tactical Risk exposure was not updated in the Fall 2009 analysis, rather has been taken from GEN-RI-001 Gate 2a Risk Management Plan. This decision is considered to be conservative since the confidence in the overall quality of the estimate has improved significantly since the original analysis in spring 2008.

9.3 Schedule Risk Assessment

Unlike in the Gate 2A risk analysis documented in the Gate 2A Risk Management Plan GEN-RI-001, this latest schedule modeling incorporated weather calendars and seasonality constraints for several key activities. These activities were:

- Installation of the Temporary Construction Bridge at Gull Island
- River Closure
- Submarine Cable Installation

In addition the period for the activity of Reservoir Impoundment / Filling was adjusted to reflect the reality that the duration was dependant upon the time of year. Details of the assumptions on weather are contained within Attachment B.4, and are based upon NE-LCP Engineering Report GI1130.

Other points of note with respect to the analysis are as follows:

- The schedule assumes injection of significant equity prior to Financial Close thereby allowing construction to progress.
- Key milestones such as River Closure and start of Transmission construction are constrained by the "artificial" requirement to first achieve Financial Close.
- The Milestone Ready to Start Early Construction Works (at Gull Island) is predicated upon the completion of a number of predecessor activities, namely Generation EA Release + 60 days for permitting, IBA ratification, and completion of the necessary engineering and procurement activities required to start work. The Time-Risk Model indicates that this could occur as early as January 2011, but the subsequent activity "Early Infrastructure Works – Bridge and Access" has a start constrained by a May 1st beginning of a weather window.

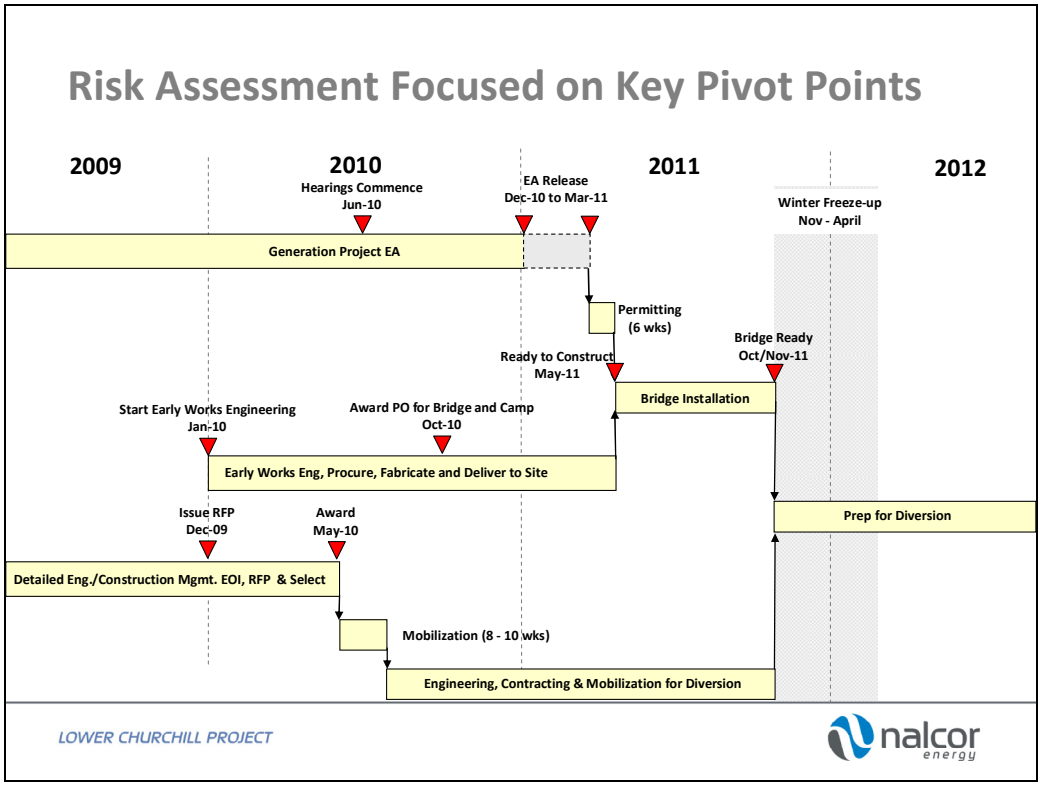
The modeled results had a predictive range for Full Commercial Power approximately 12 months (P25) to 20 months (P75) after the currently scheduled deterministic date of June 30, 2018.

The analysis also indicates:

- That there is slightly less than 50% chance of completing the installation of the temporary construction bridge across the river at Gull Island prior to the freeze-up of the river and shutdown of the ferry and barge system. **It must be noted that this analysis should be validated following the finalization of the Gull Island Early Works schedule planned for early 2010.**

- Even with significant mitigating action to maintain the Early Infrastructure Works program and the start of detailed engineering, closure of the river in 2013 will be extremely challenging.

Figure 18: Simplified Representation of Key Model Logic for Gull Island Construction



This analysis did not include a probabilistic completion analysis for each activity in the Time-Model. However a Tornado Diagram has been constructed from the analysis to identify activities that are having the primary impact on the project critical path. These results are driven by modeled delays in several key activities and the inability to complete work within tight weather windows, especially those in Gull Island Construction. The critical path in the simulation included Gull Island Construction activities over 90% of the time.

With the assumption that the start of Gull Island Early Works Construction will be funded by equity, the start is being driven by several concurrent work streams noted below. These work streams are:

- Issue of Purchase Orders for Early Infrastructure components (e.g. power transformers, bridge, Phase 1 camp, etc.)
- Release from Generation EA
- Mobilization of the Engineering Contractor
- Completion of Early Infrastructure Works in 2011
- Power Sales and Market Access work stream

Figure 19: Time-Risk Tornado Chart – Gull Island + Island Link + Maritime Link

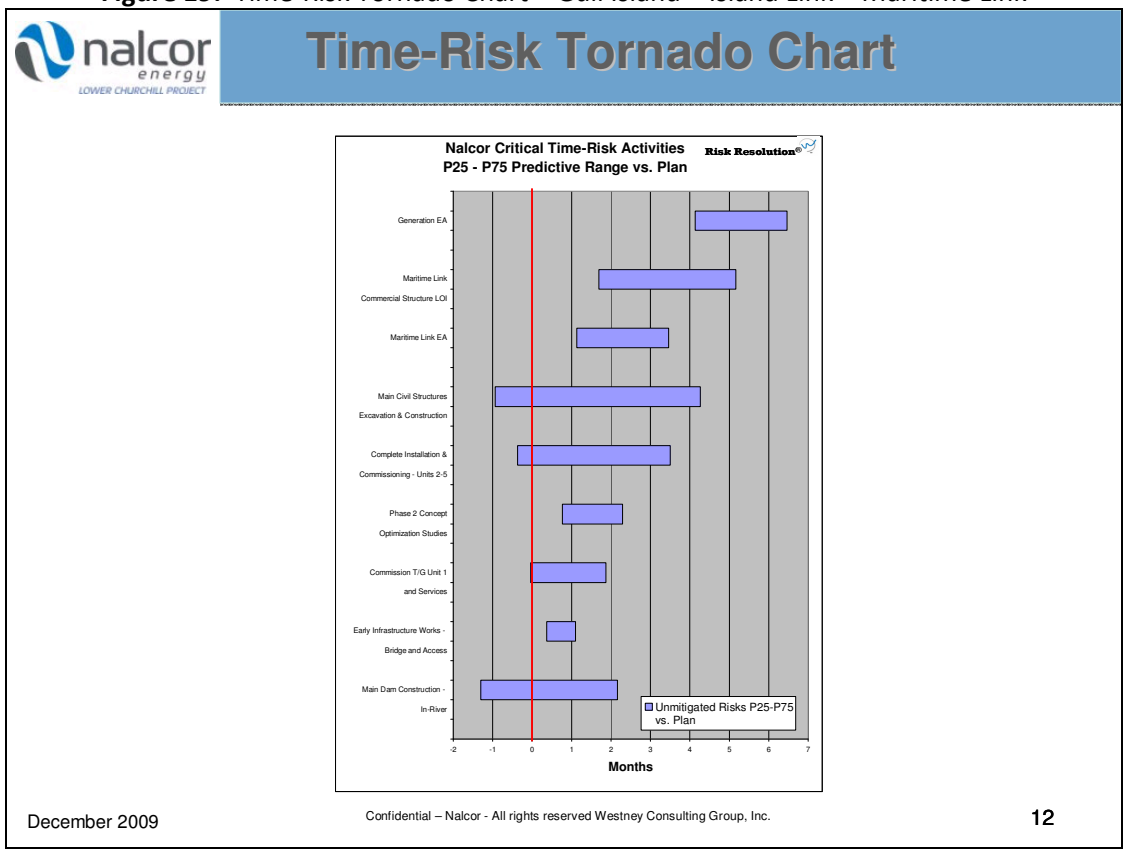


Figure 20: Predictive Range vs. Schedule (Months) – Gull Island + Island Link + Maritime Link

Schedule Activities with Significant Time Risk

The analysis shows that these seven activities have the greatest impact on project timing and, therefore, should receive considerable attention.

	Months P25*	Months P75*
≈ Phase 2 Concept Optimization Studies	1	2.5
≈ Generation EA	4	6.5
≈ Maritime Link Comm. Struct. LOI	1.5	5
≈ Maritime Link EA	1	3.5
≈ Main Civil Str. Excav. & Con.	-1	4.5
≈ Complete Install. & Comm.	-0.5	3.5
≈ Comm. T/G Unit 1 & Serv.	0	2

Additional Impact of Weather Window Constraints

≈ Weather Window	5.5	6

Base Case Predictive Range vs. Plan:
P25 = 12.5 months and P75 = 19.5 months

***Values may not be added to give total exposure.**

9.4 Strategic Risk Assessment

The reflection of a general economic cooling in the financial exposure for the Strategic Risks has resulted in a direct reduction in the recommended cost and schedule contingency. Attachment B.1 provides the Strategic Risk Frames with key unmitigated and mitigated exposure input as was used in the Fall 2009 analysis.

Figure 21 provides a Tornado Chart to illustrate the unmitigated and mitigated ranges for those Strategic Risks with the largest financial exposure, while Figure 22 provides a step chart to illustrate the cumulative exposure of these Strategic Risks.

Figure 21: Strategic Risk Tornado Chart – Gull Island + Island Link + Maritime Link

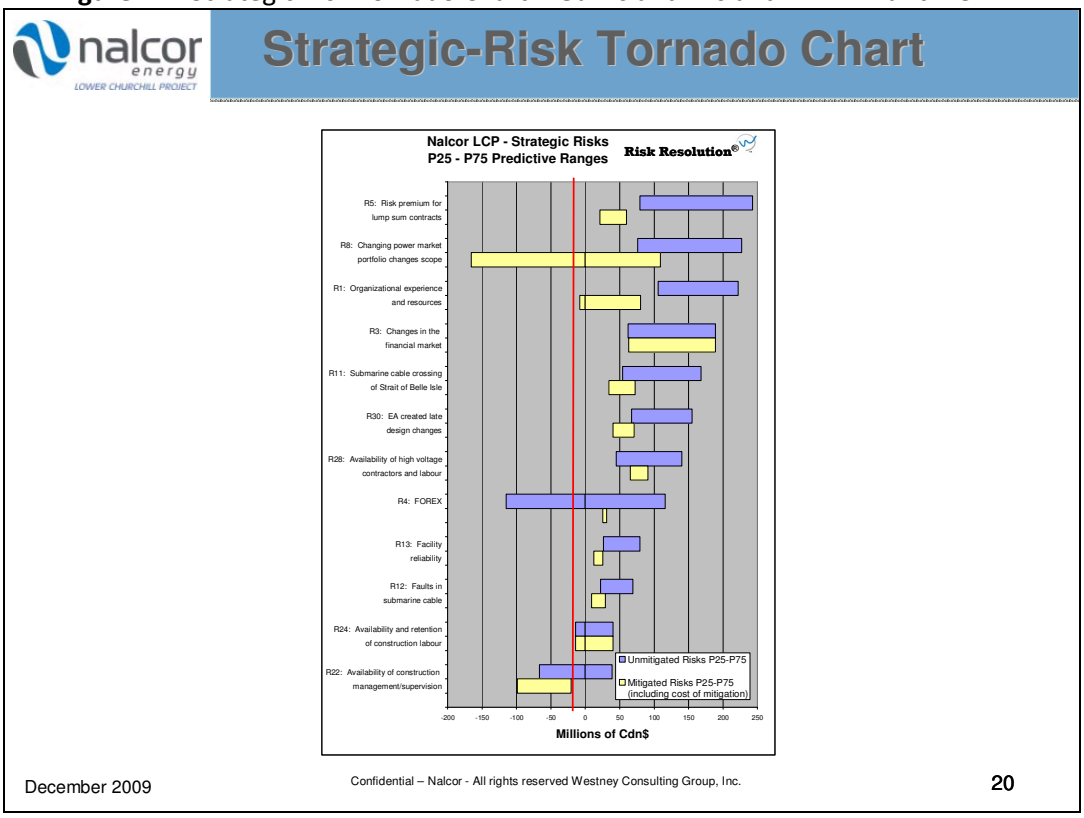
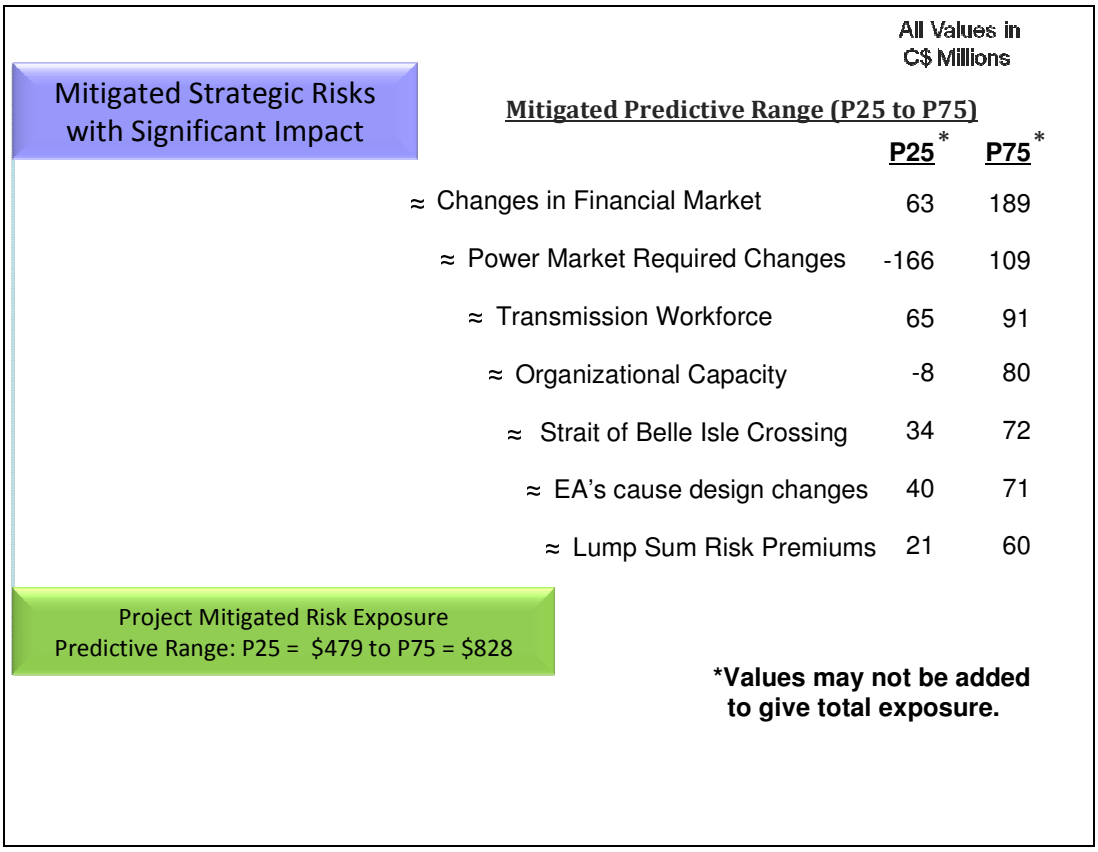


Figure 22: Strategic Risk Exposure – Gull Island + Island Link + Maritime Link



9.5 Recommendations for Economic Modeling

Based upon the Fall 2009 analysis, a recommendation for Estimate Contingency, Schedule Contingency and Strategic Risk Exposure has been made.

- P50 Combined Estimate Contingency + Strategic Risk Exposure 15.0%
- P75 Combined Estimate Contingency + Strategic Risk Exposure 21.0%
- P50 Full Power Date (unmitigated) October 2019
- P75 Full Power Date (unmitigated) February 2019

10.0 Key Strategic Risks and Management Strategies

Encapsulated within each of the Strategic Risk Frames (see Attachment B.2) is a recommended risk management strategy, supporting action plan, and risk responsibilities. Table 2.0 lists the key strategic risks faced by the Project that are significantly influencing the execution strategy and management approach for the Project.

Table 2.0: Key Strategic Risks and Management Strategies

Strategic Risk	Management Strategy
Achieving timely release from the Generation Environmental Assessment in order to facilitate a spring 2011 start of infrastructure works construction at Muskrat Falls.	• Focus on ensuring quality information is provided to the EA Panel. • Proactively address Muskrat Falls first development plan with JRP. • Maintain consultation efforts, in particular with aboriginal groups. • Bolster team resources to allow for efficient management and support of the EA process.
Achieving timely release from the Island Link Environmental Assessment.	• Strategically manage the EA process leveraging lessons learned from Generation EA • Prepare a comprehensive draft of the EIS prior to release of draft guidelines. • Conduct extensive stakeholder consultation activities • Understand and put plans in place to manage aboriginal interests. • Bolster team resources to allow for efficient management and support of the EA process.
Installation and protection of the SOBI submarine cable crossing.	• Evaluate all available opportunities as soon as possible • Employ team resources with marine installation experience in East Coast harsh environments. • Execute exhaustive studies encompassing all cable installation options for both a seabed and a tunnel crossing solution. • Engage best consultants for subsurface conditions.
Labor productivity and performance aligned with expectations.	• Establishing a benefit / reward relationship with the EPCM consultant and construction contractors that entices them to put the "A-team" on the job. • Consider appropriate incentives for the EPCM consultant that are strategically aligned with achieving design and construction readiness outcomes that support increased worker productivity. • Recognize threat of competition from other mega-projects (i.e. Hebron) and proactively manage. • Actively recruit Newfoundlanders home – leverage the "legacy" theme to entice end of career experienced supervisors to work on the Project.

	• Making the work and work site appealing to Newfoundlanders (e.g. attractive camp, compensation, rotation and transportation). • Developing a construction schedule based upon achievable labour productivities. • Negotiating a labour agreement that supports trade flexibility / work team concepts. • Training aboriginal workers in appropriate areas.
Achieving a Zero Harm – Nobody Gets Hurt mindset in a transient construction workforce.	• Early and proactive program to promote and secure commitment to best practices. • Work with EPCM to develop and implement a behavioural based safety program across the Project. • 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. • Recognizing HSE performance is imperative and start embedding an HSE culture early in the project. It all starts with management's commitment to safety. • Maintaining team awareness and establish strong & open communication channel on all aspects of HSE.
Attracting a capable EPCM contractor who has a strong background in all engineering, procurement and construction management activities for large hydro and transmission projects.	• Developing an innovative contracting strategy to make project attractive to contractors with risk/benefit balance. • Implement a rigorous EPCM selection process. • Taking early and aggressive action to secure required engineering competencies and resources. • Scheduling sufficient time for engineering completion prior to start of construction. • Implementing a project-wide Quality Management System and embed QA requirements in all contracts.
Site conditions worse than geotechnical baseline.	• 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. Hence the focus on the 2010 field program for Muskrat Falls.
Limited number of creditworthy hydro turbine suppliers.	• Engage existing "bankable" suppliers in model testing scope in order to build and maintain interest during this slower demand period. • Explore contracting model and risk allocation strategy. • Enhanced oversight during design and manufacture phases.
Availability of experienced high-voltage transmission line contractors and skilled labour.	• 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.

A.0 Activity Flowchart (Excel Format)

A.1 N/A

B.0 Attachments/Appendices

B.1 Memo from Richard Westney Providing Explanation of Risk Resolution Methodology® to the Lower Churchill Project

B.2 Strategic Risk Frames

B.3 Westney Report "Risk Analysis Results for the Option of Muskrat Falls First plus the Island Link June-July 2010"

B.4 Westney Report "Results of the Time-Risk and Strategic-Risk Assessments September 2009"

Westney
Consulting Group

June 1, 2011

To: Jason Kean, Deputy Project Manager, Lower Churchill Project

From: Richard Westney, Founder/Director, Westney Consulting Group

Re: Explanation of Westney Risk Resolution® methodology as applied to the Lower Churchill Project

Jason:

As requested, this memo will summarize Westney's Risk Resolution® methodology and its application to the Lower Churchill Project (LCP).

Background

The size and scope of the LCP places it in the class of projects known as "mega-projects"; i.e., projects whose magnitude exposes the project to external risks such as global economic conditions, actions of NGOs, and market activity for project-related goods and services. To ensure that such risks were properly reflected in the project's front-end activities and risk management plan, Westney's Risk Resolution® methodology was selected for assessing LCP cost and schedule risks.

Overview of Risk Resolution® Methodology

Large engineering and construction projects are exposed to two sources of cost and schedule risk: tactical risks and strategic risks. Tactical risks are those that project teams typically assess and control; these include design development changes, execution variations, and normal deviations in quantities and pricing. Strategic risks are those that require management attention, these typically involve the external factors impacting the project. Conventional project risk management focuses on tactical risks, hence Westney Risk Resolution® focuses on both tactical and strategic risks to ensure all sources of project risk are properly accounted for.

The Risk Resolution® methodology uses a purpose-built analysis model known as PRIMS (Predictive Risk Indicative Modeling System). Input to PRIMS is based on scenarios representing best- and worst-cases for various types of strategic risk. These scenarios are then modeled using Monte Carlo simulation to develop the project's cost- and time-risk exposure. The analysis also indicates the most important drivers of risk exposure, to serve as a basis for stress-testing project plans and developing mitigation strategies.

~~Attachment B.4~~

Overview of PRIMS™ Modeling Technique

The PRIMS™ model is adapted from the securities industry. It is very useful for valuing risks that are outside the estimate. The conventional project wisdom is that project risks are reduced by improving definition with additional design development. This wisdom is correct for definition risks, but there are many project risks beyond definition. These background risks are normally ignored or undervalued in the estimate. The PRIMS™ model is designed to address these risks and provide probabilistic view of the potential exposure to the project.

While these risks are difficult to predict, the Best and Worst potential impact if they do occur can be predicted with reasonable accuracy. The PRIMS™ model only requires the input of these Best and Worst values or impact. It does not require an estimate as a likely case. The model will predict the range of likely outcomes as opposed the traditional range around the likely estimate. A key element of this prediction is the choice of a distribution to represent the range of the risk from the Best to Worst value. The distributions used in PRIMS™ represent the history of project costs. Several distributions are used dependent on the particular risks. The general nature of the project risk distributions is that they are heavily skewed. Care must be taken in the use of a skewed distribution due to the impact of the range of the input. The chosen distribution must reflect both the nature of the risk and the input valuation approach. By nature most project teams are optimistic and the optimism is reflected in the values given the Best and Worst case. Until the recent high inflation in project elements and the many published overruns of costs, the distribution most often used was reflective of this optimism. Currently the trend is toward more realistic input values and a distribution that reflects the realism is required.

The distribution most used for the Strategic Risks reflect realistic valuations.

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Heat Map Snapshot of Strategic Risks

Revised	14-Sep-10

	# of Risks with Barometer Reading		
Category	**High**	**Med**	**Low**
Engineering/Technical	**1**	1	1
Enterprise	**2**		
Environmental Assessment	**1**	2	2
Financial	**1**	3	
Gull Island Construction		4	3
HSE		1	
HVdc Specialities Supply & Install		2	
Interface	**1**	1	
Overland Transmission Construction	**1**		
Power Sales and Market Access	**1**	2	
Stakeholder	**1**	1	1
Technical		1	

Strategic Risk Frame

Revised	14-Feb-11

Risk #	R1	Category	Enterprise	Current Risk Rating	High

Risk Details

Lead	**Paul Harrington**
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. 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. Nalcor Energy has not undertaken a project of this size/magnitude - challenges are: - 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. - Processes, Resources and Governance Structure - Specific experience of large hydro project - Depth of resources to draw upon - Lack of JV arrangements to lean upon for support. - Suitability and robustness of decision making processes for project execution.
Consequence / Impact	-Delay in making urgent decisions and resource limitations results in lost opportunities. Poor project execution using planned execution approach. Lender's & shareholder confidence required to minimize owner's contingency and to ensure timely and financial 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: - Select project execution strategy that helps reduce this risk. - Demonstrate internal alignment and clarity on strategic direction - Secure experienced resources to supplement existing organization breadth and depth - Establish a project governance approach - Implement best PM practices, including structured decentralized decision making processes - Consider planned commercial structure for Maritime Link and understand impact on the overall execution approach for the LCP. An amount of residual risk that can not be avoided will have to be accepted by Nalcor.

Risk Strategy	☑ Avoid	☐ Mitigate	☐ Transfer	☑ Accept

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Strategic Risk Frame

Revised	14-Feb-11

Risk #	R1	Category	Enterprise	Current Risk Rating	High

Action Plan	- Define corporate/enterprise governance and establish a decision making structure - Establish project charter. - Establish decision making protocol and processes. - Develop Project Execution Plan - Clearly define corporate / matrix organization interfaces. - Document and seek alignment on project governance approach - Leverage insight from other owners / developers who have faced similar challenges. - Finalization of PM / contracting approach - Develop Nalcor Matrix Organization LACTI - Identify roles and responsibilities - Develop LACTI defining interface between LCP and appropriate Nalcor departments (matrix organization) - Early engagement of lender's engineer and demonstrate internal capacity - ($2 to $5M) - Engagement of competent experienced contractors (known entities with the "A" team)
Risk Responsibilities (LACTI)	Gilbert Bennett - Accountable Paul Harrington - Lead LCPMT - Technical Fasken - Consult PWC - Technical AON - Consult 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 an prevalent issue to-date within the Project.

Risk Trend and Status Update

(Updated Feb 2, 2011)
- EPCM Contract Strategy has been decided as being the most appropriate method to mitigate this risk.
- SOBI Contract Strategy will be a direct contract with cable suppliers and installation contractors.
- EPCM contractor with proven track record and strong technical / construction management capabilities selected
- Governance document issued and financial approval levels adjusted to be more appropriate for a project of this size.

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Strategic Risk Frame

Revised	14-Feb-11

Risk #	R2	Category	Interface	Current Risk Rating	High

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. Public perception issues may outweigh schedule delay considerations Delayed decisions may lead to: - Schedule slippage and cost increases - Loss of vendor and contractor interest - Loss of team morale
Consequence / Impact	- Delay in project sanction and making key decisions. - This risks 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: - Over communicating with shareholder to ensure alignment on issues of critical importance. - 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. - Focus on embedding governance structure and ensuring alignment with Nalcor leadership, Board and Shareholder. - Implement governance structures that are designed to facilitate efficient Decision making and push accountability down within the organization. - Recognize the constraints of a crown corporation and the shareholder in design our execution approach. An amount of residual risk that can not 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 - Increase awareness of impact (communicate to market place) - Establish a Steering Committee and ensure regular communication of key dates and activities to Shareholder.

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Strategic Risk Frame

Revised	14-Feb-11

Risk #	R2	Category	Interface	Current Risk Rating	High

Risk Responsibilities (LACTI)	Ed Martin - Accountable Gilbert Bennett - Lead Derrick Sturge - Consult LCPMT - Consult 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

(Updated Feb 2, 2011)
- Work with the shareholder to streamline decision making.
- Allow time in the schedule for decision making.
- Move to EPCM Contract Strategy will alleviate this situation.
- Use of AFE's and increased financial approval levels within the Nalcor Lower Churchill Project team will facilitate the approval process.
- Maintaining existing good relationship with the shareholder will build confidence.

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Strategic Risk Frame

Revised	01-Sep-10

Risk #	R3	Category	Financial	Current Risk Rating	High

Risk Details

Lead	**Mark Bradbury**
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. 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: - Interest rate risk - increased spreads due to financial market unrest - The risk that preferred financing instruments may not be available, or available in the quantities or on terms and conditions projected. - 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. - Structure all aspects of the Project so as to minimize percieved transfer of risk to the lenders. - Carefully craft and execute Financial Market Sounding. - Engage appropriate expertise. 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. 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.
Risk Responsibilities (LACTI)	Gilbert Bennett - Accountable Mark Bradbury - Lead PwC - Technical Westney - Consult

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Strategic Risk Frame

Revised	01-Sep-10

Risk #	R3	Category	Financial	Current Risk Rating	High

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

* Current project financing assumptions are consistent with Phase 1 of PwC's scope and include a contingency of roughly 30 bps. This equates to 5.3% base rate + 200 credit = 7.3%.

* If Final Disclosure is delayed, this risk may reduced. However there is a significant risk of inflationary pressure as liquidity improves and base interest rates are increased in response.

From July-09 RRT Meeting
- Summer'07 to current - plenty of change. Some players no longer exist. Difficult to predict what will occur in 2011/12.
- Project financing currently not on the radar for some banks.
- Liquidity in markets continues to be impaired.
- Real return bonds may provide an opportunity, but really too early to tell.
- Any form of support from the Federal Government would reduce this risk.
- Counterparty risk is becoming more of a concern.
- Current market situation is introducing a re-financing risk - no longer 30 year debt, but probably 15 year is maximum available today.

Added Nov 28, 2010:
- Climbing borrowing rates and spread to address risk.

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Strategic Risk Frame

Revised	01-Sep-10

Risk #	R4	Category	Financial	Current Risk Rating	Medium

Risk Details

Lead	**Mark Bradbury**
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) - 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. - 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 - Establish an overall currency hedging program - Develop an improved forecast of currencies for the overall project estimate
Risk Responsibilities (LACTI)	Gilbert Bennett - Accountable Mark Bradbury - Lead PwC - Consult Investment Evaluation - Technical 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	01-Sep-10

Risk #	R4	Category	Financial	Current Risk Rating	Medium

- Gate 2 Estimate currently uses $0.95 CDN/USD conversion - appropriate based upon current outlook.
- Additional Euro exposure for specialist HVDC equipment and sub sea cable.
- Natural hedging strategy from oil production in USD
- Inflation around world more dramatic
- Opportunity to hedge with revenue $ from oil production
- US dollar is continuing to weaken thereby reducing US currency exposure.

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Strategic Risk Frame

Revised	14-Feb-11

Risk #	R5	Category	Financial	Current Risk Rating	Medium

Risk Details

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. 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. - Increase equity contribution thereby removing risk.

Risk Strategy	☐ Avoid	☐ Mitigate	☐ Transfer	☐ Accept

Action Plan	Avoid and mitigate this risk by: - Focus on risk brokering / allocation arrangement to achieve the most cost effective arrangement for all parties. - Ensure awareness of financial market of latest industry trends w.r.t lump sum contracts - Leverage risk strategy and 3rd party expertise to help sell the LCP approach during market sounding - Engage a shadow engineer and work with them to educate prospective lenders. - Optimize debt to equity structure to remove this risk. - Engage 3rd party partners on Maritime Link who can naturally reduce risk.
Risk Responsibilities (LACTI)	Paul Harrington - Accountable Lance Clarke - Lead Jason Kean - Consult Lance Clarke - Consult Investment Evaluation - Consult PwC - Consult 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	14-Feb-11

Risk #	R5	Category	Financial	Current Risk Rating	Medium

Risk Trend and Status Update

- Demonstrating that LCP is a good investment will increase the desire of lenders to invest. Demonstrating that risks can be managed best without lump sum contracts is key.

- Action required on engaging a shadow engineer.

Added Feb 2, 2011:
- Financing strategy and Equity from Emera and Province will mitigate this risk.
- Potential for Federal Loan guarantee will mitigate this risk and is being actively pursued.

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Strategic Risk Frame

Revised	02-Feb-11

Risk #	R6	Category	Power Sales and Market Access	Current Risk Rating	Medium

Risk Details

Lead	**Joanna Harris**
Risk Title	Extra year required to secure long-term PPA's
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. Driven by: - Customers unwilling to sign PPA until certainty exist on how we will get the power to them. - The extended time for negotiations due to a lack of political will within New Brunswick. - Declining load in target markets - Non-alignment of our and customer timelines for delivery of power - Achieving federal alignment and support for the Energy Gateway - 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. - Delay in achieving Financial Close. - 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

Management Strategy	Avoid this risk from materializing through: - Agressively focusing Power Sales teams on Atlantic Canada customers. - Selling LCP value proposition to Atlantic Canada customers. - Seeking political alignment on the value of LCP to NS and NB in reducing their GHG problem. - Advancing the Energy Gateway initiative through the Federal Government Recognize that this risk is not entirely within Nalcor's control, but depends on counterparties, thus some acceptance of this risk is required. 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 - Prepare for Regie hearings for OATT complaints - Prepare fallback strategy if Regie decision is unfavorable - Work the Energy Gateway file on the political front. - Push for clarity on Government of Canada's GHG Policy
Risk Responsibilities (LACTI)	Gilbert Bennett - Accountable Joanna Harris - Lead Derrick Sturge - Technical Laurie Coady - Technical Paul Harrington - Consult

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Strategic Risk Frame

Revised	02-Feb-11

Risk #	R6	Category	Power Sales and Market Access	Current Risk Rating	Medium

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

Added Feb 2, 2011:
- Phase 1 (MF+IL+ML) Term Sheet with Emera has allowed a Gate 2 decision to be made.
- Phase 2 - Gull Island development being actively pursued with OATT applications, appeals of Regie de l'Energie decision.

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Strategic Risk Frame

Revised	01-Sep-10

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

Risk Details

Lead	**Mark Bradbury**
Risk Title	Federal government support for generation and transmission projects
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. ** 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

Management Strategy	- Active and aggressive pursuit by Executive - Atlantic Canada political alignment on the value of the Energy Gateway and how it will develop each region. - Development of Federal Ask strategy and present to Feds. - Engage opposition parties to maintain support for the Project. - Influence GHG Policy through all vehicles including Canadian Hydropower Association.
Risk Strategy	☐ **Avoid** ☑ **Mitigate** ☐ **Transfer** ☐ **Accept**
Action Plan	- Lobby Federal government through Summa - Evaluate potential benefits to the Project from carbon credits
Risk Responsibilities (LACTI)	Ed Martin - Accountable Mark Bradbury - Lead Gilbert Bennett - Consult Investment Evaluation - Technical Steve Goulding - Consult 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	01-Sep-10

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

- Benefit has not been quantified for inclusion in contingency due to risk of double counting with Economic Modeling scenarios. During the Gate 2a assessment it was valued at $500M based on some metrics analyzed for the Alaska Gas Pipeline.

- Currently Federal Support team have been mobilized. Options are being assessed (e.g. equity injection, or loan guarantee).

- Energy Gateway concept is progressing well.

Added Nov 28, 2010:
Federal Ask has been made via P3 Canada infrastructure investment fund to fund 25% of Maritime Link cost.

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Strategic Risk Frame

Revised	02-Feb-11

Risk #	R8	Category	Power Sales and Market Access	Current Risk Rating	Medium

Risk Details

Lead	**Joanna Harris**
Risk Title	Changing power market portfolio requires changes in project scope
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: - 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. - 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. - 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. - 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 - Delay in executing LOI for power sales with Maritimes. - Delays and rework during definition phase of project. - Late scope growth - Additional integration complexities. - Cost and schedule growth - erosion of economics - 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. - 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. - 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 - Assure alignment between commercial/markets and technical (decision gate assurance process) - Receipt of NBSO Facilities Study for 800MW injection at Salisbury, NB. - Consider the merit of completing a 1000MW System Impact Study with NBSO pending the results of the proceeding. - Kick-off integrated work plan with NB Power and Emera to explore how LCP power will be integrated and used with their systems.

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Strategic Risk Frame

Revised	02-Feb-11

Risk #	R8	Category	Power Sales and Market Access	Current Risk Rating	Medium

Risk Responsibilities (LACTI)	Gilbert Bennett - Accountable Joanna Harris - Lead Paul Harrington - Consult Bob Barnes - Technical Chris Kirby - Technical 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

- We need to understand the total implications on the Island Grid if we are interconnected with the North American grid and possibly have an OATT.
- A significant number of design / concept optimizations current remain open and under investigation.
- We are endeavoring to explore VSC technology (HVdc light).

Feb-11 Update:
- The exposure due to this risk is considered to be much less with the phased development approach, in particular for LCP Phase I.

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Strategic Risk Frame

Revised	01-Sep-10

Risk #	R9	Category	HSE	Current Risk Rating	Medium

Risk Details

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. - Remote and difficult work sites - Multiple work faces - Potential for contamination of river - Experience of workforce - 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: - Poor project safety record, serious injuries or fatality - Substance abuse - River contamination during construction - Severe terrain - Remote site / wilderness / animals
Early Warning Indicator of Risk Materialization	- Safety Performance Triangle - Leading / Lagging Indicators - HSE Team recruitment and development of Management System.

Risk Response

Management Strategy	Avoid the likelihood of this risk occuring through: - Establishing and implementing a robust HSE Management System. - 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. - Recognizing HSE performance is imperative and start embedding an HSE culture early in the project. It all starts with management's commitment to safety. - 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) - Mitigate impact of catastrophic event with insurance (environment) - Incorporate environmental minimization into design - Design necessary controls into project - Communicate known river contamination - Embed HSE within the front-end of the project - Ensure contractor understands roles - HSE processes in-place - 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.

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Strategic Risk Frame

Revised	01-Sep-10

Risk #	R9	Category	HSE	Current Risk Rating	Medium

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

- Considering safety incentives in contracting strategy.
- Mar-09 Participated in ExxonMobil Contractor Safety Workshop in Houston - good sharing of lessons learned.
- The Project is striving to build a safety culture. Recruitment plans in place for a HSE Manager.

Added Nov 28, 2010:
- HSE performance is a key metric and consideration for selection of the EPCM consultant for the Project.

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Strategic Risk Frame

Revised	01-Sep-10

Risk #	R10	Category	Engineering/Technical	Current Risk Rating	Medium

Risk Details

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. - 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. - Market improving with awards slowed and projects associated with commodity markets put on hold. -Hydro design market level of demand not seen since 1988 - Many considerations and reductions in hydro engineering resources in last decade - 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. - 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. - Entry of new players into the marketplace."

Risk Response

Management Strategy	Avoid risk by: - Early and aggressive action to secure required engineering competences and resources required to avoid this risk - Schedule sufficient time for engineering completion prior to start of construction (enabled by requirements for Final Disclosure) 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 - Pay a premium for the A-Team - Provide retention incentives - Sell the job as a desirable opportunity - Select contractor on basis of competency of key named persons - Have s strong owners team in place - design / integrity function for checking - Establish design integrity review with expert panel - Combine with insurance and contractor parent company guarantee - Liquidated damages for early removal of key personnel by contractor - Factor productivity into engineering schedule

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Strategic Risk Frame

Revised	01-Sep-10

Risk #	R10	Category	Engineering/Technical	Current Risk Rating	Medium

Risk Responsibilities (LACTI)	Paul Harrington - Accountable Ron Power - Lead Bob Barnes - Consult Lance Clarke - Technical 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

- Strong demand for new Tx driven by renewables, in particular wind power in N. America. Global demand for hydro forecasted to remain strong for next 5 years.
- While the project is a mega-project, the actual design component is low in comparison to say, an oil and gas mega-project.
- Include a key personnel removal clause within each contract that results in a penalty to contractors for removal
- Strong indication that JV may be required for the Engineering
- Current rates in the Gate 2a estimate are very reasonable. Assumes mobilization of key technical resources to St. John's, with living allowances.

- Will the Benefits Targets established for Hebron create expectations for increased amount of engineering to occur within the Province? (Note: We have assumed and estimated cost for a significant portion of the engineering being done within the Province by expats).

Added Feb 2, 2011:
- Selected EPCM Contractor has a world class team and over 40 positions have been identified as key with a penalty to contractors for removal.

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Strategic Risk Frame

Revised	01-Sep-10

Risk #	R11	Category	Engineering/Technical	Current Risk Rating	High

Risk Details

Lead	**Bob Barnes**
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. - Buried shore approaches due to icebergs - Weather window very short - Difficult currents will be a challenge for existing installation vessels - Different submarine terrain - Viability of trenching technology is questionable - Sea currents at 5 to 7 knots will be very challenging - 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 - Shoreline interface challenges - Delay concerns during installation - Long lead-time for order to delivery and limited supplies - Loss of cable during operations resulting in big impact of repair cost - poor reliability - Confidence of financiers in the feasibility of this crossing may make it difficult to finance - Insurance underwriters unwilling to insure this asset.
Early Warning Indicator of Risk Materialization	Viability of submarine cable option for SOBI.

Risk Response

Management Strategy	- Recognize the risks and challenges and evaluate all available opportunities as early as possible (pre Gate 2b) 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 - Engage the best consultants available in order to fully understand the subsurface conditions. - Complete a detailed geotechnical program for the area. - Understand the risk of cable loss due to icebergs and fishing activity - Gather more marine data, i.e. currents, bottom survey, geotech., etc - Develop a design with adequate sparing - also have submarine cables in 2 different routes - Identify and minimize installation difficulties - Establish marine specialist capability within Nalcor - Engage 2 suppliers in design competition for the preferred crossing solution and pay for it - Build and test rock trenching equipment.

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Strategic Risk Frame

Revised	01-Sep-10

Risk #	R11	Category	Engineering/Technical	Current Risk Rating	High

Risk Responsibilities (LACTI)	Paul Harrington - Accountable Bob Barnes - Lead AON - Consult Ron Power - Technical 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

- Early review of available geotechnical and ocean currents is questioning the basis of the submarine cable option. Further evaluation is required.
- Current construction schedule based upon completion of installation 1 year prior to in-service date.
- Submarine option requires tunnel from each shore to deep water - 3-4km on Newfoundland side, 2-3 km on Labrador side.
- Stattnet final cost estimate was double their original estimate and full of caveats.
- A seismic and drilling program in the SOBI was carried out in 2009.

Added Nov 28, 2010:
-Detailed work completed in 2009 and 2010 have facilitated a better understanding of this risk, thereby reducing the likelihood of materialization.

Added Feb 2, 2011:
- Cable crossing method decided to be Horizontal Directional Drilling (HDD) at Labrador side and Island side to get down to deeper water.
- Cable Protection will be via rock placement.
- Ongoing design work is focussed on selected cable crossing method.

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Strategic Risk Frame

Revised	28-Nov-10

Risk #	R12	Category	HVdc Specialities Supply & Install	Current Risk Rating	Medium

Risk Details

Lead	**Bob Barnes**
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 - Faults in buried SOBI section extremely expensive to repair. - According to Statnett, cable manufacturers generally lack experienced installation engineering know-how.
Consequence / Impact	- System reliability implications (potentially caused by installation damages, manufacturing defects…). - Increase in operating cost - 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	28-Nov-10

Risk #	R12	Category	HVdc Specialities Supply & Install	Current Risk Rating	Medium

- 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
Bob Barnes - Lead
Ron Power - Consult
AON - Technical
PwC - Consult
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

This risk materialized on the NorNed project resulting in a 6 month impact on start-up. We have captured these lessons learned and will be striving to implement.

** This could be a greater issue for the Maritimes Link where no spare capacity exist (N/A to the July 2010 risk analysis).
- Lessons learned session held with Statnett on NorNed. NorNed experiences 3 cable failures during start-up delaying the delivery of power by 6 months. NorNed experienced a 4th failure in early 2010.
- Two cable failures during the first 25 years of operations have been carried in the OPEX estimates.
- Given NorNed challenging track record during start-up, we can anticipate insurance premiums to significantly increase.

Added Nov 28, 2010:
Significant progress on understanding this issue has been made in 2010 by SOBI Task Force. Historically failure has been predominantly at cable joints.

Added Feb 2, 2011:
Statnett will be approached to provide key documents for cable specification, testing, shipping, handling and deployment based on their experiences.

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Strategic Risk Frame

Revised	01-Sep-10

Risk #	R13	Category	Engineering/Technical	Current Risk Rating	Medium

Risk Details

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 - Many hydro projects have had reliability issues in recent years (generator inefficiencies, water availability). - 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

Management Strategy

Avoid risk by enacting the following
- Implement an overall project-wide Quality Management System and supporting programs.
- Engage experience Engineering contractors who have a good track record for equipment specification and selection
- equipment selection through Life Cycle Analysis
- Early commissioning and operability planning
- Material and component testing
- Optimization System design based upon design Life, cost and reliability performance specifications.
- Utilize M/C and Commissioning system with experienced team.

Consider transferring risk through:
- Commercial insurance products - e.g. delayed start-up, production insurance
- 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
- Bring operation team representative on early as possible to influence key design decisions
- Build simulator to facilitate commissioning and start-up
- Engage existing operation staff for lessons learned
- Negotiate in PPA to minimize cost impact of initial start-up and full load demands issues
- Consider Negotiate performance incentives in equipment supply contracts
- System redundancy considered in initial design
- Establish and implement life-cycle design philosophy
- Turbine - Generator supply with or w/o Balance of Plant to be determined.
- Complete design review of overland Tx in order to optimize reliability requirements.
- Conduct FAT and SAT on all control software / hardware
- Evaluate available insurance products that could reduce our exposure should this risk occur.

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Strategic Risk Frame

Revised	01-Sep-10

Risk #	R13	Category	Engineering/Technical	Current Risk Rating	Medium

Risk Responsibilities (LACTI)	Paul Harrington - Accountable Lance Clarke - Consult Bob Barnes - Lead Ron Power - Consult 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

- Expert review of Long Range Mountains transmission has concluded that it can be designed within the current capital cost estimates to achieved the desired reliability rating.
- Design return period for overland transmission currently being reviewed as part of environmental loading conditions review.
- Note: Hydro's last hydro project (Granite Cannel) had a lengthy commissioning period.

Added Feb 7, 2011:
-Granite Canal lessons learned regarding instrument and control system design, integration and testing have been incorporated.

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Strategic Risk Frame

Revised	07-Feb-11

Risk #	R14	Category	Environmental Assessment	Current Risk Rating	High

Risk Details

Lead	**Todd Burlingame**
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: 1.) Lack of resources within the EA team to manage the process and associated risk introduces delays and missed opportunities. 2.) EIS contains missing information and we are unable or unwilling to provide this information. 3.) Legal challenge by HQ on EA, Aboriginals claiming insufficient consultation, or Quebec Innu claiming project splitting of the Tx and Generation Projects. 4) Inaction, indecision and political interference as a result of conflicts between Nalcor and Province's mandates. We are encumbered. EA process is largely outside of LCP control…thus may become highly problematic: - Regulators decision making process - Use of process to protest project - Alternatives requested - Multiple legislative jurisdictions which are not all defined - 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. - Not achieving EA release from the Panel.
Early Warning Indicator of Risk Materialization	-# of Information Requests submitted to the Panel. - Messages received during Consultation process. - Monitoring of topics and discussions taking place during all Environmental Assessment Hearings;

Risk Response

Management Strategy	Avoid this risk by: - Focus on ensuring quality information is provided to the EA Panel. - Step up consultation efforts, in particular with Aboriginal groups. - Bolster team resources to allow for efficient management and support of the EA process. 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. - Prepare quality and complete answers to IRs - Push panel to meet all deadlines - Identify and fill information gaps - Prepare for hearings - Educate and engage stakeholders and regulators - Develop detailed plan to obtain permits with mitigating actions to accelerate - Public awareness campaign at various levels (appropriate timing is critical)

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Strategic Risk Frame

Revised	07-Feb-11

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 Paul Harrington - Consult Todd Burlingame - 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

- Draft consultation agreements now with all 6 Quebec Innu groups. 1 near signing.
- NunatuKavut near signing consultation agreement.
- HQ appear to be positioning for a legal challenge. Romaine currently has a claim against it by Quebec Innu re lack of consultation.

Added Feb 7, 2011:
- Consultation agreement signed with NunatuKavut on December 11, 2009.
- Consultation agreement signed with Pakua Shipi (a Quebec Innu group) on April 30, 2010.
- Public Hearing date established.

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Strategic Risk Frame

Revised	01-Sep-10

Risk #	R15	Category	Environmental Assessment	Current Risk Rating	Low

Risk Details

Lead	**Todd Burlingame**
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). - 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. - Develop an early warning system to forecast potential conditions imposed by the EA Panel / process.

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Strategic Risk Frame

Revised	01-Sep-10

Risk #	R15	Category	Environmental Assessment	Current Risk Rating	Low

Risk Responsibilities (LACTI)	Paul Harrington - Accountable Todd Burlingame - Lead Ron Power - Consult 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

- Significant commitments are and will be required to be made in order to get the Project through EA.
- 2 potential issues, shape not changing, extent of compensation facility. Additional fish habitat or improve the habitat.
- Any impact on design, with regards to rising (water up facility), and destruction of the habitat.
- Biggest risk is monetary, not scheduling.

- DFO currently engaged - work plan being developed to achieve a compensation plan.
- There continues to be a lot of public interest in the reservoir clearing activity.

- Task force on Reservoir Preparation established. Completed the first phase of the reservoir clearing assessment (safety considerations) and began development of the reservoir clearing philosophy and plan.

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Strategic Risk Frame

Revised	01-Sep-10

Risk #	R16	Category	Environmental Assessment	Current Risk Rating	Low

Risk Details

Lead	**Todd Burlingame**
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 Todd Burlingame - 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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Strategic Risk Frame

Revised	01-Sep-10

Risk #	R16	Category	Environmental Assessment	Current Risk Rating	Low

- Design optimizations are continuing and will do so until Construction starts (e.g. 345kV line CF to MF construction sequence, MF configuration).

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Strategic Risk Frame

Revised	02-Feb-11

Risk #	R17	Category	Stakeholder	Current Risk Rating	High

Risk Details

Lead	**Todd Burlingame**
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). - Bundling of IBA with other agreements may make it unachievable to ratify the IBA. - 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. - 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: - Maintain close ties with Aboriginal leaders - be responsive to the needs of various Aboriginal groups. - support the communication of accurate information on the arrangement. - Accelerate Federal Government activities on Land Claims file. - Maintain a good working relationship with the Innu Nation. - Strengthen consultation activity with other Aboriginal groups.

Risk Strategy	☑ Avoid	☑ Mitigate	☐ Transfer	☐ Accept

Action Plan	- Conclude IBA, Redress and Land Claims agreements - Continue to disseminate facts into the community on the Project.
Risk Responsibilities (LACTI)	Gilbert Bennett - Accountable Todd Burlingame - Lead Mary Hatherly - Technical Paul Harrington - Consult 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	02-Feb-11

Risk #	R17	Category	Stakeholder	Current Risk Rating	High

- New Dawn agreement successfully put in place; good cooperation from Innu. Negotiations currently under way and nearing completion to the point of initialing draft chapters. Favorable outcome anticipated.
- Nalcor pushing Federal Government to accelerate Lands Claims settlement post the conclusion of the land claims agreement between NL and Innu Nation.
- Development of an interim measures agreement is necessary to ensure guarantees contained in the IBA can be implemented in a timely manner following ratification.

Added Nov 28, 2010:
Awaiting ratification of New Dawn by Innu Nation - could be late Q1 / early Q2, 2011.

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Strategic Risk Frame

Revised	07-Feb-11

Risk #	R18	Category	Stakeholder	Current Risk Rating	Medium

Risk Details

Lead	**Todd Burlingame**
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. - Court challenge of the EA process on grounds of Project Splitting (Generation and Tx) - this happened by La Romaine - May also resist Labrador Innu Land Claim deal - 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 - Bad media coverage - Permitting intervention causing delay - 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: - Aggressive engagement and consultation of all potentially impacted Aboriginal groups. - Add additional consultation resources to ensure consultation is addressed. - 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. - Seek a mandate to negotiate a compensation agreement with these groups. - Increased consultations and communications with parties - Ensure compliance with EA Guidelines and Terms of Reference - Ensure Crown complies with fiduciary requirements - Proactive engagement with government to ensure they are aware of this risk and work with us to manage it. - Seek training opportunities under ASEP - Understand their claims and traditional use of the land
Risk Responsibilities (LACTI)	Paul Harrington - Accountable Lance Clarke - Consult Todd Burlingame - Lead Mary Hatherly - Consult Gail Warren - Technical Maria Moran - Consult Dawn Dalley - Consult

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Strategic Risk Frame

Revised	07-Feb-11

Risk #	R18	Category	Stakeholder	Current Risk Rating	Medium

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

- Crown has a duty to consult Aboriginal groups - scaled to level of claim
- ASEP Program likely to be funded by Federal Government at $15M level. NunatuKavut, Inuit and Labrador Innu are parties to this program.
- Draft consultation agreement in front of each Quebec Innu group and with NunatuKavut.
- NunatuKavut seeking employment and business opportunities from the Project. They are very focused on bringing credibility to their land claim.
- Nalcor must work with Quebec Innu and NunatuKavut to conclude community consultation agreements with each Aboriginal group in order to fulfill requirements of EIS guidelines and ensure adequate consultation. Quebec Innu in particular have been very vocal with respect to their dissatisfaction with lack of consultation.

Added Nov 28, 2010:
- In Sept-10, Nalcor submitted an Aboriginal consultation summary to the JRP, which should reduce the likelihood of this risk materializing.

Added Feb 7, 2011:
- 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	01-Sep-10

Risk #	R19	Category	Stakeholder	Current Risk Rating	Low

Risk Details

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. - 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. - 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. - Poor community relations - Court challenge at EA release delaying permitting - Demonstration or work stoppage. - 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. - Focus on getting Nalcor's message out on the benefits of the Project (i.e. sell the project in order to leverage public support). - Convince our "silent" supporters to speak-out for the Project. - Monitor public and media pulse and focus strategic messages accordingly. - Leverage Quebec versus NL debate to rally support for this venture.

Risk Strategy	☑ Avoid	☑ Mitigate	☐ Transfer	☑ Accept

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

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Strategic Risk Frame

Revised	01-Sep-10

Risk #	R19	Category	Stakeholder	Current Risk Rating	Low

Risk Responsibilities (LACTI)	Gilbert Bennett - Accountable Paul Harrington - Consult Consultation Lead - Technical 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

- The Project has not received substantial bad press from International NGOs. Routing of Tx line through GMNP created quite a stir leading to significant protest.
- Current construction program heavily dependant on significant pre-sanction spending commitments funded by equity - this may be limited if public support for the project is not strong.
- 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)

Added Feb 7, 2011:
- 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	01-Sep-10

Risk #	R20	Category	Gull Island Construction	Current Risk Rating	Medium

Risk Details

Lead	**Lance Clarke**
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: - 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 -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 - 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: - Engaging worldwide market and "sell the project" to stimulate interest. - Developing an Innovative contracting strategy to make project attractive to contractors with risk/benefit balance. 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 - Early engagement of qualified contractors - Evaluate and make decision on contract package configuration - Convey to contractors that the Project is "real" - Provide sufficient on-site oversight - Obtain completion guarantee
Risk Responsibilities (LACTI)	Paul Harrington - Accountable Bob Barnes - Technical Lance Clarke - Lead Fasken - Technical AON - Consult Ron Power - Technical

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Strategic Risk Frame

Revised	01-Sep-10

Risk #	R20	Category	Gull Island Construction	Current Risk Rating	Medium

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

- 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
- Large EPCM contractors are all exhibiting significant interest.
- Low commodities level is impacting this group more than the any stimulus money is adding.
- Federal Government support for the Project would likely significantly reduce this risk.

Added Feb 7, 2011:
-World class EPCM contractor with strong team has been selected.

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Strategic Risk Frame

Revised	02-Feb-11

Risk #	R21	Category	Gull Island Construction	Current Risk Rating	Low

Risk Details

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: - Creditworthiness - Level of Completion Risk Guarantee - Ability to perform - 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 - Federal or provincial support/guarantee.
Early Warning Indicator of Risk Materialization	

Risk Response

Management Strategy	Miitgate by: - Work with local contractors to find suitable partners or underwriters. - Initiate discussions with Atlantic Canada Opportunities Agency (ACOA) to educate them on this risk and work with them to help mitigate this risk. - 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 - Potentially develop regional vendor data base - Encourage teaming or partnering arrangements for local companies - Consider insurance program to backstop this exposure - Develop creditworthiness assessment guidelines
Risk Responsibilities (LACTI)	Paul Harrington - Accountable Lance Clarke - Lead Fasken - Consult Charles Cook - Technical PwC - Technical Dawn Dalley - Consult 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	02-Feb-11

Risk #	R21	Category	Gull Island Construction	Current Risk Rating	Low

Risk Trend and Status Update

- Current trend indicates that there is a good chance that this will materialize, howeverit will be influenced by a number of external factors.

- Minimal requirements to engage local contractors, however precedents set for Hebron will influence our project.
- Contractor creditworthiness assessment guidelines produced with the assistance of PwC.
- Given the current marketplace we need to contemplate legal default and bankruptcy provisions for all contractors and suppliers.

Feb-11 Update:
- Equity injection for Muskrat Falls and regulated Island Link asset funded by debt service guarenteed by either the Government of Newfoundland and Labrador or Canada would minimize this risk.

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Strategic Risk Frame

Revised	01-Sep-10

Risk #	R22	Category	Gull Island Construction	Current Risk Rating	Low

Risk Details

Lead	**Lance Clarke**
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. - 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. Key issues for productivity: - Accommodations complex conditions - Rotation / Transportation - Career goals and opportunity - Pride for Newfoundlanders – Coming home from Alberta? - Correct skill sets - Competitive Compensation
Consequence / Impact	- Cost growth and poor productivity - High turnover rates - Potential schedule slippage
Early Warning Indicator of Risk Materialization	Global and Canadian construction trends.

Risk Response

Management Strategy	Avoid risk by: -Establishing a benefit / reward relationship with the engineering & construction management contractor and construction contractors that entices them to put the "A-team" on the job. - Actively recruit Newfoundlanders home - leverage the "legacy" theme to entice end of career experienced supervisors to work on the Project. - Making the work and work site appealing to Newfoundlanders (e.g. attractive camp, compensation, rotation and transportation). Accept that this risk is not entirely avoidable and cover additional contingency to mitigate it.

Risk Strategy	☑ Avoid	☐ Mitigate	☐ Transfer	☑ Accept

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

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LOWER CHURCHILL PROJECT

Strategic Risk Frame

Revised	01-Sep-10

Risk #	R22	Category	Gull Island Construction	Current Risk Rating	Low

Risk Responsibilities (LACTI)	Paul Harrington - Accountable Lance Clarke - Lead Dawn Dalley - Consult 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

- Market and contractor market improving in late 2009 due to weakening demand, as a result the qualified construction supervision is currently easier to secure. Uncertainty exists on how the future will look.

- Gate 2 labour wage rate assumptions for supervision are fairly robust.

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Strategic Risk Frame

Revised	01-Sep-10

Risk #	R23	Category	Gull Island Construction	Current Risk Rating	Medium

Risk Details

Lead	**Bob Barnes**
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 - 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. - Contingency erosion - Delay in First Power
Early Warning Indicator of Risk Materialization	Detection of uncertainties in geotechnical surveys.

Risk Response

Management Strategy	Mitigatie 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 - Develop and utilize a comprehensive geotechnical baseline - Consider commercial structure of contract to minimize impact (unit prices) - Method of approach for excavation can mitigate impact - Establish owner's representatives (preferably on-site) to monitor contractor performance
Risk Responsibilities (LACTI)	Paul Harrington - Accountable Bob Barnes - Lead Ron Power - Consult 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	01-Sep-10

Risk #	R23	Category	Gull Island Construction	Current Risk Rating	Medium

- Field programs conducted in 2007 and 2008 have helped to characterize the geotechnical conditions with greater certainty, however some exposure remains.
- Good geotechnical baseline for Gull Island following 2007-08 programs - we know the conditions hence this risk has been largely mitigated.
- Have we truly represented the value of this risk? Impact on late power? Should we consider a deferred start-up insurance policy or other?

Added Nov 28, 2010:
- Field programs conducted in 2010 have not revealed any surprises, however questions remain regarding the detailed build-up of major quantities.

Added Feb 7, 2011:
- MF layout proposed by SNC-L has been challenged and justification for increase in quantities is required before any changes will be accepted.

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Strategic Risk Frame

Revised	01-Sep-10

Risk #	R24	Category	Gull Island Construction	Current Risk Rating	Medium

Risk Details

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. - 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. Key issues: - Accommodations complex conditions - Compensation & competition with Alberta - Rotation / Transportation - Pride for Newfoundlanders – coming home from Alberta? - Productivity Other considerations: - Union attitude on training and development - Foreign workers - NL is largely a micro-economy within Canada, forecasting significant growth during the coming years.
Consequence / Impact	- Cost growth and poor productivity - High turnover rates - Potential schedule slippage
Early Warning Indicator of Risk Materialization	- Increased sick leave amongst the older demographic - Rates of current enrolment in various applicable trades programs - Out-migration to oil jobs in Alberta continues.

Risk Response

Management Strategy	Avoid risk by: - Actively recruit Newfoundlanders home - Making the work and work site appealing to Newfoundlanders (e.g. attractive camp, compensation, rotation and transportation) - Recruit supervision that works well with Newfoundlanders Mitigate the exposure by: - Developing a construction schedule based upon achievable labor productivities - Negotiating a labor agreement that supports trade flexibility - Training Aboriginal workers in semi-skilled areas

Risk Strategy	☑ Avoid	☑ Mitigate	☐ Transfer	☐ Accept

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Strategic Risk Frame

Revised	01-Sep-10

Risk #	R24	Category	Gull Island Construction	Current Risk Rating	Medium

Action Plan	- Make work location/employment attractive (quality of accommodations, transportation, family benefits, vacation) - Promote in recruitment plan - Consistent employment deals where possible - Maintain some control of benefit distribution - Include provisions in contracts and labor agreements - Structure labor strategy that does not impair engaging local labor - Develop a construction schedule based upon achievable labor productivities - Develop a dynamic labor supply and demand model in order to understand this issue. - Train Aboriginal workers in semi-skilled areas
Risk Responsibilities (LACTI)	Paul Harrington - Accountable Lance Clarke - Lead Jason Kean - Consult Steve Goulding - Technical Maria Moran - Technical Debbie Molloy - Technical 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

- Oil Sands slowdown was reducing the likelihood of this risk occurring.
- Labor supply and demand model prepared.
- Planning labor survey designed for workers on rotation out west.
- Labor rates benchmarked well against Vale-Inco labor agreement for Long Harbour.

Added Feb 7, 2011:
- Recent survey indicates that somewhere in the region of 16,000 to 18,000 Newfoundland workers commute to/from Western Canada. MF requires significantly smaller workforce than GI.

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Strategic Risk Frame

Revised	01-Sep-10

Risk #	R25	Category	Gull Island Construction	Current Risk Rating	Low

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 - 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 Key issues: - Accommodations complex conditions - Compensation & competition with Alberta - Rotation / Transportation - Opportunities / Training
Consequence / Impact	** There is very minimal exposure for this risk in the current marketplace. - Cost growth and poor productivity - High turnover rates - Potential schedule slippage
Early Warning Indicator of Risk Materialization	- Increased sick leave amongst the older demographic - Rates of current enrolment in various applicable trades programs - Out-migration to oil jobs in Alberta continues.

Risk Response

Management Strategy	Avoid risk by: - Providing competitive opportunities for locals. - Promoting opportunity for training and advancement of local unskilled workforce. - 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) - Make the worksite attractive for the local residents (daily commute options, etc.) - Develop a diversity plan - Promote in recruitment plan - Consistent employment deals where possible - Maintain some control of benefit distribution - Include provisions in contracts and labor agreements - Structure labor strategy that does not impair engaging local labor - Leverage ASEP program to train Aboriginals
Risk Responsibilities (LACTI)	Paul Harrington - Accountability Lance Clarke - Lead Steve Goulding - Technical Maria Moran - Technical

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Strategic Risk Frame

Revised	01-Sep-10

Risk #	R25	Category	Gull Island 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

- 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.
- ASEP funding of $15M to be leveraged.
- 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?

Added Nov 28, 2010:
- Given the 2009 downturn, this risk is not considered to be significant.

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Strategic Risk Frame

Revised	01-Sep-10

Risk #	R26	Category	Gull Island Construction	Current Risk Rating	Medium

Risk Details

Lead	**Lance Clarke**
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 - Industry presently busiest since "Golden years" of 83 to 92 - In last 5 years increasingly "sellers" market - order books full for 2010 - North America declining in importance as market – GE exits North America for Brazil and China - Complex international supply chain - Only remaining North American supplier is Alstom - they are busy Key Considerations: - Willingness to bid - Ability to deliver / reliability - Installation competency - Fair lump sum price / Transparency / Risk Premium - Level of Aggregate Guarantee - Level of Performance Guarantee / Testing acceptance - Warranty – Latent defects - Level of Completion Risk Guarantee - Conforming Contract - Creditworthiness
Consequence / Impact	- Longer lead times required and earlier commitments - Fewer suppliers = less competition - Increased cost due to demand factor despite downturn in commodities
Early Warning Indicator of Risk Materialization	- Global demand for hydro. - # of creditworthy suppliers

Risk Response

Management Strategy	Mitigate the risk by: - Engaging 2 existing "bankable" suppliers and explore contracting model and risk allocation strategy. - Early strategy decision and selection of supplier. - Enhanced oversight during design and manufacture phases. 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 - Early engagement of qualified vendors - Evaluate and make decision on turbine package configuration - Convey to vendors that project is "real" - Provide sufficient factory oversight - Potential insurance to cover unexpected perils during manufacture - Obtain performance guarantee on efficiency (exclude run-a-way test)

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Strategic Risk Frame

Revised	01-Sep-10

Risk #	R26	Category	Gull Island Construction	Current Risk Rating	Medium

Risk Responsibilities (LACTI)	Paul Harrington - Accountable Bob Barnes - Technical Pat Hussey - Technical Lance Clarke - Lead Fasken - Technical 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

- Hydro demand very strong over past 2 - 3 years and forecasted similar trend for next 5 years.
- Down in global marketplace will provide schedule improvements, castings will be easier/faster, therefore may see some improvement in price.
- Order books remain full for 2010. Future demand will be influenced by demand with China, India and Brazil.
- 2 bankable suppliers are Alstom and Voith - both still very interested in LCP due to size, location and low risk
- Decision still required on Balance of Plant with our without T/Gs - awaiting arrival of engineering contractor to make this decision.

Added Feb 7, 2011:
- Model testing awarded to big three suppliers which will derisk the schedule.

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Strategic Risk Frame

Revised	01-Sep-10

Risk #	R27	Category	Financial	Current Risk Rating	Medium

Risk Details

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 - There has been significant upswing and downswing on commodities since late 2004 resulting in significant increase in build cost. - Future is difficult to predict - best we can practically hope for is a reasonable view for the next 2 years - 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. - 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: - Monitoring market and understand supply / demand balance for goods and materials. - Developing an escalation forecasting model specific for LCP in order to translate market intelligence into an educated assessment of likely exposure to this risk. Transfer residual risk by: - Consider commodity hedging strategy to reduce exposure. - 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) - Consider core escalation plus market specific escalation - Obtain external benchmarking on escalation - Consider foreign currency and exchange assumptions - Continue to obtain market intelligence on supply & demand of key equipment (e.g. T/G's)
Risk Responsibilities (LACTI)	Derrick Sturge - Accountable Rob Hull - Consult Jason Kean - Lead Steve Goulding - Technical Pat Hussey - Consult Fasken - Consult PWC - Consult Westney - Consult

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Strategic Risk Frame

Revised	01-Sep-10

Risk #	R27	Category	Financial	Current Risk Rating	Medium

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

- Large downturn in commodities over the past 9 months, however construction cost has not been in-step with this trend.
- 3.5% weighted equivalent escalation carried in Gate 2A economics.
- New escalation model currently being developed with support of John Hollmann of Validation Estimation.

Added Nov 28, 2010:
- Price of commodities have began to rebound from the downturn of early 2009.

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LOWER CHURCHILL PROJECT

Strategic Risk Frame

Revised	01-Sep-10

Risk #	R28	Category	Overland Transmission Construction	Current Risk Rating	High

Risk Details

Lead	**Lance Clarke**
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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Strategic Risk Frame

Revised	01-Sep-10

Risk #	R28	Category	Overland Transmission Construction	Current Risk Rating	High

- 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
Lance Clarke - Lead
Bob Barnes - Technical
Fasken - Technical
Ron Power - Technical
Steve Goulding - Consult
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

- Current trend points to strong demand for new Tx as a result of push on renewables in the US.
- ASEP program will train linespersons.
- The Engineering EOI is revealing additional global expertise that could mitigate this risk.

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Strategic Risk Frame

Revised	01-Sep-10

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

Risk Details

Lead	**Lance Clarke**
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) - 3 main suppliers of HVdc equipment - Areva, Siemens and ABB - Location, especially Strait of Belle Isle, is challenging - Tight weather window for installation - Cabot Strait and SOBI combined would place tremendous demands on cable supply
Consequence / Impact	- Unavailability of cable installation vessels - Unavailability of factory slots for cable - Schedule delays - Cost premium to secure and maintain factory slots for cable and installation vessels
Early Warning Indicator of Risk Materialization	- Market demand for HVdc technology - Market consolidation or entry of new players - Financial strength of existing Market players

Risk Response

Management Strategy	Mitigate this risk by: - Optimization of packaging strategy of HVdc specialties equipment and services to entice key players - Early selection and engagement to ensure availability 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 - Further understand the market and its dynamics. - Reassess execution and contract packaging for this scope to align with market intelligence and mitigation of this risk.
Risk Responsibilities (LACTI)	Paul Harrington - Accountable Lance Clarke - Lead Bob Barnes - Technical Faskens - Consult 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	01-Sep-10

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

- Currently 3 main suppliers, however varying views on the capability of each may limit to 1 on some components.
- Statnett considers Nexans to be the only cable manufacturer that has installation engineering capability while ABB is the only capable supplier of HVdc converter stations.
- Statnett suggests that a manufacturing slot can be reserved early with no premium.

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Strategic Risk Frame

Revised	07-Feb-11

Risk #	R30	Category	Environmental Assessment	Current Risk Rating	Medium

Risk Details

Lead	**Todd Burlingame**
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. Potential Threats: - 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.) - There have been significant public concerns raised regarding the access route for the electrode line to Lake Mellville / Mud Lake. - Impact of line routing in Labrador and over the Long Range Mountains on Woodland Caribou mitigation and protection. - 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. - Potential schedule slippage resulting from additional time to find alternative solution.
Early Warning Indicator of Risk Materialization	- Issues raised during consultation - Extent of media interest and tone of coverage - EIS Guidelines - how it addresses these issues

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 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. - 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

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LOWER CHURCHILL PROJECT

Strategic Risk Frame

Revised	07-Feb-11

Risk #	R30	Category	Environmental Assessment	Current Risk Rating	Medium

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. - 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). - Consider alternate arrangements for electrode rather than in a marine environment (e.g. beachside, or near-shore pond) - 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 Bob Barnes - Technical Todd Burlingame - Lead Steve Bonnell - Technical 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

- Island Link registration document references Sea Electrodes.
- Woodland caribou issues on both the Island and in Labrador are being raised during consultations. Risk of having to route Tx line closer to TLH to reduce opening up Labrador. Additionally, concern has been raised about the impact of the SOBI crossing on fishing activities.
- Concerns have been raised during consultation on impact of Tx route to outfitters.
- We have yet to make a decision on where the electrodes will be located. This will be required for the submission of the EIS. Physical work (baseline studies) to support the EA have be completed prior to submittal of EIS.
- Electrode type and location will not be sorted out until end of 2009. This would mean the EIS could not be submitted until late Q3-10 and approval coming by summer 2011.

Added Feb 7, 2011:
- Electrode type and location have been selected.
- 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 to be submitted late Q3 / early Q4 2011, with a decision on the Island Link EA anticipated in Q3 2012.

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Strategic Risk Frame

Revised	02-Feb-11

Risk #	R31	Category	Interface	Current Risk Rating	Medium

Risk Details

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. - Delay in start of construction until post 2011 election. - 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: - Ensuring early and on-going alignment with the Shareholder on all aspects of the project. - 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. - Seek early commitment and release of capital for 2010 activities. 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 Gate 2b and adjust execution plan accordingly. - Regular briefings provided by Project Team to Executive Leadership on pending decisions for the next 90 days. - Regular communication on key messages between Nalcor and Shareholder. - Ensure clarity on overall project schedule and financial commitment curve.
Risk Responsibilities (LACTI)	Ed Martin - Accountable Gilbert Bennett - Lead Mark Bradbury - Technical Rob Hull - Technical Paul Harrington - Technical 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	02-Feb-11

Risk #	R31	Category	Interface	Current Risk Rating	Medium

Risk Trend and Status Update

- Directionally Shareholder is aligned with Deep Equity injection. Unfortunately start of construction is planned for 2011 - same timing as next provincial election.

Feb-11 Update:
- It's likely that EA release for Generation will occur in Q1-12 thus beyond the election timeline. Budget for all 2011 activities approved for use.

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Strategic Risk Frame

Revised	07-Feb-11

Risk #	R32	Category	Environmental Assessment	Current Risk Rating	Medium

Risk Details

Lead	**Todd Burlingame**
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. - Uncertainty re type and location of electrodes - Uncertainty re conduit or sub sea option for SOBI - Limited Aboriginal consultation - Challenge of Project Splitting - 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. - Schedule delay as a result of delay in EA Release - Potential court action re lack of consultation and Project Splitting - Slippage of first power date.
Early Warning Indicator of Risk Materialization	Timing of issue of EA Guidelines.

Risk Response

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

Risk Strategy	☑ Avoid	☑ Mitigate	☐ Transfer	☐ Accept

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

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Strategic Risk Frame

Revised	07-Feb-11

Risk #	R32	Category	Environmental Assessment	Current Risk Rating	Medium

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

- Province has indicated that EIS Guidelines may be delayed until October 2009 and will be seeking Nalcor Energy's concurrence with that timing.
- 4 to 6 months slippage on EA release currently observed as a result in GMNP Tx routing decision. No impact yet to first power.

January 2010 Update
-As a result of a recent associated Supreme Court of Canada decision (January 21, 2010, Red Chris Mine), the federal government is re-evaluating its previous EA track decision for the Project, which previously saw a screening-level assessment focused exclusively on the Strait of Belle Isle crossing. As a result of this court decision, such EA "scoping to trigger" is no longer permitted, and it is likely that federal regulatory interest, and the level of federal EA, will increase. The potential implications of this are currently being evaluated, and Nalcor Energy will be meeting with federal representatives on this issue in February.

Added February 7, 2011:
- EIS draft Guidelines were released for public review February 7, 2011. Final EIS Guidelines are anticipated in Q2 2011. EIS to be submitted late Q3 / early Q4 2011, with a decision on the Island Link EA anticipated in Q3 2012.

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Strategic Risk Frame

Revised	01-Sep-10

Risk #	R33	Category	Enterprise	Current Risk Rating	High

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. - Uncertainty also exists as to whether this will be a merchant or regulated asset. - Finalization of this philosophy to allow for securing the necessary partners is considered to take considerable amounts of time. - 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. - Schedule delay pre Market Sounding given the need to have all JV partners onboard prior to this occurring. - 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: - 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. - Aggressive engage Emera and NB Power - Nalcor to champion link. Mitigate exposure risk by: - Evaluating options for Nalcor led EA for Maritime Link

Risk Strategy	☑ Avoid	☑ Mitigate	☐ Transfer	☐ Accept

Action Plan	- Verify preferred option with Steering Committee. - Develop a strategy to progress selected option. - Develop EA strategy for Maritime Link. - Develop Aboriginal consultation plan for Maritime Link.
Risk Responsibilities (LACTI)	Ed Martin - Accountable Gilbert Bennett - Lead Laurie Coady - Technical Rob Hull - Technical Todd Burlingame - Technical 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	01-Sep-10

Risk #	R33	Category	Enterprise	Current Risk Rating	High

Risk Trend and Status Update

- Initial exploratory discussions have commenced with NB Power and Emera regarding ownership of the Maritime Link.

Added Nov 28, 2010:
- Negotiations continue with Emera re the Maritime Link, including the application to P3 Canada for funding in support of the Link's construction.

Added Feb 7, 2011:
- Phase I of LCP agreed and term sheet signed with Emera.

Attachment B.3 to Doc. No. LCP-PT-MD-0000-RI-RP-0001-01 Rev. B1

Risk Analysis Results for the Option of Muskrat Falls First plus the Island Link June-July 2010

Risk Resolution®

Westney™

Consulting Group, Inc.
www.westney.com

July 2010

General Information

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

Contents

Consultants' Comments

- The work included in this report builds upon previous risk analyses for the Lower Churchill Project. However, the project in this option is defined somewhat differently than it was in the fall of 2009:

  1) the smaller and technically less complex Muskrat Falls plant has replaced the Gull Island plant as the first phase of the total project;

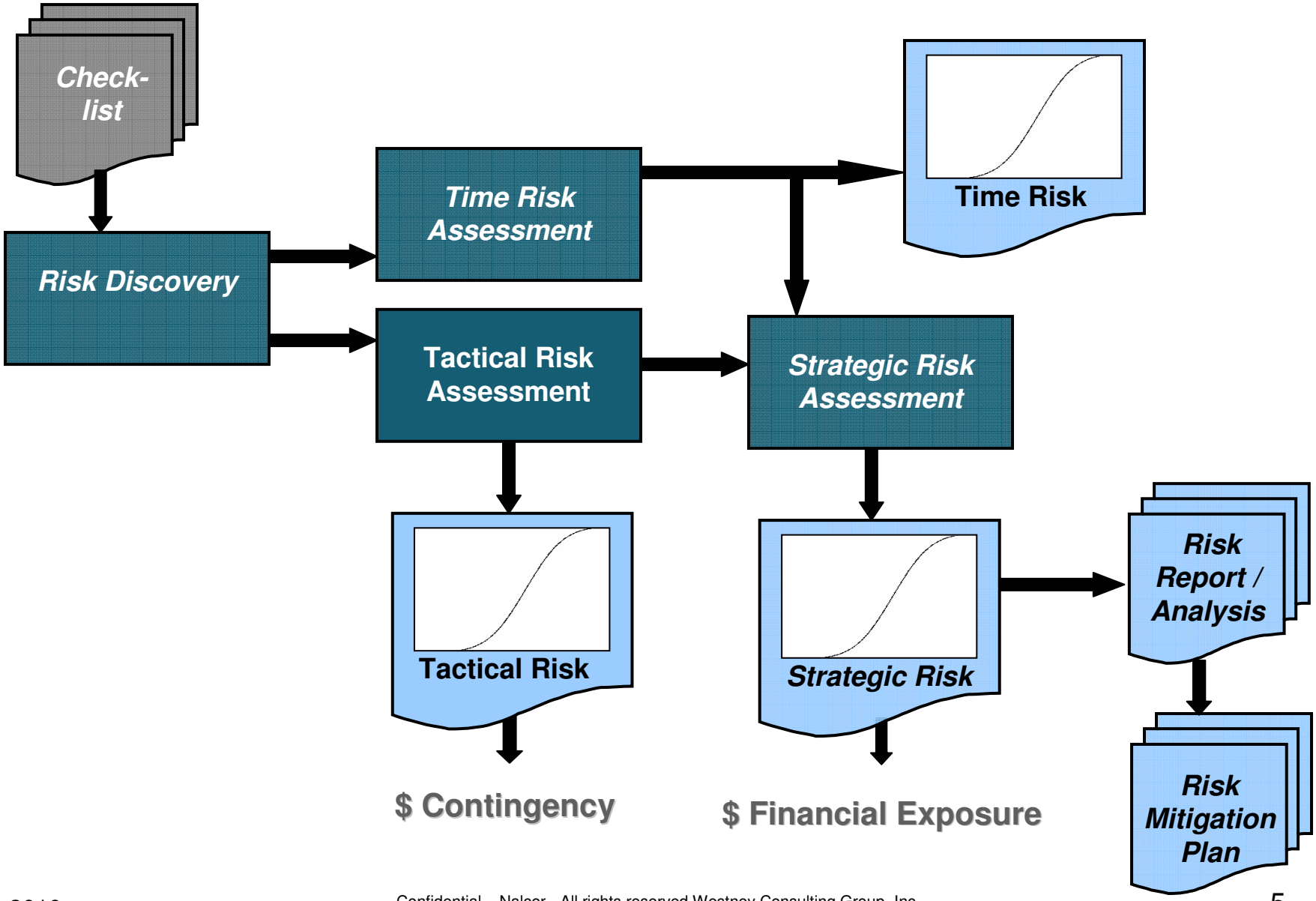
  2) the first phase project is no longer envisioned to require project financing; and

  3) the assumptions for handling power sales are now different, with the Maritime Link now viewed as a separate project phase.

- The project's first phase option of a smaller size and less complex structure have a significant impact on the results of the risk analyses, with many of the Gull Island strategic risks no longer being applicable for Muskrat Falls. However, it should be noted that much of the analysis for the Muskrat Falls plant is still in a more preliminary stage than the analysis for the Gull Island plant. Therefore, the probability distributions chosen for the Muskrat Falls risk analyses reflect the higher levels of uncertainty that would be associated with a less mature project.

- As the Muskrat Falls analysis matures, it would be appropriate to consider updating these preliminary risk assessments, especially the Strategic Risk Assessment, where a preliminary risk assessment is less likely to fully capture the impact of unique risks.

The Westney Risk Resolution® Process



Basis of Assessment

Project Components*

1) Muskrat Falls 824 MW Plant
2) 600 MW 250kV HVdc Island Link (50-year return period)

*Consistent with client Capital Cost Case 8

Cost Estimates+

1) Muskrat Falls Plant: $2,215 million
2) Island Link: $1,144 million

+Estimates are in C$ and do not include any contingency

Current Project Schedule

Ready to Start Site Work at Muskrat Falls	19-Jun-11
First Power	22-Sep-16
Island Link Ready for Power Delivery	7-Feb-17
Full Commercial Power	16-May-17

Assessment Summary

Time Risk	The modeled results show a predictive range (P25 to P75) for Full Commercial Power of February 2018 to September 2018, which equates to 9 to 16 months later than the current schedule of May 2017.	Almost half of this delay is due to schedule slippage that occurs from Powerhouse Excavation (Task 29) through Commissioning of the final turbine/generator unit (Task 51) – (slippage is driven by powerhouse excavation and concreting). About two months of the delay is associated with the Generation Project EA (Task 16) and the EP+CM Bid and Award (Task 8).
Tactical Risk	The predictive range for the Tactical-Risk analysis for Muskrat Falls and the Island Link is $3,469 million to $4,367 million, with the P50 value being $3,885 million.	The P50 value of $3,885 million compares to an estimate of $3,359 million, suggesting that an estimate contingency of $526 million (16%) would be appropriate for Muskrat Falls combined with the Island Link.
Strategic Risk	The predictive range for the Unmitigated Risk Exposure is $490 million to $852 million; the predictive range for the Mitigated Risk Exposure drops to $187 million to $413 million.	It is recommended that a reserve be established to cover the Mitigated Risk Exposure level of $413 million. This reserve is in addition to the contingency and equates to approximately 12% of the estimate.

Time-Risk Assessment

Basis of Assessment

Time-Risk Model

A Time-Risk model was built for the Muskrat Falls Plant and the Island Link using Microsoft Project. The model logic incorporates the dates, durations, and key dependencies (including weather modeling) that are contained in the current project master schedule. The key activities were identified and framed by Nalcor.

Westney consultants met with Nalcor representatives at Nalcor's St. John's office to discuss possible outcomes for each modeled activity. The final ranging was performed by the Nalcor team, but it was vetted and questioned by the Westney participants. The modeling simulation was performed by Westney using the @Risk Monte Carlo technique with 10,000 iterations.

Assessment Results

Time-Risk Results

The modeled results had a predictive range for Full Commercial Power approximately 9 to 16 months after the currently scheduled date of May 16, 2017.

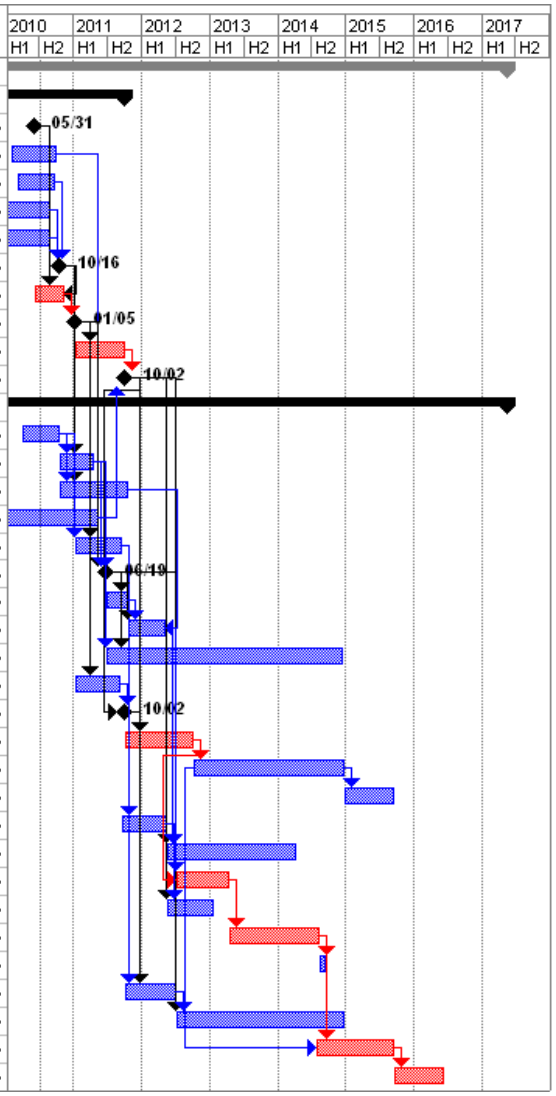
Predictive Range	
P25	P75
19-Feb-2018	30-Sep-2018

These results are driven by modeled delays in several key activities, particularly Powerhouse Excavation and Powerhouse Concreting (Primary and Secondary). The critical path In the simulation included Muskrat Falls construction activities almost 80% of the time.

nalcor energy
LOWER CHURCHILL PROJECT

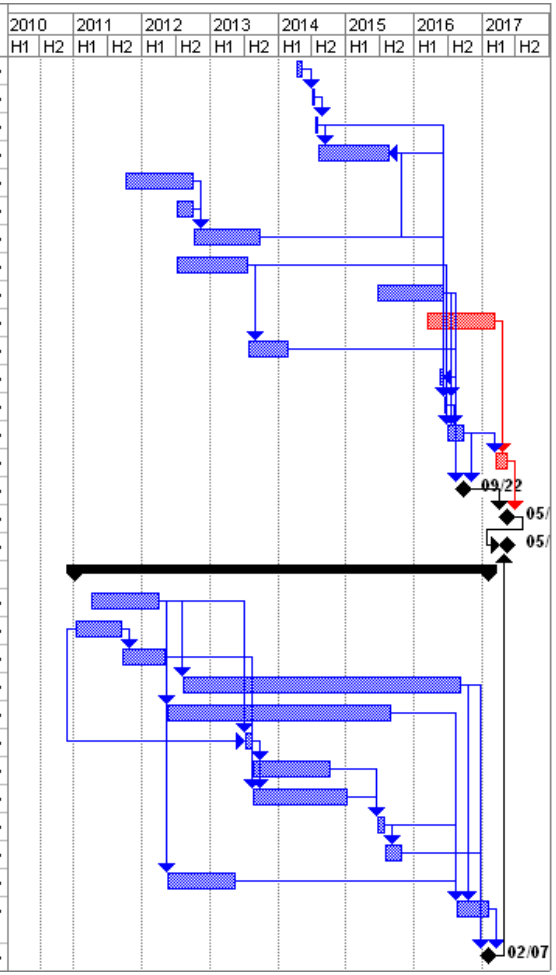
Time-Risk Model

ID	Name	Duration	Start	Finish	Predecessors	@RISK: Critical Index
0	**Nalcor Energy - Lower Churchill Project - June 2010**	**3820 d**	**12/01/06**	**05/16/17**		
1	**Gateway Phase 2 Activities / Readiness to Mobilize EP+CM**	**824 d**	**07/01/09**	**10/02/11**		**17.00%**
2	Ready to Issue EP+CM RFP	0 d	05/31/10	05/31/10		47.90%
3	Ratification of IBA by Innu Nation	240 d	02/01/10	09/28/10		0.36%
4	Business Case Comfort Achieved by Gatekeeper	200 d	03/01/10	09/16/10		11.09%
5	Project Team Phase 3 Readiness Preparation (incl. IPR)	240 d	01/01/10	08/28/10		4.57%
6	Complete Phase 2 Concept Opt. Studies (SOBI, MF, VSC)	420 d	07/01/09	08/24/10		0.20%
7	Gate 2 Approval	0 d	10/16/10	10/16/10	4FS+30 d,6,5	15.86%
8	EP+CM Bid and Award	160 d	05/31/10	11/06/10	7FF,2	63.44%
9	EP+CM Contractor Mobilized	0 d	01/05/11	01/05/11	8FS+60 d	63.44%
10	Gate 3 Key Deliverables	270 d	01/06/11	10/02/11	9	22.21%
11	Project Sanction	0 d	10/02/11	10/02/11	10,16	22.70%
12	**Muskrat Falls (824 MW) Plant**	**3820 d**	**12/01/06**	**05/16/17**		**78.81%**
13	Early Works Infrastructure Engineering & Procurement	200 d	04/01/10	10/17/10		1.07%
14	Early Civil Works & Reservoir Clearing Contracting	180 d	10/18/10	04/15/11	13,7FS-60 d	1.06%
15	Phase 1 Camp - Vendor Engineering, Fab & Deliver	365 d	10/18/10	10/17/11	7FS-60 d,13	0.26%
16	Generation Project EA	1620 d	12/01/06	05/08/11		29.83%
17	Initial Critical Contracting for Engineering Detailed Design	250 d	01/06/11	09/12/11	9,13	17.92%
18	Readiness to Commence Site Work	0 d	06/19/11	06/19/11	16FS+42 d,3,14,9FS+90 d	31.24%
19	Access Road & Early Site Roads Infrastructure	120 d	06/20/11	10/17/11	18	30.67%
20	Phase 1 Camp Construction	200 d	10/18/11	05/04/12	15FF+90 d,18,19	30.93%
21	Reservoir Clearing (incl. decomm.) & Habitat Compensation	1275 d	06/20/11	12/15/14	14,18	0.57%
22	T/G - Prepare Specification and Tender Process	240 d	01/06/11	09/02/11	9	5.88%
23	Award Turbine / Generator Contract	0 d	10/02/11	10/02/11	22,11	28.56%
24	T/Gs - Vendor Design, Model Test, Completion of Basic Des.	365 d	10/03/11	10/01/12	23	28.56%
25	T/Gs - Shop Detailing, Fabrication, & Delivery - Unit 1	810 d	10/02/12	12/20/14	24	0.63%
26	T/Gs - Additional Time for Delivery of Final Unit	270 d	12/21/14	09/16/15	25	0.62%
27	Contracting for Civil Works (Pwrhse, Spill., North Spur, RCC)	240 d	09/13/11	05/09/12	17	17.91%
28	Spillway (Phase 1) - Excavation, Concrete & Gates	700 d	05/10/12	04/09/14	27,20,11FS+60 d	0.16%
29	Powerhouse Excavation (Incl Intake & Tailrace)	280 d	07/04/12	04/09/13	27,20,24FS-90 d,11FS+60 d	76.61%
30	North Spur Work (Pre Phase 1 Impoundment)	250 d	05/10/12	01/14/13	27,18,11FS+60 d	0.00%
31	Intake & Powerhouse Primary Concrete	488 d	04/10/13	08/10/14	29	76.61%
32	Complete Powerhouse Crane Installation	30 d	08/11/14	09/09/14	31	0.00%
33	Contracting for 345 kV Hvac and CF Yard Ext. Mat. & Constr.	270 d	10/03/11	06/28/12	17,11	0.02%
34	345 kV HVac TL to CF	908 d	06/29/12	12/23/14	33,18	0.01%
35	Powerhouse Secondary Concreting for Unit 1	420 d	07/22/14	09/14/15	31FS-20 d,25SS+25%	76.61%
36	Completion of Secondary Concrete for Units 2 - 4	270 d	09/15/15	06/10/16	35	75.73%



Time-Risk Model (continued)

ID	Name	Duration	Start	Finish	Predecessors	@RISK: Critical Index
37	Spillway - Upstream & Downstream Plug Removals	28 d	04/10/14	05/07/14	28	0.16%
38	Close Cofferdam	14 d	07/01/14	07/14/14	37	0.96%
39	Stage 1 Impoundment	14 d	07/15/14	07/28/14	30,38	0.96%
40	North Dam (Foundation & Dam)	220 d	07/29/14	08/18/15	39,43FF	0.96%
41	"Year after Project Sanction (Task 11)"	365 d	10/03/11	10/01/12	11	0.00%
42	"90 Days after Start of Powerhouse Excavation (Task 27)"	90 d	07/04/12	10/01/12	29SS	0.00%
43	South Dam (RCC)	194 d	10/02/12	09/26/13	27,18,41,42	0.00%
44	CF Switchyard Mods	222 d	06/29/12	07/21/13	33,18	0.02%
45	T/G - Assembly/Installation Unit 1	365 d	06/12/15	06/10/16	35FF+270 d,32FF-180 d,25	0.89%
46	T/G - Assembly/Installation Final Unit	365 d	03/08/16	03/07/17	26,36FF+270 d	76.35%
47	Construct MF Switchyard	220 d	07/22/13	02/26/14	44,18	0.02%
48	Tailrace Plug Removal	28 d	05/14/16	06/10/16	29,31,45FF	0.89%
49	Stage 2 Impoundment	14 d	06/11/16	06/24/16	39,48,43,40,21FF	2.42%
50	T/G - Commissioning Unit 1	90 d	06/25/16	09/22/16	45,49,44,34,47	2.45%
51	T/G - Commissioning Final Unit	70 d	03/08/17	05/16/17	50,46	78.80%
52	First Power (Unit 1)	0 d	09/22/16	09/22/16	47,50,34	0.00%
53	Full Power (Unit 4)	0 d	05/16/17	05/16/17	52,51	78.80%
54	**Full Commercial Power**	0 d	05/16/17	05/16/17	53,68	100.00%
55	**Island Link 600 MW (250 kV) HVdc VSC Link**	**2225 d**	**01/06/11**	**02/07/17**		**21.20%**
56	Island Link EA	365 d	04/01/11	03/30/12	7	1.11%
57	Initial Critical Contracting for Engineering Detailed Design	250 d	01/06/11	09/12/11	9	17.01%
58	Complete Contracting and Procurement	235 d	09/13/11	05/04/12	57	15.60%
59	HVdc TL Overland Construction - MF to Soldier's Pond	1500 d	08/03/12	09/10/16	56FS+44 d,7,58FS+90 d,11	16.69%
60	Soldier's Pond and Muskrat Falls Converter Stations	1200 d	05/12/12	08/24/15	56FS+42 d,7,11	0.03%
61	SOBI Cable Survey	42 d	07/05/13	08/15/13	56,7,57SS+520 d,58,11	1.43%
62	SOBI Design, Type Test & Manufacturing	420 d	08/16/13	10/09/14	61	1.06%
63	SOBI Cable Landfall and Protection Preparation	510 d	08/16/13	01/07/15	58,61	0.37%
64	SOBI Cable Installation (with weather window)	45 d	06/15/15	07/29/15	6,62,63	4.48%
65	Finalize SOBI Cable Protection Scope	90 d	07/30/15	10/27/15	6,64	3.05%
66	Island System Upgrades and Reinforcements	365 d	05/12/12	05/11/13	56FS+42 d	0.00%
67	System Testing and Commissioning	180 d	08/12/16	02/07/17	64FS-30 d,66FS-60 d,60FS-60 d,59FS-30 d	18.15%
68	Island Link Ready for Power Delivery	0 d	02/07/17	02/07/17	59,67,65	21.20%



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LOWER CHURCHILL PROJECT

Time-Risk Ranging

Lower Churchill Project Time-Risk Assessment
Ranging Sheet - Base Case

		Time-Risk Model			Changes in Months	
ID	Task Description	Duration	Start	Finish	Best	Worst
01	**Gateway Phase 2 Activities / Readiness to Mobilize EP+CM**	**824 d**	**1-Jul-09**	**2-Oct-11**		
02	Ready to Issue EP+CM RFP	0 d	31-May-10	31-May-10	0.5	1.5
03	Ratification of IBA by Innu Nation	240 d	1-Feb-10	28-Sep-10	3	8
04	Business Case Comfort Achieved by Gatekeeper	200 d	1-Mar-10	16-Sep-10	-0.5	3.5
05	Project Team Phase 3 Readiness Preparation (incl. IPR)	240 d	1-Jan-10	28-Aug-10	0	4
06	Complete Phase 2 Concept Optimization Studies (SOBI, MF, VSC)	420 d	1-Jul-09	24-Aug-10	0	2
07	**Gate 2 Approval**	**0 d**	**16-Oct-10**	**16-Oct-10**		
08	EP+CM Bid and Award	160 d	31-May-10	6-Nov-10	0	3
09	**EP+CM Contractor Mobilized**	**0 d**	**5-Jan-11**	**5-Jan-11**		
10	Gate 3 Key Deliverables	270 d	6-Jan-11	2-Oct-11	-2	4
11	**Project Sanction**	**0 d**	**2-Oct-11**	**2-Oct-11**		
12	**Muskrat Falls (824 MW) Plant**	**3820 d**	**1-Dec-06**	**16-May-17**		
13	Early Works Infrastructure Engineering & Procurement	200 d	1-Apr-10	17-Oct-10	-1	2
14	Early Civil Works & Reservoir Clearing Contracting	180 d	18-Oct-10	15-Apr-11	0	2
15	Phase 1 Camp - Vendor Engineering, Fab & Deliver	365 d	18-Oct-10	17-Oct-11	-1.5	3
16	Generation Project EA	1620 d	1-Dec-06	8-May-11	0	8
17	Initial Critical Contracting for Engineering Detailed Design	250 d	6-Jan-11	12-Sep-11	-1	3
18	**Readiness to Commence Site Work**	**0 d**	**19-Jun-11**	**19-Jun-11**		
19	Access Road & Early Site Roads Infrastructure	120 d	20-Jun-11	17-Oct-11	-1	2
20	Phase 1 Camp Construction	200 d	18-Oct-11	4-May-12	-1	3
21	Reservoir Clearing (incl decommissioning) & Habitat Compensation	1275 d	20-Jun-11	15-Dec-14	0	15
22	T/G - Prepare Specification and Tender Process	240 d	6-Jan-11	2-Sep-11	-1	2
23	**Award Turbine / Generator Contract**	**0 d**	**2-Oct-11**	**2-Oct-11**		

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LOWER CHURCHILL PROJECT

Time-Risk Ranging

Lower Churchill Project Time-Risk Assessment

Ranging Sheet - Base Case

		Time-Risk Model			Changes in Months	
ID	Task Description	Duration	Start	Finish	Best	Worst
24	T/Gs - Vendor Design, Model Test, Completion of Basic Design	365 d	3-Oct-11	1-Oct-12	-3	2
25	T/Gs - Shop Detailing, Fabrication, & Delivery - Unit 1	810 d	2-Oct-12	20-Dec-14	-3	2
26	T/Gs - Additional Time for Delivery of Final Unit	270 d	21-Dec-14	16-Sep-15	-3	3
27	Contracting for Civil Works (Powerhouse, Spillway, North Spur, RCC)	240 d	13-Sep-11	9-May-12	0	2
28	Spillway (Phase 1) - Excavation, Concrete & Gates	700 d	10-May-12	9-Apr-14	-2	4
29	Powerhouse Excavation (Incl Intake & Tailrace)	280 d	4-Jul-12	9-Apr-13	0	6
30	North Spur Work (Pre Phase 1 Impoundment)	250 d	10-May-12	14-Jan-13	-2	4
31	Intake & Powerhouse Primary Concrete	488 d	10-Apr-13	10-Aug-14	-2	6
32	Complete Powerhouse Crane Installation	30 d	11-Aug-14	9-Sep-14	-0.5	1
33	Contracting for 345 kV Hvac and CF Yard Ext. Materials and Constr.	270 d	3-Oct-11	28-Jun-12	-1	3
34	345 kV HVac TL to CF	908 d	29-Jun-12	23-Dec-14	-3	6
35	Powerhouse Secondary Concreting for Unit 1	420 d	22-Jul-14	14-Sep-15	-2	4
36	Completion of Secondary Concrete for Units 2 - 4	270 d	15-Sep-15	10-Jun-16	-1	2
37	Spillway - Upstream & Downstream Plug Removals	28 d	10-Apr-14	7-May-14	-0.5	0.5
38	Close Cofferdam	14 d	1-Jul-14	14-Jul-14	0	0.5
39	**Stage 1 Impoundment**	**14 d**	**15-Jul-14**	**28-Jul-14**		
40	North Dam (Foundation & Dam)	220 d	29-Jul-14	18-Aug-15	-1	2
41	**"Year after Project Sanction (Task 11)"**	**365 d**	**3-Oct-11**	**1-Oct-12**		
42	**"90 Days after Start of Powerhouse Excavation (Task 27)"**	**90 d**	**4-Jul-12**	**1-Oct-12**		
43	South Dam (RCC)	194 d	2-Oct-12	26-Sep-13	-1	3
44	CF Switchyard Mods	222 d	29-Jun-12	21-Jul-13	-2	4
45	T/G - Assembly/Installation Unit 1	365 d	12-Jun-15	10-Jun-16	-2	2
46	T/G - Assembly/Installation Final Unit	365 d	8-Mar-16	7-Mar-17	-1.5	1.5

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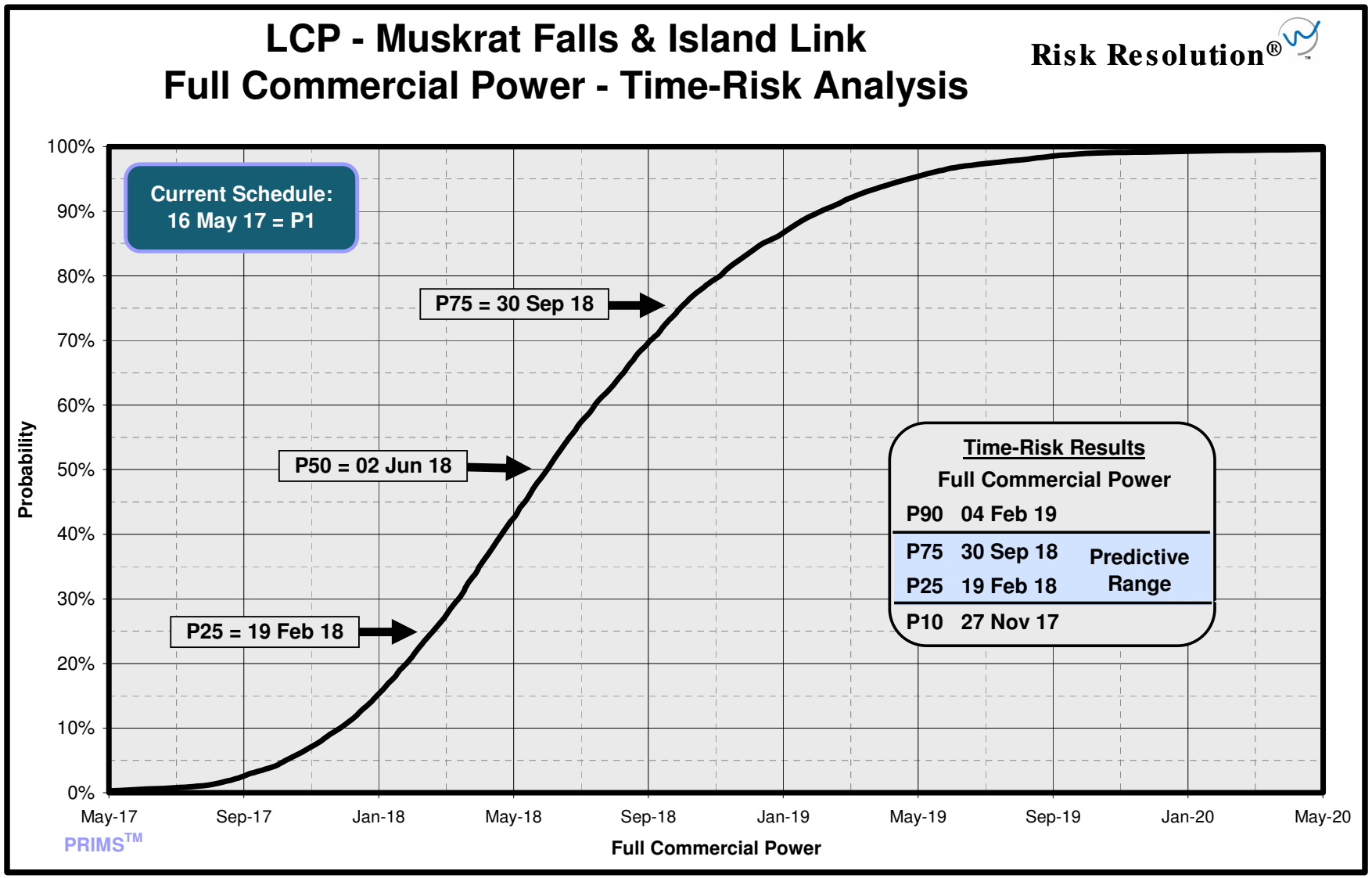
LOWER CHURCHILL PROJECT

Time-Risk Ranging

Lower Churchill Project Time-Risk Assessment
Ranging Sheet - Base Case

		Time-Risk Model			Changes in Months	
ID	Task Description	Duration	Start	Finish	Best	Worst
47	Construct MF Switchyard	220 d	22-Jul-13	26-Feb-14	0	4
48	**Tailrace Plug Removal**	**28 d**	**14-May-16**	**10-Jun-16**		
49	**Stage 2 Impoundment**	**14 d**	**11-Jun-16**	**24-Jun-16**		
50	T/G - Commissioning Unit 1	90 d	25-Jun-16	22-Sep-16	-0.5	3
51	T/G - Commissioning Final Unit	70 d	8-Mar-17	16-May-17	0	2
52	**First Power (Unit 1)**	**0 d**	**22-Sep-16**	**22-Sep-16**		
53	**Full Power (Unit 4)**	**0 d**	**16-May-17**	**16-May-17**		
54	**Full Commercial Power**	**0 d**	**16-May-17**	**16-May-17**		
55	**Island Link 600 MW (250 kV) HVdc VSC Link**	**2225 d**	**6-Jan-11**	**7-Feb-17**		
56	Island Link EA	365 d	1-Apr-11	30-Mar-12	0	6
57	Initial Critical Contracting for Engineering Detailed Design	250 d	6-Jan-11	12-Sep-11	-1	4
58	Complete Contracting and Procurement	235 d	13-Sep-11	4-May-12	0	4
59	HVdc TL Overland Construction - MF to Soldier's Pond	1500 d	3-Aug-12	10-Sep-16	-6	6
60	Soldier's Pond and Muskrat Falls Converter Stations	1200 d	12-May-12	24-Aug-15	-2	4
61	SOBI Cable Survey	42 d	5-Jul-13	15-Aug-13	-0.5	0.5
62	SOBI Design, Type Test & Manufacturing	420 d	16-Aug-13	9-Oct-14	-3	12
63	SOBI Cable Landfall and Protection Preparation	510 d	16-Aug-13	7-Jan-15	-6	6
64	SOBI Cable Installation (with weather window)	45 d	15-Jun-15	29-Jul-15	-0.5	0.5
65	Finalize SOBI Cable Protection Scope	90 d	30-Jul-15	27-Oct-15	-1	3
66	Island System Upgrades and Reinforcements	365 d	12-May-12	11-May-13	-2	6
67	System Testing and Commissioning	180 d	12-Aug-16	7-Feb-17	-1	6
68	**Island Link Ready for Power Delivery**	**0 d**	**7-Feb-17**	**7-Feb-17**		
	Last Line					

Time-Risk Assessment Results



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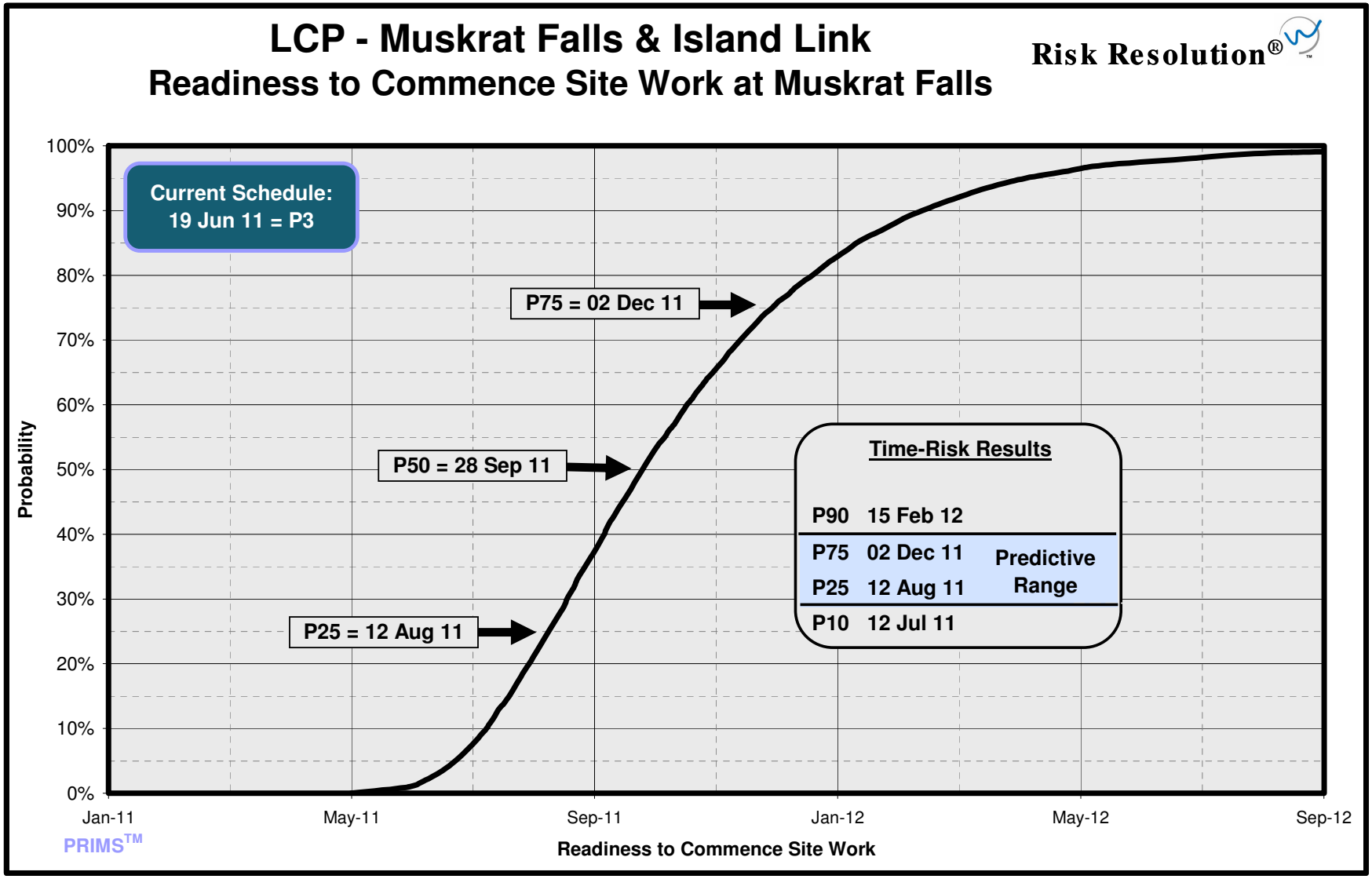
Time-Risk Assessment Results



Time-Risk Assessment Results

LCP - Muskrat Falls and Island Link - Timing of Key Tasks/Milestones

Task	Current Schedule	Time-Risk Model Results P25	P50	P75	Difference (P50 - Schedule)
9 - EP+CM Contractor Mobilized	05-Jan-11	26-Feb-11	21-Mar-11	17-Apr-11	2.5 months
16 - Generation Project EA (finish)	08-May-11	17-Jun-11	09-Aug-11	18-Oct-11	3.0 months
18 - Ready to Start Site Work at Muskrat Falls	19-Jun-11	12-Aug-11	28-Sep-11	02-Dec-11	3.5 months
23 - Award Turbine / Generator Contract	02-Oct-11	10-Dec-11	24-Jan-12	18-Mar-12	3.5 months
28 - Spillway (Phase 1) - (start)	10-May-12	15-Sep-12	02-Nov-12	03-Jan-13	5.5 months
52 - First Power (Unit 1)	22-Sep-16	21-May-17	07-Sep-17	04-Jan-18	11.5 months
56 - Island Link EA (finish)	30-Mar-12	29-Apr-12	09-Jun-12	02-Aug-12	2.5 months
64 - SOBI Cable Installation (finish)	29-Jul-15	02-Aug-15	11-Jul-16	01-Aug-16	11.5 months
68 - Island Link Ready for Power Delivery	07-Feb-17	13-Jun-17	02-Oct-17	03-Mar-18	8.0 months
54 - Full Commercial Power	16-May-17	19-Feb-18	02-Jun-18	30-Sep-18	12.5 months

Analysis of Probabilistic Critical Path

In the early portion of the Time-Risk model, there are primarily two parallel paths which share the probabilistic critical path:

- EP+CM Bid and Award (Task 8) – on the probabilistic critical path in approximately 64% of the iterations; the timing for Gate 2 Approval has only a modest impact on this task (critical 17% of the time)

- Generation Project EA (Task 16) - on the probabilistic critical path in approximately 30% of the iterations

Analysis of Probabilistic Critical Path

In the middle portion of the Time-Risk model, there are primarily four parallel paths which share the probabilistic critical path:

- Generation Project EA (Task 16) through Phase 1 Camp Construction (Task 20) to Powerhouse Excavation (Task 29) – on the probabilistic critical path in approximately 31% of the iterations

- EP+CM Contractor Mobilized (Task 9) through Gate 3 Key Deliverables (Task 10) and T/Gs – Vendor Design, Model Test, Completion of Basic Design (Task 24) to Powerhouse Excavation (Task 29) – critical 29% of the time

- EP+CM Contractor Mobilized (Task 9) through Contracting for Civil Works (Task 27) to Powerhouse Excavation (Task 29) – critical 18%

- EP+CM Contractor Mobilized (Task 9) to Island Link Initial Critical Contracting for Engineering Detailed Design – critical 18%

Analysis of Probabilistic Critical Path

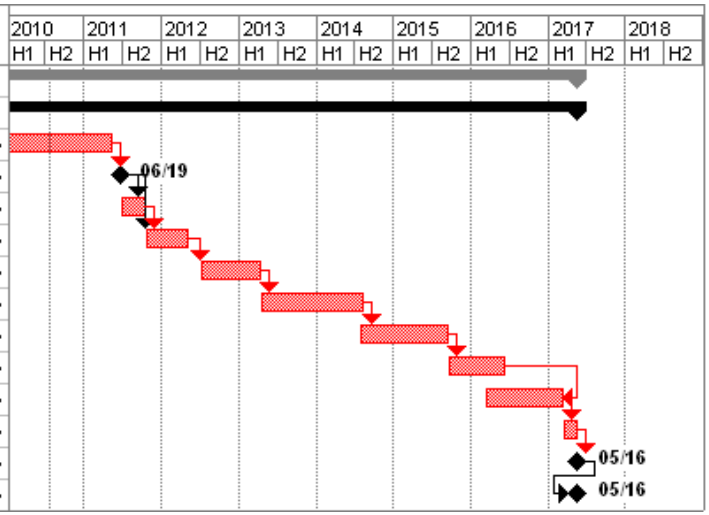
In the later portion of the Time-Risk model, there are primarily two parallel paths which share the probabilistic critical path:

- Powerhouse Excavation (Task 29) through T/G – Commissioning Final Unit (Task 51) to Full Commercial Power (Task 54) – on the probabilistic critical path in approximately 80% of the iterations

- Island Link Initial Critical Contracting for Engineering Detailed Design (Task 57) through Island Link System Testing and Commissioning (Task 67) to Full Commercial Power (Task 54) - on the probabilistic critical path in approximately 20% of the iterations

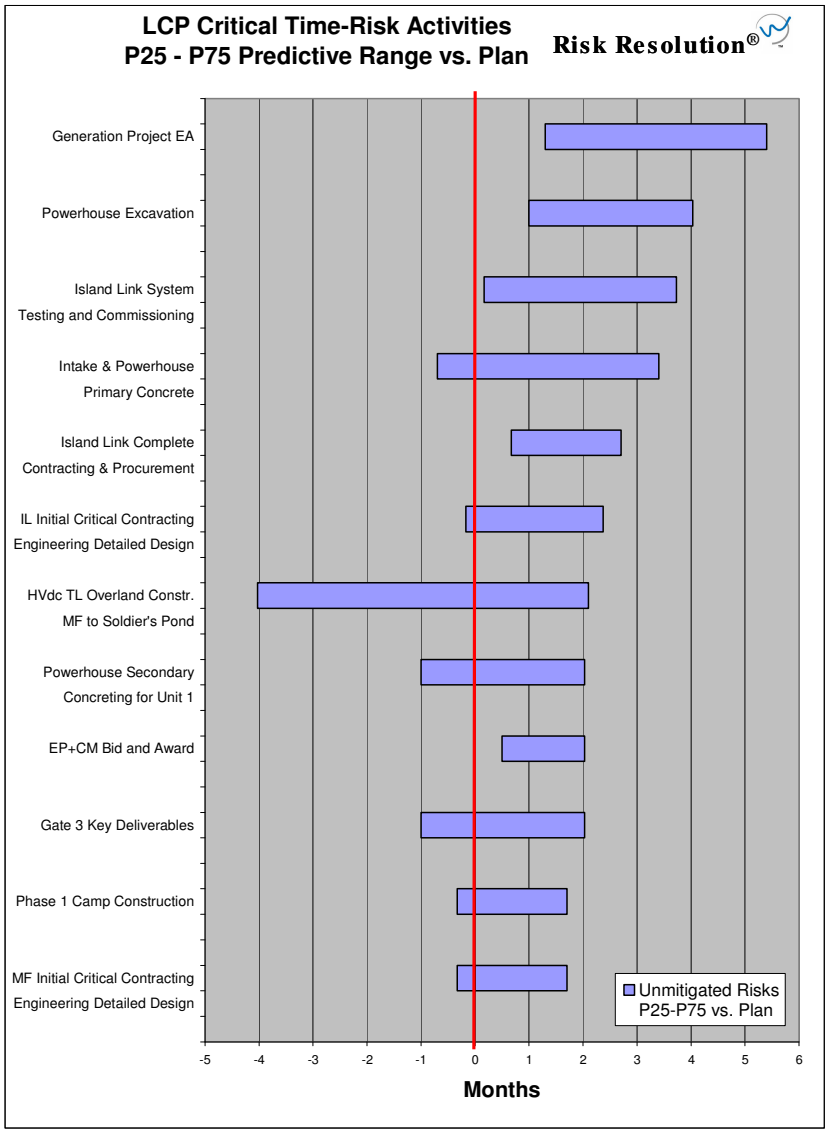
Most Common Probabilistic Critical Path

ID	Name	Duration	Start	Finish	@RISK: Critical Index
0	**Nalcor Energy - Lower Churchill Project - June 2010**	**3820 d**	**12/01/06**	**05/16/17**	
12	**Muskrat Falls (824 MW) Plant**	**3820 d**	**12/01/06**	**05/16/17**	**78.81%**
16	Generation Project EA	1620 d	12/01/06	05/08/11	29.83%
18	Readiness to Commence Site Work	0 d	06/19/11	06/19/11	31.24%
19	Access Road & Early Site Roads Infrastructure	120 d	06/20/11	10/17/11	30.67%
20	Phase 1 Camp Construction	200 d	10/18/11	05/04/12	30.93%
29	Powerhouse Excavation (Incl Intake & Tailrace)	280 d	07/04/12	04/09/13	76.61%
31	Intake & Powerhouse Primary Concrete	488 d	04/10/13	08/10/14	76.61%
35	Powerhouse Secondary Concreting for Unit 1	420 d	07/22/14	09/14/15	76.61%
36	Completion of Secondary Concrete for Units 2 - 4	270 d	09/15/15	06/10/16	75.73%
46	T/G - Assembly/Installation Final Unit	365 d	03/08/16	03/07/17	76.35%
51	T/G - Commissioning Final Unit	70 d	03/08/17	05/16/17	78.80%
53	Full Power (Unit 4)	0 d	05/16/17	05/16/17	78.80%
54	**Full Commercial Power**	0 d	05/16/17	05/16/17	100.00%



* The task network identified above represents the most commonly occurring unique critical path in the Monte Carlo simulation. There are several individual tasks, not on this unique critical path, which have a significant impact on the Time-Risk results. The individual tasks most critical to the Time-Risk results are identified on slides 21 and 22.

Time-Risk Tornado Chart



Percent of Time on Probabilistic Critical Path

30%
77%
18%
77%
16%
17%
17%
77%
63%
22%
31%
18%

The P25-P75 vs. Plan ranges (shown in blue) indicate which tasks have a high level of uncertainty; the information on probabilistic critical paths indicates the likelihood of a given risk impacting project results.

To accelerate the expected timing of Full Commercial Power, it is recommended that risk mitigation efforts focus on those tasks which have a high level of uncertainty and are on the probabilistic critical path a high percentage of the time. It may also be helpful to take action that would change the model logic (such as accelerating the mobilization of the EP+CM contractor).

Predictive Range vs. Schedule (Months)

Schedule Activities with Significant Time Risk

The analysis shows that these seven activities have the greatest impact on project timing and, therefore, should receive considerable attention.

	Months P25*	Months P75*
≈ Generation Project EA	1.5	5.5
≈ Powerhouse Excavation	1.0	4.0
≈ Island Link Testing & Comm.	0	3.5
≈ Intake & Pwrhse Pri. Concrete	-0.5	3.5
≈ Pwrhse Sec. Concret. Unit 1	-1.0	2.0
≈ EP+CM Bid and Award	0.5	2.0
≈ Phase 1 Camp Construct.	-0.5	1.5

Base Case Predictive Range vs. Plan:
P25 = 9 months and P75 = 16 months

***Values may not be added to give total exposure.**

Tactical-Risk Assessment

Basis of Assessment

The Tactical-Risk Assessment considers the impact of definition and performance risks on the project cost estimate. Nalcor provided estimates for both the Muskrat Falls Plant and the 600 MW HVdc VSC Island Link (not including any contingency amounts) using its Case 8 capital cost assumptions. Each cost estimate was broken down by major category.

Westney consultants met with Nalcor representatives to discuss the Best and Worst Case ranges around the estimate for each cost category. The final ranging was performed by Nalcor, but it was vetted and questioned by the Westney participants. Westney selected the probability distributions to use with the ranged data and ran the Monte Carlo simulation.

Assessment Results

Tactical-Risk Results

The P50 of the Tactical-Risk Assessment equates to the cost estimate plus the recommended contingency. The Tactical-Risk Assessment yields the following results for the Muskrat Falls Plant combined with the Island Link:

	Millions of C$
Tactical-Risk P50:	$3,885
Muskrat Falls Estimate:	$2,215
Island Link Estimate:	+$1,144
Total Estimate:	$3,359 (100%)
	$3,885
	-$3,359
Recommended Contingency:	$526 (16%)

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Tactical-Risk Ranging

Lower Churchill Project - Muskrat Falls & Island Link

Tactical Cost Ranging Sheet

Cost Category	Original Estimate (C$ MM)	Spent to Date (C$ MM)	Special Adjust-ments (C$ MM)	Cost to be Risked (C$ MM)	Risk Range: Best - What % Less Could It Cost? (enter as negative)	Risk Range: Worst - What % More Could It Cost?	Risk Range: Best Cost (C$ MM)	Risk Range: Worst Cost (C$ MM)
Muskrat Falls								
Site Preparation & Access Roads	17.0			17.0	-10	200	15.3	50.9
Camp and Support Facilities	233.0			233.0	-20	15	186.4	268.0
Communications	12.6			12.6	-10	100	11.3	25.2
Reservoir Clearing / Preparation	119.1			119.1	-20	20	95.3	142.9
Main Excavation Works	77.2			77.2	-15	25	65.6	96.5
Intake & Powerhouse	519.1			519.1	-30	40	363.4	726.8
Spillway Structure	121.3			121.3	0	25	121.3	151.6
Cofferdams & North Spur Stabilization	74.1			74.1	-10	20	66.7	88.9
RCC Dams - North and South	78.4			78.4	-10	20	70.6	94.1
Turbines & Generators	326.9			326.9	-10	20	294.2	392.3
Muskrat Falls Switchyard (230 kV)	28.3			28.3	-10	30	25.5	36.8
CF Switchyard Extension	22.8			22.8	-10	40	20.5	31.9
345 kV Dual Transmission Lines - MF to CF	210.4			210.4	-15	20	178.8	252.5
Feasibility & Design Engineering	40.0			40.0	50	175	60.0	110.0
Insurance	30.0			30.0	-10	20	27.0	36.0
Owner / Project Mgmt / Construction Mgmt	255.0			255.0	-15	50	216.8	382.5
Habitat Compensation	30.0			30.0	0	100	30.0	60.0
Historical / Prior Costs (Spent)	20.0	20.0		0.0				
Muskrat Falls Total, C$ MM	**2,215.2**	**20.0**	**0.0**	**2,195.2**				

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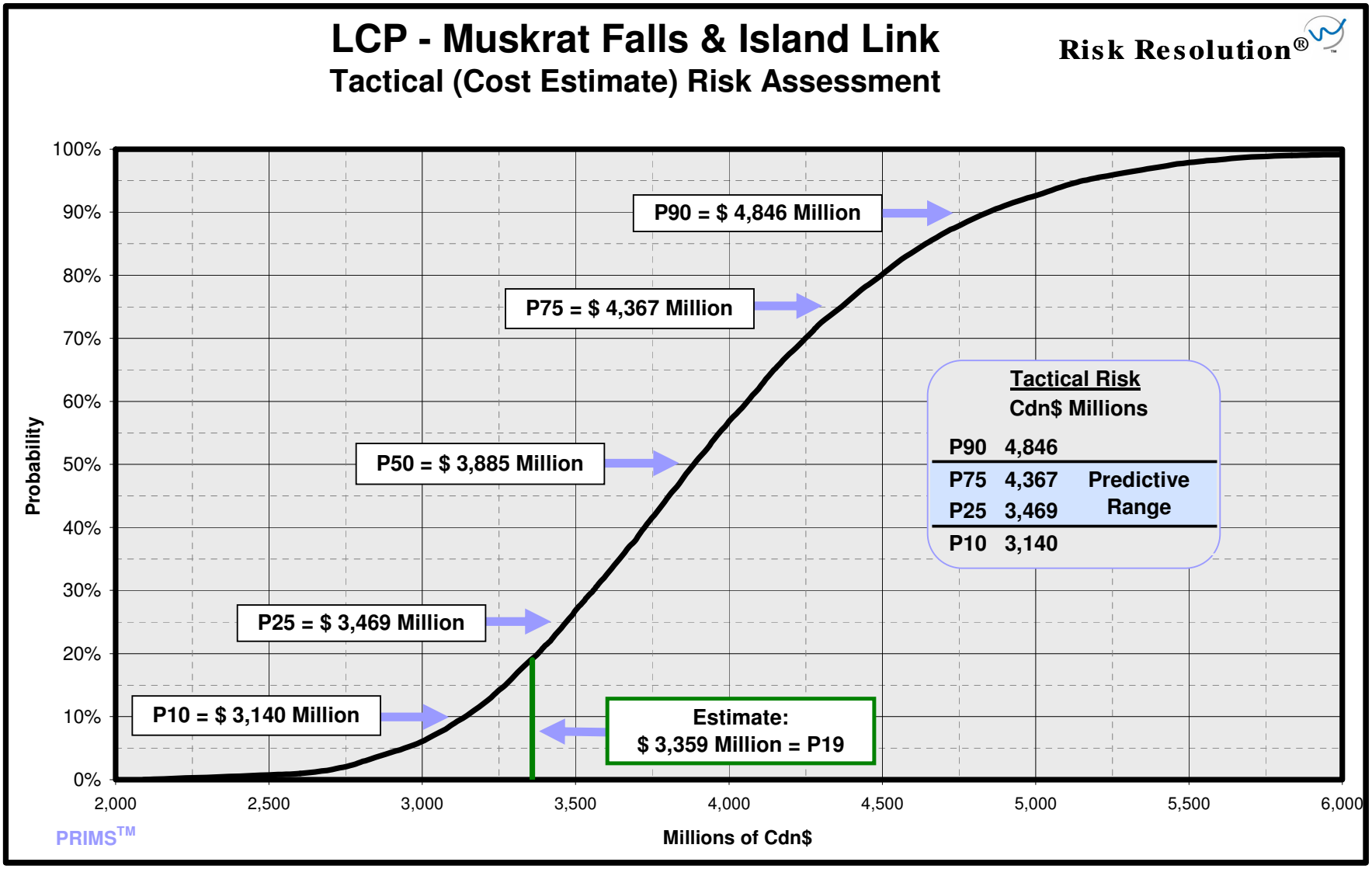
LOWER CHURCHILL PROJECT

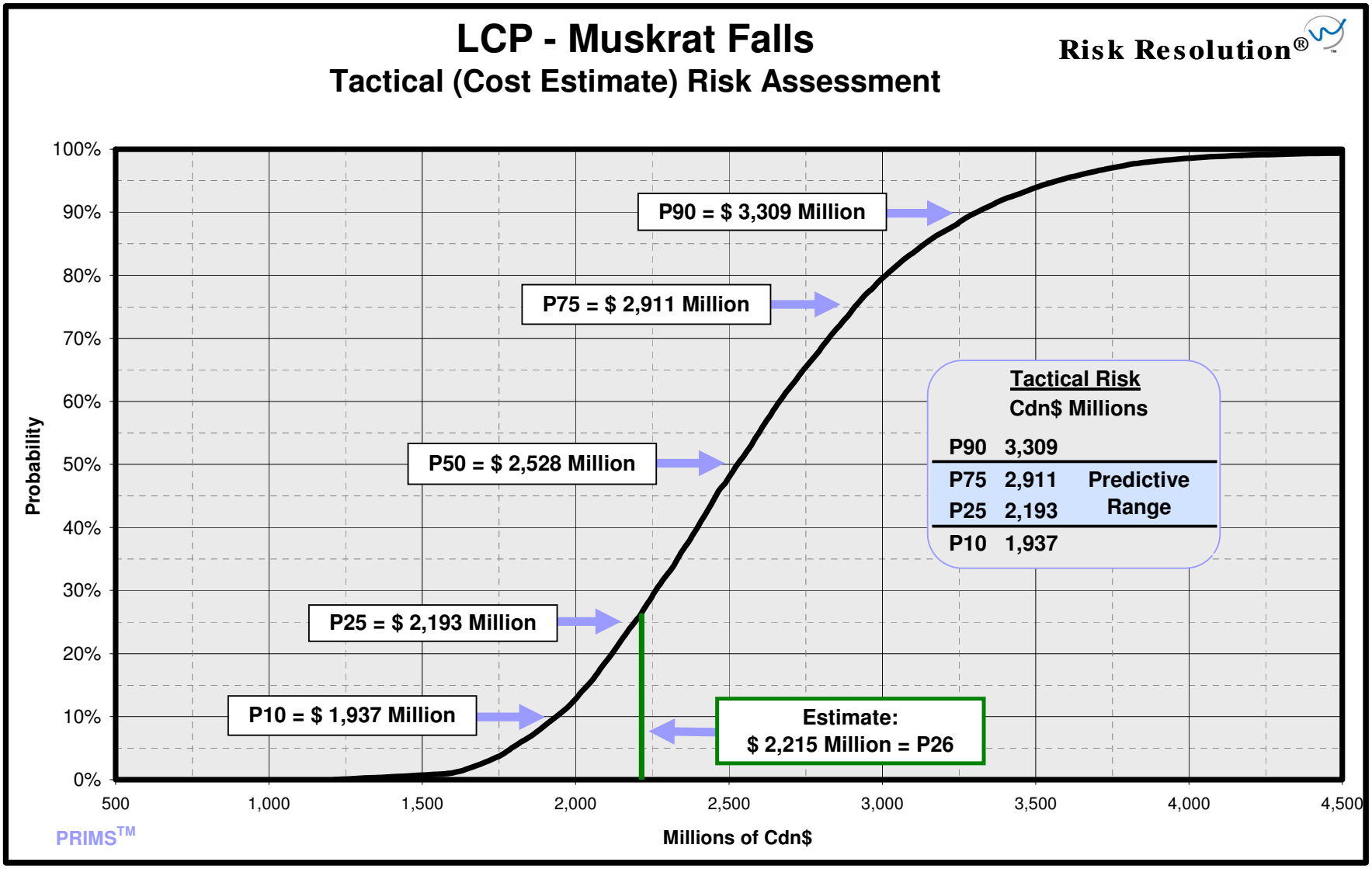
Tactical-Risk Ranging

Lower Churchill Project - Muskrat Falls & Island Link Tactical Cost Ranging Sheet					Risk Range			
Cost Category	**Original Estimate (C$ MM)**	**Spent to Date (C$ MM)**	**Special Adjust-ments (C$ MM)**	**Cost to be Risked (C$ MM)**	**Best - What % Less Could It Cost? (enter as negative)**	**Worst - What % More Could It Cost?**	**Best Cost (C$ MM)**	**Worst Cost (C$ MM)**
600MW HVdc VSC Island Link								
Converter Station 600 MW - Muskrat Falls	126.0			126.0	-10	25	113	158
Converter Station 540 MW - Soldiers Pond	113.4			113.4	-10	25	102	142
Cable Supply & Delivery	61.7			61.7	0	100	62	123
SOBI Cable Install & Protection	145.1			145.1	0	60	145	232
Overland Tx - Muskrat Falls to SOBI	122.5			122.5	-10	35	110	165
Overland Tx - SOBI to Taylor's Brook	83.3			83.3	-10	25	75	104
Overland Tx - Taylor's Brook to Soldier's Pond	157.5			157.5	-10	20	142	189
Switchyards	34.5			34.5	-10	30	31	45
Island Upgrades	6.8			6.8	0	200	7	20
Electrodes	48.4			48.4	-10	30	44	63
Habitat Compensation	12.0			12.0	-50	100	6	24
Owner / Project Mgmt / Construction Mgmt	170.4			170.4	0	35	170	230
Historical / Prior Costs (Spent)	62.0	62.0		0.0				
600MW HVdc VSC Island Link Total, C$ MM	**1,143.6**	**62.0**	**0.0**	**1,081.6**				
Project Total Cost								
Project Total Cost, C$ MM	**3,358.8**	**82.0**	**0.0**	**3,276.8**				

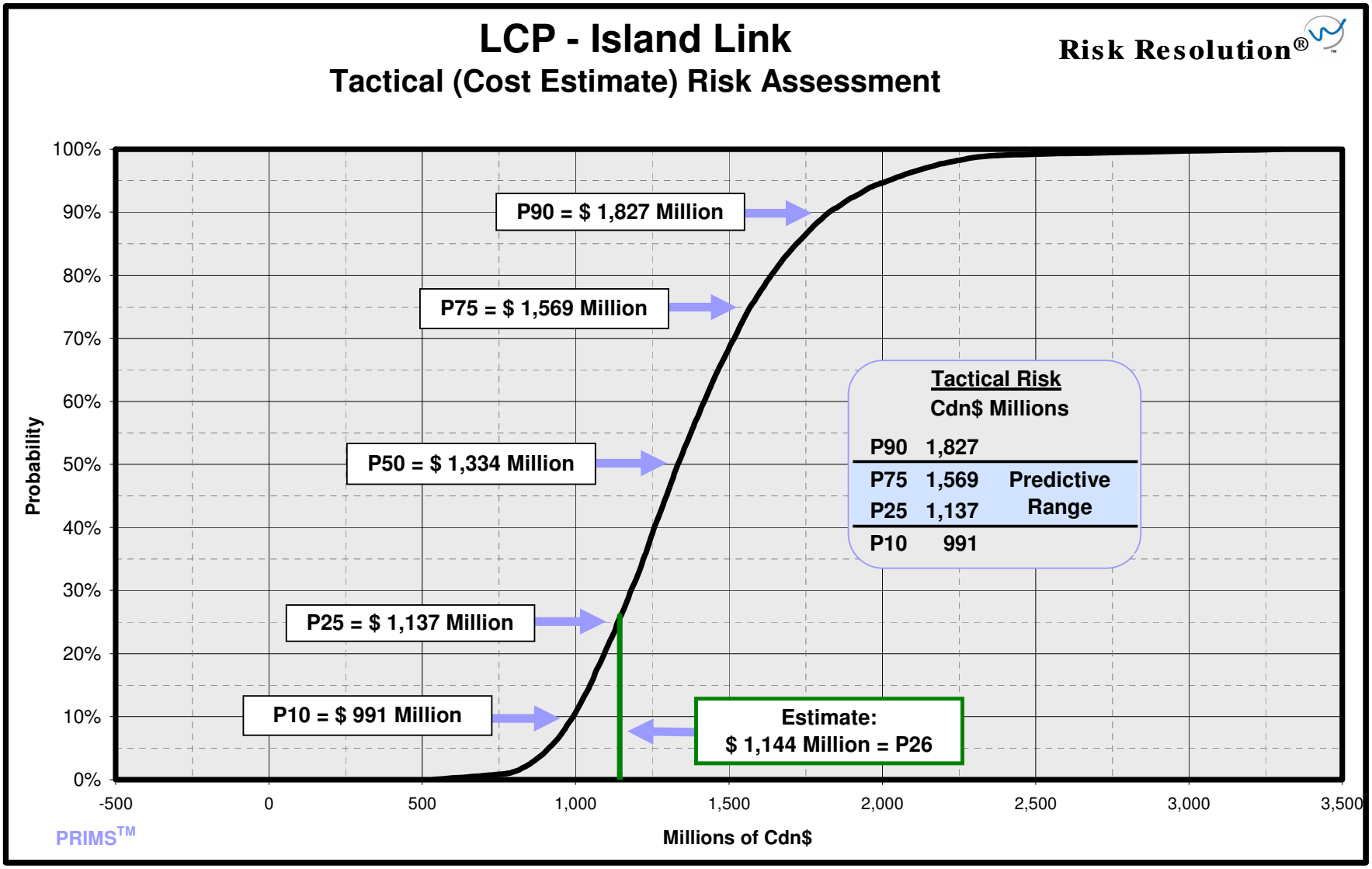
Tactical-Risk Assessment



Tactical-Risk Assessment



Tactical-Risk Assessment



Strategic-Risk Assessment

Basis of Assessment

The Strategic-Risk Assessment does not consider the impact of tactical risks (i.e., estimate contingency) on the costs of the Lower Churchill Project. This assessment dealt solely with Capex issues; revenue and Opex issues were noted for the economic model.

The strategic risks for the Muskrat Falls Plant and the Island Link were identified and framed on a preliminary basis by the Nalcor team. Westney consultants met with Nalcor representatives at Nalcor's St. John's office to discuss possible outcomes for both the Unmitigated and Mitigated cases. The final ranging was performed by the Nalcor team, but it was vetted and questioned by the Westney participants. The Monte Carlo simulation was run by Westney.

Assessment Results

Strategic Risk Exposure

The Strategic Risk Exposure is the range of the costs that might be incurred that currently would not be incorporated into the estimate. A decision will be required as to whether these risks become costs in the estimate or remain as Risk Exposure above the estimate.

	Predictive Range	
	P25 (mil)	P75 (mil)
Unmitigated Risk Exposure	$490	$852
Mitigated Risk Exposure*	$187	$413

*Includes costs of mitigation.
All currency is in C$.

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Strategic Risks Considered in Analysis

Key Risks / Potential Benefits

Bold Comments are Mitigations

Impact (Millions)
Unmitigated
Mitigated (including cost of mitigation)

Organizational Risks

1 Organizational experience and resources for a project of this size

- Processes, Resources, and Governance
- Specific experience of large hydro project
- **Mitigation represents early and aggressive effort to address each issue**
  - **Recruiting experienced people**
  - **Installing best of practice processes and governance**
  - **Plans to secure experienced consultants and contractors**

$0 to $50
-$50 to $10

Interface Risks

2 Time required under Crown Corporation rules to gain approval

- Delayed decisions leading to schedule slippage and cost increases
- Loss of vendor and contractor interest
- Loss of team morale
- **Mitigation - Communicate impact of issue to stakeholders and proactively work at executive level**

$7 to $20
$4 to $10

Financial Risks

3 Changes in the financial market

- Increased interest rate spreads
- Preferred financing instruments may not be available in quantities or on terms and conditions projected
- **Little mitigation possible**

Not Applicable

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Strategic Risks Considered in Analysis

Key Risks / Potential Benefits

Bold Comments are Mitigations

Impact (Millions)
Unmitigated
Mitigated (including cost of mitigation)

Financial Risks

4 Foreign currency exchange risk

- Approximately $1.0 B of estimate is in non-CAD $ expenditures (e.g., U.S.$, Kroner, Euro)
- Potential for 10% swing in exchange rates
- **Mitigated Case assumes hedging of all currency risks**

-$100 to $100
$10

---

5 Risk Premium for obtaining lump sum contracts

- Market shifting from seller's market to buyer's market for contractors and vendors
- Contractor and vendor creditworthiness continues to be a concern for potential financiers
- **Reduce exposure by using independent risk brokering to improve risk allocation and/or increase equity contribution**

Not Applicable

Commercial Risks

6 Extra year required to secure long-term PPA's

- Concern about time to secure agreements to support financial close
- **Mitigate potential exposure by awarding engineering contract at Gate 2b only when clarity on market access is available**
- **Risk is not entirely within Nalcor's control, thus some acceptance of this risk is required**

Not Applicable

Strategic Risks Considered in Analysis

Key Risks / Potential Benefits

Bold Comments are Mitigations

Impact (Millions)
Unmitigated
Mitigated (including cost of mitigation)

Commercial Risks

7 Federal government support for generation and transmission projects

- Federal government visible support of the project in any form would benefit the confidence in the market that the project will proceed
- **Active pursuit of support by executive management**

Not Quantified in Analysis

---

8 Changing power market portfolio requires changes in project scope

- The power market for this project could influence new routes and capacities for power sales
- **Mitigate by engaging counterparties and validating project scope assumptions ASAP and maximizing Front-End Loading prior to sanction**

Not Applicable

HSE Risks

9 Good HSE record is critical for project success

- Remote and difficult site
- Multiple work faces
- Potential for contamination of river
- **Mitigation includes early and proactive program to promote and secure commitment to best practices**
- **Engage and retain contractors who are leaders in safety performance**

$0 to $100
$10 to $20

Strategic Risks Considered in Analysis

Key Risks / Potential Benefits

Bold Comments are Mitigations

Impact (Millions)
Unmitigated
Mitigated (including cost of mitigation)

Engineering / Technical Risks

10 Availability of resources to achieve a quality design

- Limited capacity within NL for hydro, resulting in need to mobilize resources outside the Province
- Hydro design market level of demand not seen since 1988
- Many reductions in hydro engineering resources in last decade
- **Mitigations include:**
  - **Taking early and aggressive action to secure required engineering competencies and resources**
  - **Scheduling sufficient time for engineering completion prior to start of construction**
  - **Implementing a project-wide Quality Management System and embed QA requirements in all contracts**

$10 to $35
-$10 to $10

---

11 Submarine cable crossing of Strait of Belle Isle

- Many firsts:
  - Buried shore approaches due to icebergs
  - Weather window very short
  - Sea currents at 5 to 7 knots will be very challenging
  - Viability of trenching technology is questionable
  - Limited capacity of installation vessels
- **Mitigations include:**
  - **Evaluate all available opportunities as soon as possible**
  - **Engage best consultants for subsurface conditions**
  - **Additional studies, particularly on trenching technology**

$0 to $100
$0 to $50

Strategic Risks Considered in Analysis

Key Risks / Potential Benefits

Bold Comments are Mitigations

Impact (Millions)
Unmitigated
Mitigated (including cost of mitigation)

Engineering / Technical Risks

12 Faults in submarine cable during commissioning and post installation

- Recent installations in Europe experiencing faults
- Faults in buried Belle Isle section expensive to repair
- **Mitigations include using a conservative, robust design**
- **Using lessons learned from recent installations**
- **Evaluating insurance coverage**

$0 to $120
$0 to $50

---

13 System reliability during commissioning and start-up

- Many hydro projects have had reliability issues in recent years
- **Engage experienced engineering contractors**
- **Conduct system studies**
- **Consider commercial insurance products**

$0 to $75
$5 to $15

Environmental Approvals & Permitting Risks

14 Securing generation project release from Environmental Assessment

- Highly problematic
  - Regulators decision-making process
  - Use of process to protest project
  - Alternatives requested
- **Bolster team resources to allow for efficient management and support of the EA process**
- **Step up consultation efforts, esp. w/ aboriginal groups**

$0 to $30
$0 to $5

Strategic Risks Considered in Analysis

Key Risks / Potential Benefits

Bold Comments are Mitigations

Impact (Millions)
Unmitigated
Mitigated (including cost of mitigation)

Environmental Approvals and Permitting Risks

15 Environmental process impact on design

- Design changes may be required as a result of environmental concessions
- **Work to understand issues and accommodate realistic solutions early in design process to minimize downstream effects on procurement and construction**

$0 to $10
$0

---

16 Unanticipated design changes impact environmental process

- Due to changes, the design may no longer be consistent with concepts previously submitted for regulatory approval
- **Screen for issues early and try to work acceptable solutions that avoid schedule impact**
- **Include EA Manager in approval process for design changes**

$0 to $30
$0 to $10

Stakeholder Risks

17 Schedule impact due to delay in ratification of IBA by Labrador Innu Nation

- Ratification delay due to non-alignment within the Innu community
- **Maintain close ties with aboriginal leaders and be responsive to the needs of various aboriginal groups**

$0 to $20
$0 to $10

Strategic Risks Considered in Analysis

Key Risks / Potential Benefits

Bold Comments are Mitigations

Impact (Millions)
Unmitigated
Mitigated (including cost of mitigation)

Stakeholder Risks

18 Lack of support from other aboriginal groups

- Other aboriginal groups may claim a lack of consultation during the project EA process which may result in the EA process being stayed
- **Aggressively engage and consult all potentially impacted aboriginal groups**

$0 to $20
$0 to $10

---

19 Non-governmental organization / stakeholder protest

- Protest could come at critical stage of construction or during the EA process
- **Implement a stakeholder communication plan**
- **Focus on getting Nalcor's message out on the benefits of the project**

$0 to $25
$0 to $10

Muskrat Falls Construction Risks

20 Availability of experienced hydro contractors

- Industry consolidation and lack of hydro activity for 20 years has limited available and viable contractors
- Contractor market improving due to weakening demand
- **Engage worldwide market and "sell the project" to stimulate interest**
- **Use innovative contracting strategy to make project attractive to contractors with risk / benefit balance**

$0 to $50
$0 to $10

Strategic Risks Considered in Analysis

Key Risks / Potential Benefits

Bold Comments are Mitigations

Impact (Millions)
Unmitigated
Mitigated (including cost of mitigation)

Muskrat Falls Construction Risks

21	**Ability to use Newfoundland & Labrador contractors due to lack of creditworthiness**	– Conditions of project finance will demand contractors be creditworthy for value of scope – **Proactive program to educate contractors on issue** – **Work with contractors to find suitable partners or underwriters** – **Consider this risk in the contract package definition**	**Not Applicable**
22	**Availability of qualified construction management / supervision**	– Worldwide construction at historic high with peak early next decade; however, due to recession, there is a forecasted slowdown for the short to medium term – **Establish benefit/reward relationships with contractors** – **Actively recruit Newfoundlanders home**	**-$100 to $50** **-$100 to $10**
23	**Site conditions worse than geotechnical baseline**	– Contractors will not take unknown geotechnical risks without prohibitive risk premiums – **Maximize geotechnical investigations to determine conditions as well as possible before bidding**	**$0 to $75** **$0 to $75**

Strategic Risks Considered in Analysis

Key Risks / Potential Benefits

Bold Comments are Mitigations

Impact (Millions)
Unmitigated
Mitigated (including cost of mitigation)

Muskrat Falls Construction Risks

24 Availability and retention of skilled construction labour

- Current worldwide peak construction over Q2 2011
- **Actively recruit Newfoundlanders home**
- **Recruit supervision that works well with Newfoundlanders**
- **Negotiate a labor agreement that supports trade flexibility**

$0 to $40
$0 to $20

---

25 Availability of unskilled construction labour

- Remote jobsite and less desirable work
- **Promote opportunity for training and advancement**
- **Leverage underutilized labour pools**
- **Provide competitive opportunities for locals**

Not Applicable

Hydro Turbine Supplier Risks

26 Limited number of creditworthy hydro turbine suppliers

- "Seller's market" worldwide - order books full for 2010
- North America declining in importance as market
- **Actively engage the two existing "bankable" suppliers**
- **Explore contracting model and risk allocation strategy**
- **Decide early on strategy and selection of supplier**

$0 to $50
$0 to $50

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Strategic Risks Considered in Analysis

Key Risks / Potential Benefits

Bold Comments are Mitigations

Impact (Millions)
Unmitigated
Mitigated (including cost of mitigation)

De-escalation / Inflation Risks

27 **De-escalation / hyper-inflation risks**	– Driven by global demand with future difficult to predict – Need to consider hyperinflation due to significant barriers to entry in the specialty supply marketplace – **Monitor market and understand supply / demand balances for goods and materials**	**$0** **$0**

Transmission Risks

28 **Availability of experienced high-voltage contractors and skilled labour**	– Limited number of qualified transmission contractors – Resource requirements very large compared to supply – **Actively pursue potential suppliers worldwide** – **Phase the transmission build in order to flatten resource demands** – **Actively support training of linespersons**	**$0 to $100** **$0 to $20**
29 **Limited number of HVdc specialties suppliers and installers**	– Basically two suppliers and installers of subsea cable – Location (especially Strait of Belle Isle) challenging – Tight weather window for installation – **Optimize packaging strategy of HVdc specialties equipment and services to entice key players** – **Select and engage early to ensure availability**	**$0 to $50** **$2 to $35**

Strategic Risks Considered in Analysis

Key Risks / Potential Benefits

Bold Comments are Mitigations

Impact (Millions)
Unmitigated
Mitigated (including cost of mitigation)

Transmission Risks

30 Island Link EA results in late design changes

- Sea-return electrodes faced challenges in other jurisdictions
- Significant public concerns raised regarding access routes
- Habitat destruction in the SOBI due to submarine cable
- **Work to understand environmental issues and promote realistic solutions early in the design process**
- **Complete early concept desktop studies on potential design changes that the EA could recommend**

$0 to $50
$0 to $25

Shareholder Risks

31 Unwillingness of Shareholder to fund early construction on equity defers construction

- Current engineering and construction schedule assumes $1-2 B of equity injection by 2013
- Major go/no-go decision regarding equity spend is in late 2011 – concurrent with the next provincial election when there could be an unwillingness to commit to spending
- **Ensure early and ongoing alignment with the Shareholder on all aspects of the project**
- **Seek early commitment and release of capital for 2010 activities**

$0 to $50
$0 to $25

Strategic Risks Considered in Analysis

Key Risks / Potential Benefits

Bold Comments are Mitigations

Impact (Millions)
Unmitigated
Mitigated (including cost of mitigation)

Environmental Assessment Risks

32 Delay in the release of the Island Link from EA

- Federal government decisions on type and level of federal EA required have not yet been made
- Uncertainty re: type and location of electrodes
- Uncertainty re: conduit or subsea option for SOBI
- **Make a strategic decision to go with a Comprehensive Review rather than a Screening Study to avoid recycle and schedule slippage**
- **Increase stakeholder consultation activities**

$0
$0

Enterprise Risks

33 Uncertainty on commercial structure for transmission

- Ownership philosophy for the Maritime Link and Island Link not yet determined; Emera and NB Power are potential equity partners
- Uncertainty also exists as to whether this will be a merchant or regulated asset
- **Identify and evaluate all plausible options and develop recommendation based on alignment with Nalcor's and the Province's strategic objectives**
- **Aggressively engage Emera and NB Power**

$0
$0

Strategic Risks Considered in Analysis

Key Risks / Potential Benefits

Bold Comments are Mitigations

Impact (Millions)
Unmitigated
Mitigated (including cost of mitigation)

Technology Risks

34

Failure of application of VSC HVdc technology for Island Link

- Technology maturing for overhead system application – one existing overhead system built (Africa); however, currently not fully proven to operate within specification
- Fallback to LCC technology results in the need to install three 80 MVAR synchronous condensers and additional system reinforcements on the island
- **Monitor technology development / evolution and adjust project direction accordingly (there is time for the technology bugs to be worked out)**
- **Actively engage three HVdc vendors to study solutions for LCP**

$0 to $200
$0 to $200

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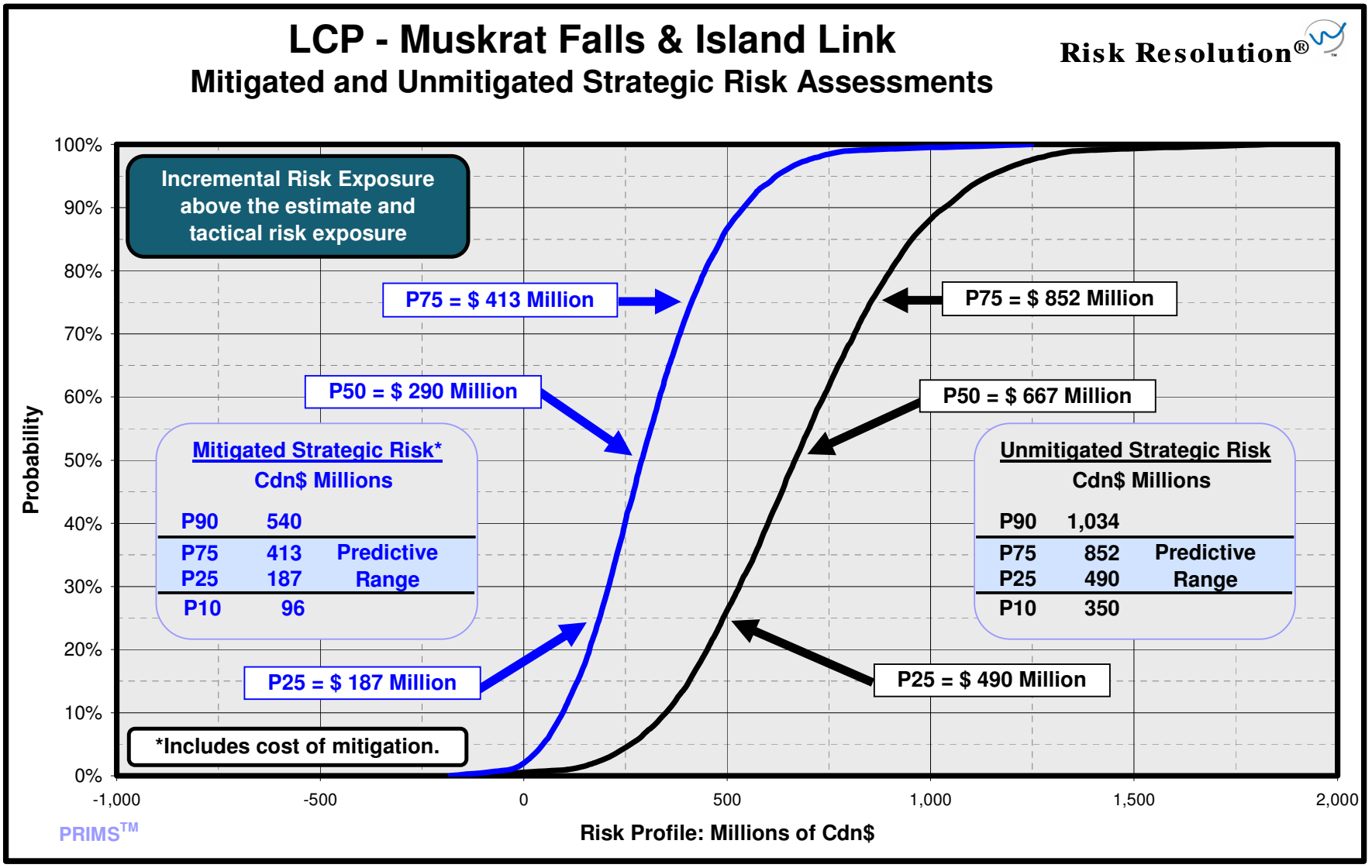
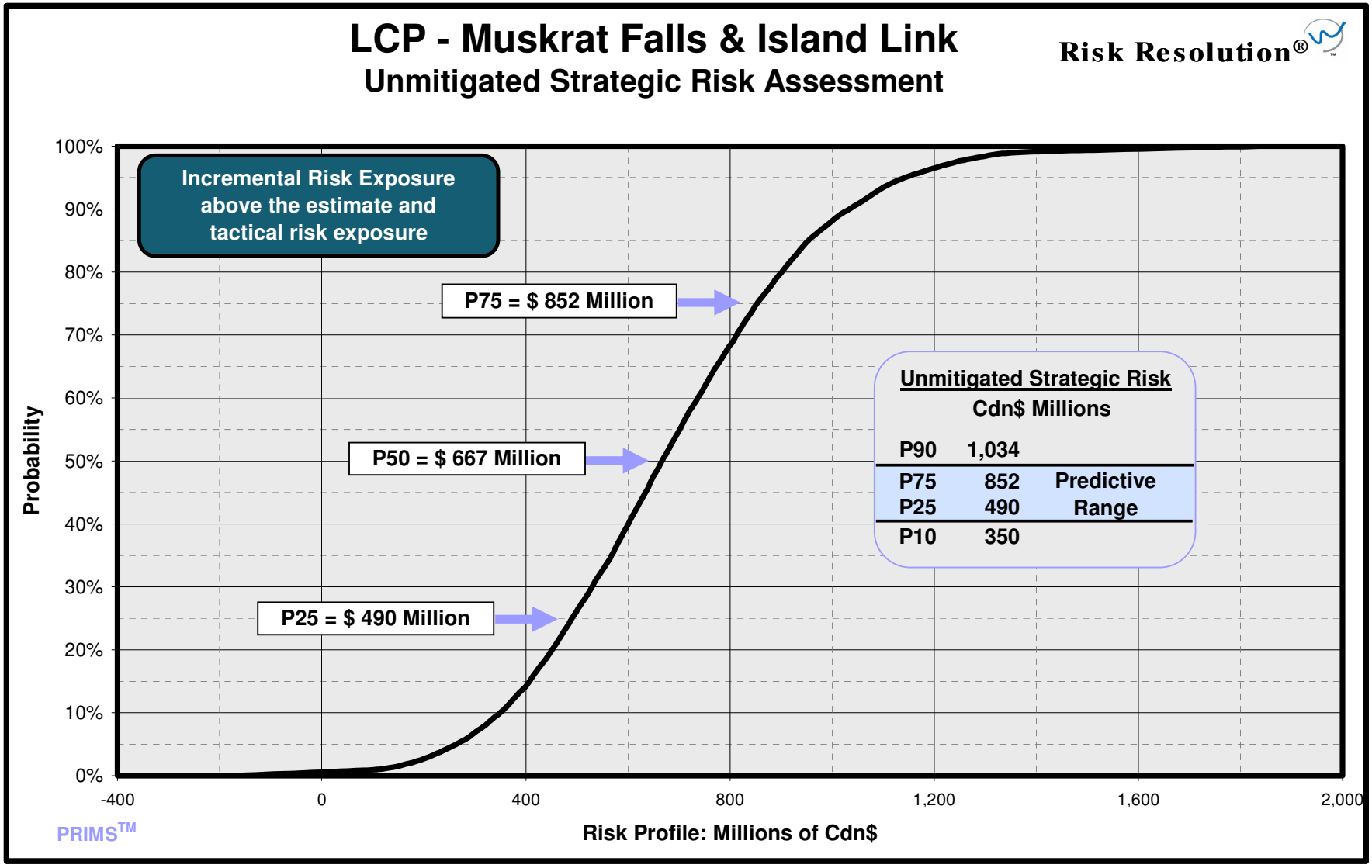
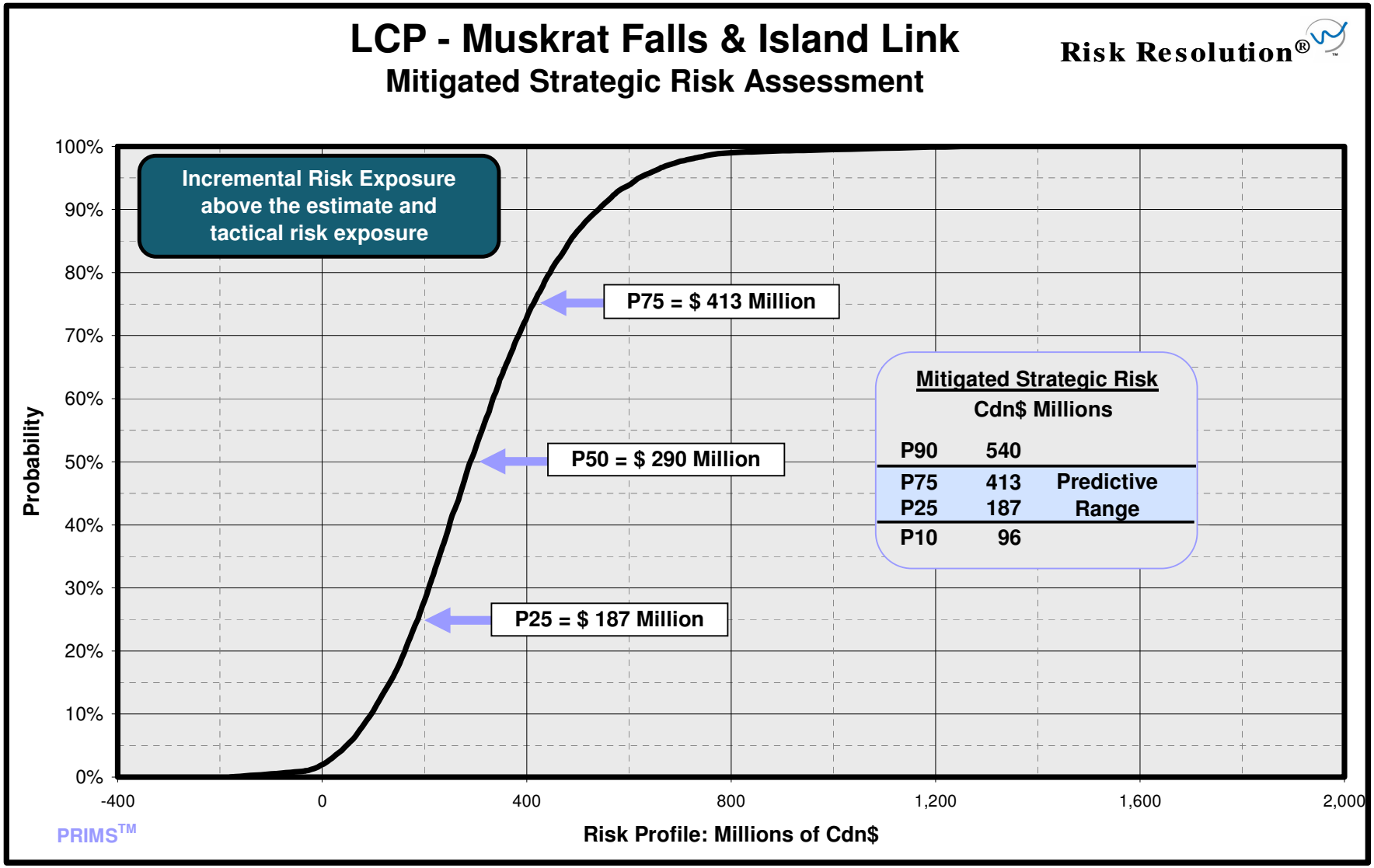
Strategic-Risk Exposure



Unmitigated Risk Exposure



Mitigated Risk Exposure



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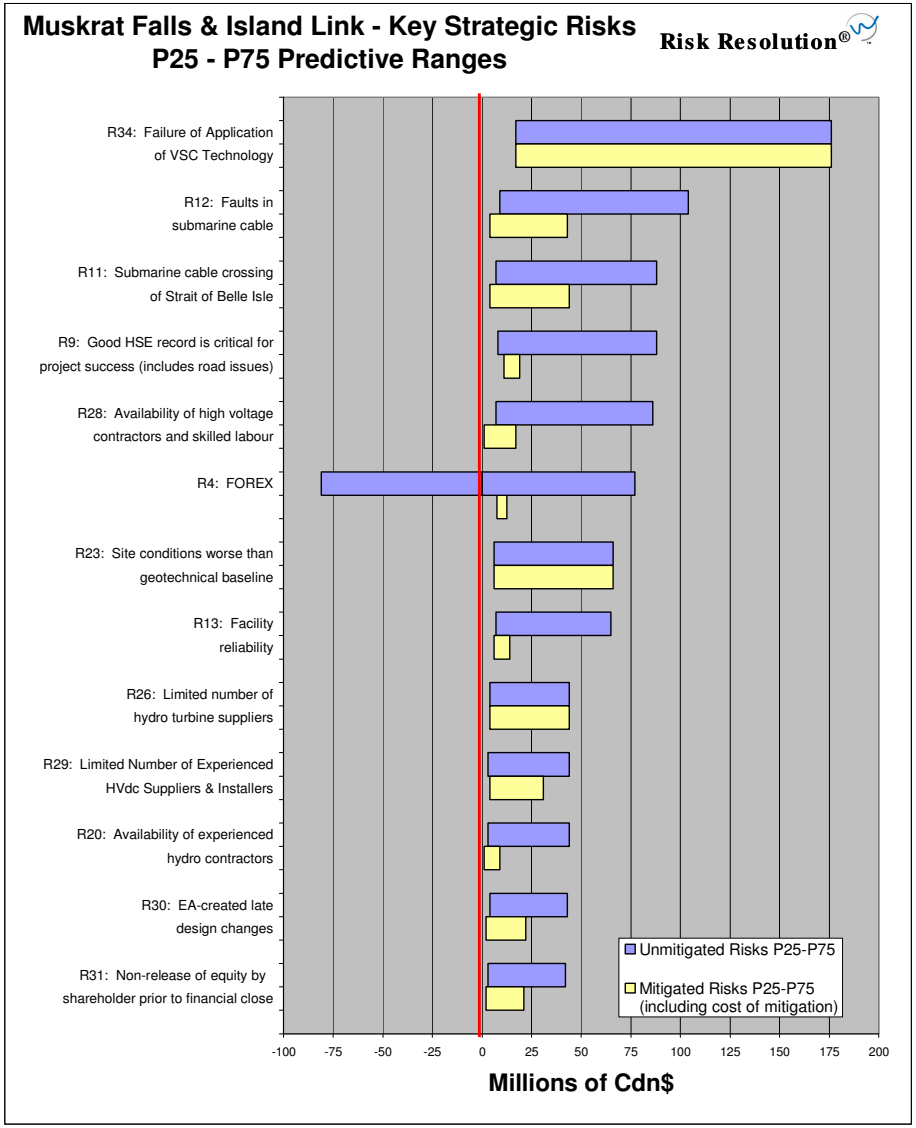
Strategic-Risk Tornado Chart



Strategic-Risk Exposure

All Values in C$ Millions

Mitigated Strategic Risks with Significant Impacts

Mitigated Predictive Range (P25 to P75)

	P25*	P75*
≈ Failure of Application of VSC Tech.	17	176
≈ Site Conditions vs. Geo. Baseline	6	66
≈ Limited Hydro Turbine Suppliers	4	44
≈ Strait of Belle Isle Crossing	4	44
≈ Faults in Submarine Cable	4	43
≈ Ltd. HVdc Suppliers/Installers	4	31
≈ EA-created Design Changes	2	22

Project Mitigated Risk Exposure
Predictive Range: P25 = $187 to P75 = $413

***Values may not be added to give total exposure.**

Supplemental Information

Predictive Range

<u>Predictive Range</u>: The term predictive range is used throughout this report when describing the results of Monte Carlo simulations for all types of risk assessments. Specifically, the predictive range refers to the P25 to P75 band of results for a given assessment. Because the predictive range is comprised of the middle 50% of the results, it is usually thought to be the most relevant indicator of future outcomes when assessing a modeled situation.

Weather Windows for Time-Risk Activities

The following weather windows are used in the Time-Risk analysis:

1) Task 38: Close Cofferdam
July 1 – September 30

2) Task 40: North Dam (Foundation and Dam)
Task 43: South Dam (RCC)
Task 44: Churchill Falls Switchyard Modifications
May 1 – November 15

3) Task 61: SOBI Cable Survey
Task 64: SOBI Cable Installation
June 15 – October 15

4) Task 65: Finalize SOBI Cable Protection Scope
May 1 – October 31

Attachment B.4 to Doc. No. LCP-PT-MD-0000-RI-RP-0001-01 Rev. B1

Results of Time-Risk and Strategic-Risk Assessments September 2009

Risk Resolution®

Westney™

Consulting Group, Inc.
www.westney.com

December 2009

General Information

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

Contents

Assessment Summary

Basis of Assessment

Project Components

The Lower Churchill Project is comprised of the following three main components:

1) the Gull Island 2,250 MW plant;
2) the 1,800 MW Island Link with submarine cables; and
3) the 1,000 MW Maritime Link.

Key Master Schedule Dates

Ready to Start Early Works Construction:	16-Jan-2011
Full Commercial Power:	30-Jun-2018

Assessment Results

Financial Exposure above Estimate and Tactical Risk

	P25 (mil)	P75 (mil)
Unmitigated Risk Exposure	$1,351	$1,818
Mitigated Risk Exposure*	$479	$828

*Includes mitigation costs of $80 - $154 mil.
All currency is in C$.

Time-Risk Exposure

	P25	P75
Ready to Start Early Works Construction	26-Apr-11	11-Jul-11
Full Commercial Power	10-Jul-19	12-Feb-20

Time-Risk Assessment

Basis of Assessment

Time-Risk Model

A revision to the 2008 Time-Risk model was developed using Microsoft Project that represents the dates, durations, and key dependencies (including weather modeling) in the current approved Project Master Schedule. The key activities were identified and framed by Nalcor.

Nalcor representatives met with Westney consultants at Westney's Houston office to discuss possible outcomes for each modeled activity. The final ranging was performed by the Nalcor team, but it was vetted and questioned by the Westney participants. The modeling simulation was performed by Westney using the @Risk Monte Carlo technique with 10,000 iterations.

Assessment Results

Time-Risk Results

The modeled results had a predictive range for Full Commercial Power approximately 12 to 20 months after the currently scheduled date of June 30, 2018.

Predictive Range	
P25	P75
10-Jul-2019	12-Feb-2020

These results are driven by modeled delays in several key activities and the inability to complete work within tight weather windows, especially those in Gull Island Construction. The critical path In the simulation included Gull Island Construction activities over 90% of the time.

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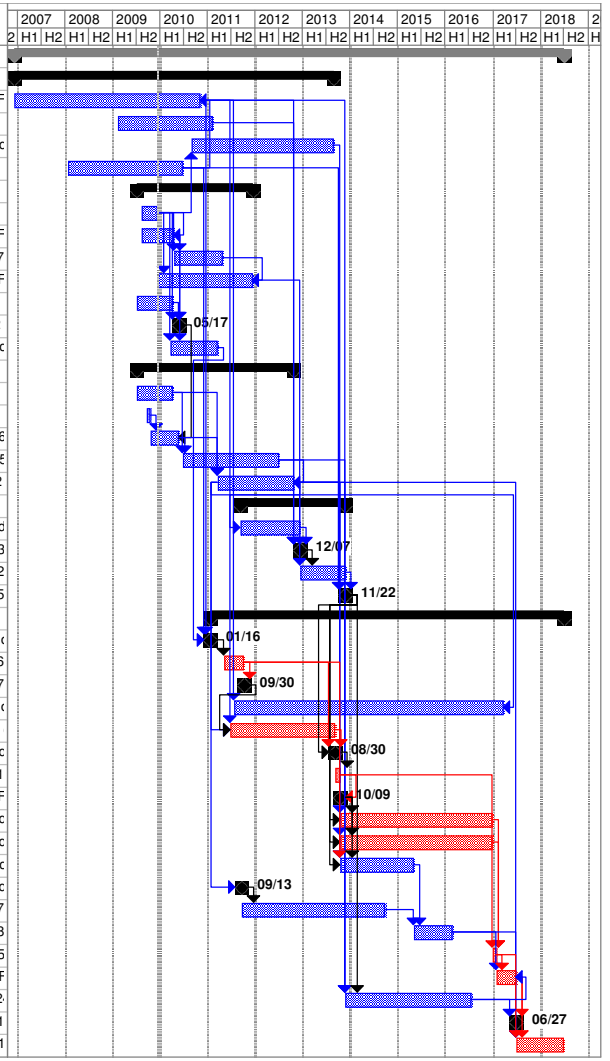
LOWER CHURCHILL PROJECT

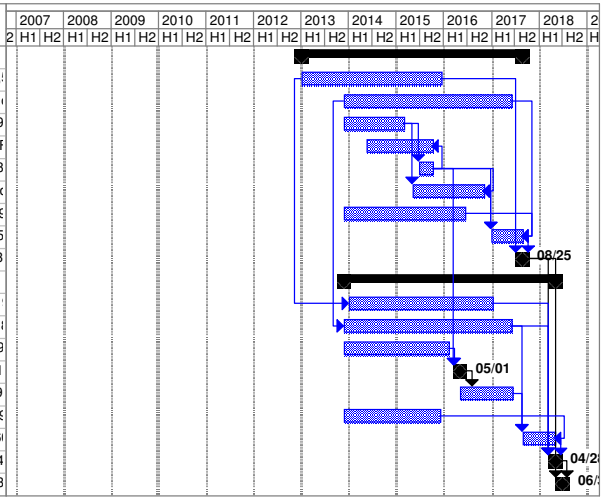
Time-Risk Model

ID	Name	Duration	Start	Finish	Predecessors
0	**Nalcor Energy - Lower Churchill Project**	**4230 d**	**12/01/06**	**06/30/18**	
1	**Environmental Assessment**	**2457 d**	**12/01/06**	**08/22/13**	
2	Generation EA	1432 d	12/01/06	11/01/10	5FF
3	Island Link EA	729 d	02/02/09	01/31/11	
4	Maritime Link EA	1096 d	08/23/10	08/22/13	7FS+261 c
5	Negotiate and Ratify IBA with Innu Nation	889 d	01/15/08	06/21/10	
6	**Power Sales and Market Access**	**887 d**	**07/01/09**	**12/04/11**	
7	Maritime Link Commerical Structure LOI	124 d	08/03/09	12/04/09	
8	LOIs with Anchor Customers - Maritimes	256 d	08/03/09	04/15/10	7FF
9	Negotiate and Execute Ownership Structure for Maritime Link	370 d	04/16/10	04/20/11	8,7
10	Negotiate and Execute PPA with Maritimes	730 d	12/05/09	12/04/11	7,9FF
11	Phase 2 Concept Optimization Studies (SOBI, etc.)	276 d	07/01/09	04/02/10	
12	Gate 2b	0 d	05/17/10	05/17/10	7FS+32 d,8FS+32 d,11FS+32
13	Engineering and Procurement for Early Works	365 d	03/17/10	03/16/11	7FS-30 d,8FS-30 c
14	**Engineering and Contracting**	**1209 d**	**07/01/09**	**10/21/12**	
15	Minimum Required Prep for Start of Engineering	276 d	07/01/09	04/02/10	
16	Decision on PM and Contracting Model	31 d	09/15/09	10/15/09	
17	Engineering RFP, Bidding and Award	215 d	10/16/09	05/18/10	12FF,16
18	Engineering & Detailed Design	738 d	06/17/10	06/23/12	17FS+29 d,15
19	Contractors & Vendors Bidding & Negotiations	584 d	03/18/11	10/21/12	18FF+120 d,15FS+273 d,17FS+302
20	**Project Financing**	**812 d**	**09/03/11**	**11/22/13**	
21	Finance Market Sounding and RFP	462 d	09/03/11	12/07/12	19FS-415 d
22	Final Disclosure	0 d	12/07/12	12/07/12	21,19,2,3
23	Final Proposal Review and Finalize Lender's Agreement	350 d	12/08/12	11/22/13	10,22
24	Financial Close	0 d	11/22/13	11/22/13	4,23,5
25	**Gull Island Construction**	**2723 d**	**01/16/11**	**06/30/18**	
26	Ready to Commence Early Infrastructure Works	0 d	01/16/11	01/16/11	2FS+42 d,5,13FS-60 c
27	Early Infrastructure Works - Bridge and Access (with weather window)	153 d	05/01/11	09/30/11	26
28	South Side Access Bridge Ready	0 d	09/30/11	09/30/11	27
29	Reservoir Clearing	2079 d	07/15/11	03/23/17	2FS+42 d,19SF-180 c
30	Diversion Inlet, Outlet and Tunnel Construction	800 d	06/23/11	08/30/13	2FS+42 d,28FS-100 d,19SS+90
31	Ready to Close River	0 d	08/30/13	08/30/13	30,27,24FS-90 c
32	Cofferdam Closure	40 d	08/31/13	10/09/13	31
33	River Diverted	0 d	10/09/13	10/09/13	32FF
34	Main Dam Construction - In-River (incl. Face Slab)	1170 d	10/10/13	12/22/16	33,19,24FS-90 c
35	Main Civil Structures Excavation and Construction Works Post Diversion	1170 d	10/10/13	12/22/16	33,19,24FS-90 c
36	Powerhouse & Penstocks Excavation and Concreting	570 d	10/10/13	05/02/15	27,33,19,24FS-90 c
37	Award Contract for T/G	0 d	09/13/11	09/13/11	19SS+180 c
38	Eng., Model Test, Manufacture and Deliver T/G Unit 1	1108 d	09/14/11	09/25/14	37
39	Installation of T/G Unit 1 and Services	300 d	05/03/15	02/26/16	36,38
40	Reservoir Impoundment	28 d	12/23/16	01/28/17	32,34,35
41	Commission T/G Unit 1 & Services	150 d	01/29/17	06/27/17	39,40,42FF
42	735kV HVac TL to CF and CF Switchyard Construct	969 d	11/23/13	07/18/16	2FS+42 d,18,19FS+60 d,2
43	First Power	0 d	06/27/17	06/27/17	42,41
44	Complete Installation & Commissioning - Units 2-5	368 d	06/28/17	06/30/18	19,39,40,41



Time-Risk Model (continued)

ID	Name	Duration	Start	Finish	Predecessors
45	**Island Link Construction**	**1707 d**	**12/23/12**	**08/25/17**	
46	HVdc TL Overland Construction - GI to Soldier's Pond	1080 d	12/23/12	12/07/15	18,19FS+62 d,3FS+44 d,4
47	Soldier's Pond and Gull Island Converter Stations	1280 d	11/23/13	05/25/17	3FS+42 d,24,5,19FS+60 d
48	SOBI Cable Manufacturing	462 d	11/23/13	02/27/15	24,18,19
49	SOBI Cable Landfall and Protection	510 d	05/14/14	10/05/15	3FS+42 d,50FF
50	SOBI Cable Installation (with weather window)	113 d	06/15/15	10/05/15	48,11,18
51	SOBI Cable Protection	368 d	05/01/15	10/31/16	11,18,19,48,50FF+90 d
52	Island System Upgrades and Reinforcements	924 d	11/23/13	06/03/16	3FS+42 d,24,18,19
53	System Testing and Commissioning	246 d	12/23/16	08/25/17	50,52FF+92 d,47FF+92 d,43FF,5
54	Island Link Ready for Power	0 d	08/25/17	08/25/17	46,53
55	**Maritime Link Construction**	**1618 d**	**11/23/13**	**04/28/18**	
56	HVdc TL Construct - TB to CR, Lingan to NB Border	1108 d	12/28/13	01/08/17	4FS+42 d,24,46SS+370 d,5,9,18,1
57	NB Converter Station Supply and Install	1280 d	11/23/13	05/25/17	4FS+42 d,24,47SS,5,19,9,1
58	Cabot Strait Cable Manufacturing	800 d	11/23/13	01/31/16	4,24,5,9,18,19
59	Ready to Install Cabot Strait Cable	0 d	05/01/16	05/01/16	58FS-91 d,4FS+42 d,50FS+16 d,9,18,1
60	Cabot Strait Cable Installation (with weather window)	206 d	05/01/16	06/07/17	59
61	Maritime System Upgrades and Reinforcements	738 d	11/23/13	11/30/15	4FS+42 d,24,9,18,19
62	System Testing and Commissioning	246 d	08/26/17	04/28/18	61FF+90 d,57FS+92 d,6
63	Maritime Link Ready for Power	0 d	04/28/18	04/28/18	57,62,56,54
64	Full Commercial Power	0 d	06/30/18	06/30/18	44,43,54,63



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Time-Risk Ranging

Lower Churchill Project Time-Risk Assessment
Ranging Sheet - Base Case

		Time-Risk Model			Risk Ranges (changes in months)	
ID	Task Description	Duration	Start	Finish	Best	Worst
01	**Environmental Assessment**	**2457 d**	**1-Dec-06**	**22-Aug-13**		
02	Generation EA	1432 d	1-Dec-06	1-Nov-10	3	9
03	Island Link EA	729 d	2-Feb-09	31-Jan-11	3	8
04	Maritime Link EA	1096 d	23-Aug-10	22-Aug-13	0	6
05	Negotiate and Ratify IBA with Innu Nation	889 d	15-Jan-08	21-Jun-10	-4	2
06	**Power Sales and Market Access**	**887 d**	**1-Jul-09**	**4-Dec-11**		
07	Maritime Link Commerical Structure LOI	124 d	3-Aug-09	4-Dec-09	0	9
08	LOIs with Anchor Customers - Maritimes	256 d	3-Aug-09	15-Apr-10	-3	6
09	Negotiate and Execute Ownership Structure for Maritime Link	370 d	16-Apr-10	20-Apr-11	-2	6
10	Negotiate and Execute PPA with Maritimes	730 d	5-Dec-09	4-Dec-11	-6	3
11	Phase 2 Concept Optimization Studies (SOBI, etc.)	276 d	1-Jul-09	2-Apr-10	0	4
12	**Gate 2b**	**0 d**	**17-May-10**	**17-May-10**		
13	Engineering and Procurement for Early Works	365 d	17-Mar-10	16-Mar-11	-2	2
14	**Engineering and Contracting**	**1209 d**	**1-Jul-09**	**21-Oct-12**		
15	Minimum Required Prep for Start of Engineering	276 d	1-Jul-09	2-Apr-10	0	4
16	Decision on PM and Contracting Model	31 d	15-Sep-09	15-Oct-09	0.5	2.5
17	Engineering RFP, Bidding and Award	215 d	16-Oct-09	18-May-10	-1	1
18	Engineering & Detailed Design	738 d	17-Jun-10	23-Jun-12	-2	2
19	Contractors & Vendors Bidding & Negotiations	584 d	18-Mar-11	21-Oct-12	-2	2
20	**Project Financing**	**812 d**	**3-Sep-11**	**22-Nov-13**		
21	Finance Market Sounding and RFP	462 d	3-Sep-11	7-Dec-12	-3	0
22	**Final Disclosure**	**0 d**	**7-Dec-12**	**7-Dec-12**		
23	Final Proposal Review and Finalize Lender's Agreement	350 d	8-Dec-12	22-Nov-13	-6	6
24	**Financial Close**	**0 d**	**22-Nov-13**	**22-Nov-13**		

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LOWER CHURCHILL PROJECT

Time-Risk Ranging

Lower Churchill Project Time-Risk Assessment
Ranging Sheet - Base Case

		Time-Risk Model			Risk Ranges (changes in months)	
ID	Task Description	Duration	Start	Finish	Best	Worst
25	**Gull Island Construction**	**2723 d**	**16-Jan-11**	**30-Jun-18**		
26	**Ready to Commence Early Infrastructure Works**	**0 d**	**16-Jan-11**	**16-Jan-11**		
27	Early Infrastructure Works - Bridge and Access (with weather window	153 d	1-May-11	30-Sep-11	0	2
28	**South Side Access Bridge Ready**	**0 d**	**30-Sep-11**	**30-Sep-11**		
29	Reservoir Clearing	2079 d	15-Jul-11	23-Mar-17		
30	Diversion Inlet, Outlet and Tunnel Construction	800 d	23-Jun-11	30-Aug-13	-3	2
31	**Ready to Close River**	**0 d**	**30-Aug-13**	**30-Aug-13**		
32	Cofferdam Closure	40 d	31-Aug-13	9-Oct-13	-1	0
33	**River Diverted**	**0 d**	**9-Oct-13**	**9-Oct-13**		
34	Main Dam Construction - In-River (incl. Face Slab)	1170 d	10-Oct-13	22-Dec-16	-3	6
35	Main Civil Structures Excavation and Construction Works Post Divers	1170 d	10-Oct-13	22-Dec-16	-3.5	10
36	Powerhouse & Penstocks Excavation and Concreting	570 d	10-Oct-13	2-May-15	-2	4
37	**Award Contract for T/G**	**0 d**	**13-Sep-11**	**13-Sep-11**		
38	Eng., Model Test, Manufacture and Deliver T/G Unit 1	1108 d	14-Sep-11	25-Sep-14	-2	6
39	Installation of T/G Unit 1 and Services	300 d	3-May-15	26-Feb-16	-1	4.5
40	Reservoir Impoundment	28 d	23-Dec-16	28-Jan-17	1*	2*
41	Commission T/G Unit 1 & Services	150 d	29-Jan-17	27-Jun-17	-1	4
42	735kV HVac TL to CF and CF Switchyard Construct	969 d	23-Nov-13	18-Jul-16	-8.5	7
43	**First Power**	**0 d**	**27-Jun-17**	**27-Jun-17**		
44	Complete Installation & Commissioning - Units 2-5	368 d	28-Jun-17	30-Jun-18	-2.5	7.5

* Duration for reservoir impoundment in Monte Carlo simulation depends on time of year when activity takes place; a calendar with water flow rates is used to determine activity duration instead of sampling from a probability distribution.

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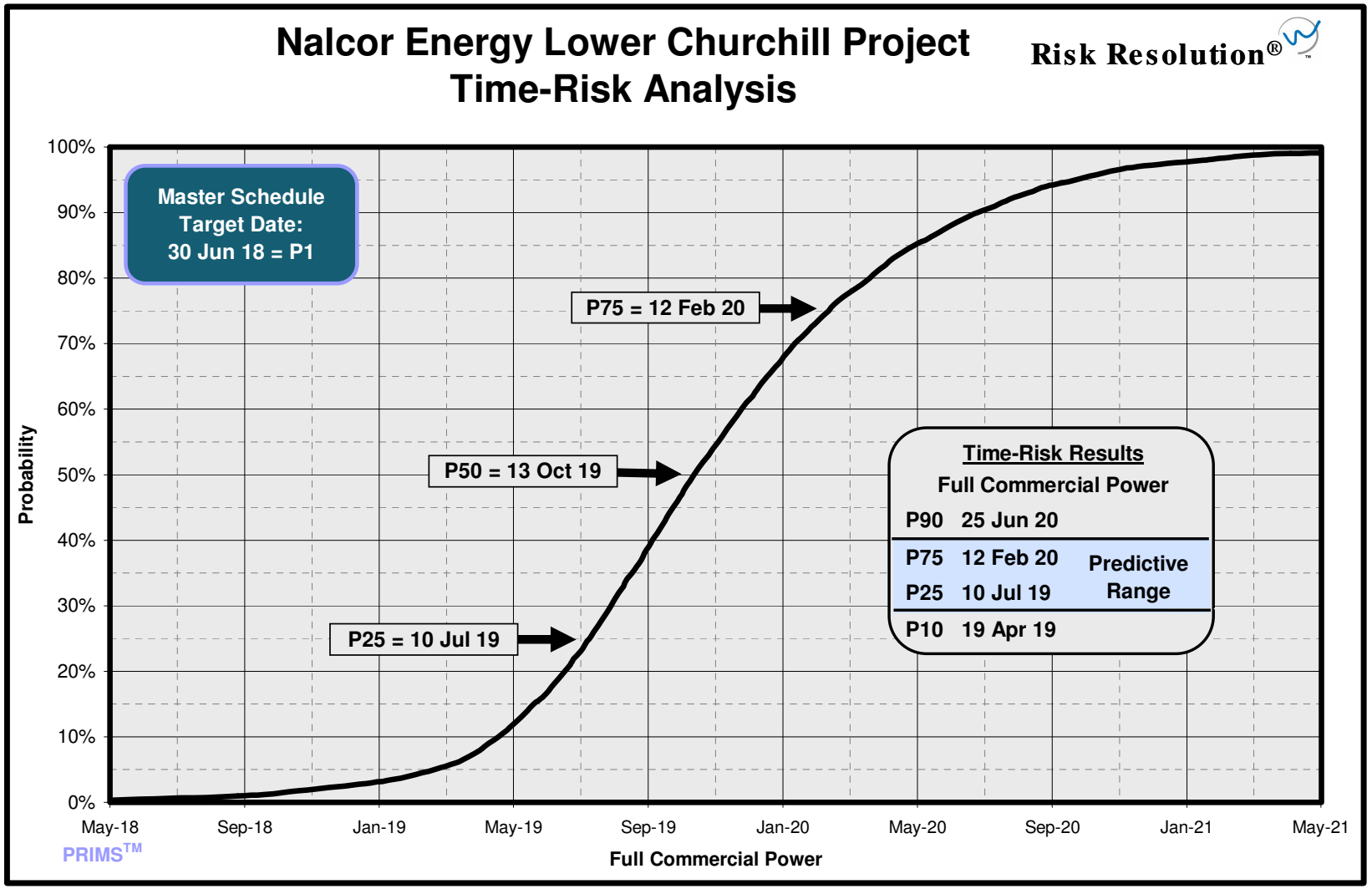
LOWER CHURCHILL PROJECT

Time-Risk Ranging

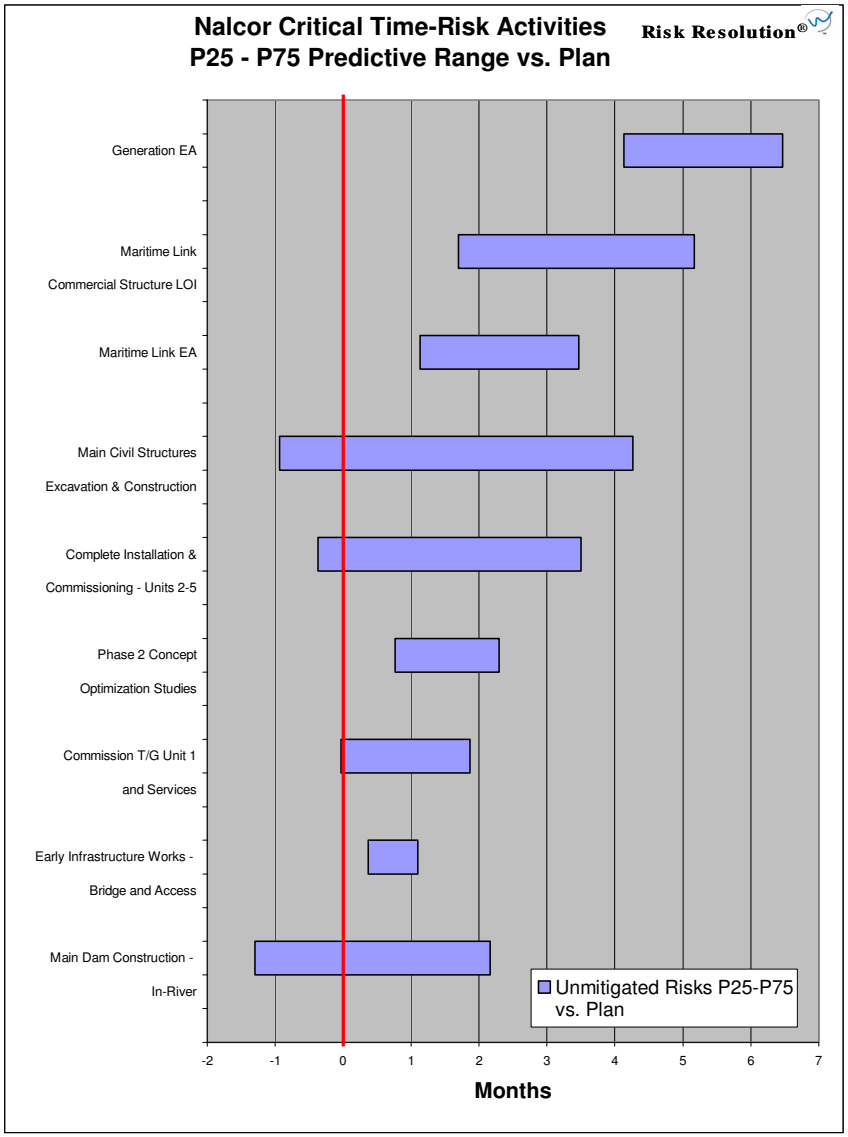
Lower Churchill Project Time-Risk Assessment
Ranging Sheet - Base Case

		Time-Risk Model			Risk Ranges (changes in months)	
ID	Task Description	Duration	Start	Finish	Best	Worst
45	**Island Link Construction**	**1707 d**	**23-Dec-12**	**25-Aug-17**		
46	HVdc TL Overland Construction - GI to Soldier's Pond	1080 d	23-Dec-12	7-Dec-15	-4	12
47	Soldier's Pond and Gull Island Converter Stations	1280 d	23-Nov-13	25-May-17	-6	5.5
48	SOBI Cable Manufacturing	462 d	23-Nov-13	27-Feb-15	-3	4.5
49	SOBI Cable Landfall and Protection	510 d	14-May-14	5-Oct-15	-1	8
50	SOBI Cable Installation (with weather window)	113 d	15-Jun-15	5-Oct-15	-1	1.5
51	SOBI Cable Protection	368 d	1-May-15	31-Oct-16	-2.5	4.5
52	Island System Upgrades and Reinforcements	924 d	23-Nov-13	3-Jun-16	-12	3
53	System Testing and Commissioning	246 d	23-Dec-16	25-Aug-17	-2	6
54	**Island Link Ready for Power**	**0 d**	**25-Aug-17**	**25-Aug-17**		
55	**Maritime Link Construction**	**1618 d**	**23-Nov-13**	**28-Apr-18**		
56	HVdc TL Construct - TB to CR, Lingan to NB Border	1108 d	28-Dec-13	8-Jan-17	-6	3
57	NB Converter Station Supply and Install	1280 d	23-Nov-13	25-May-17	-9.5	2
58	Cabot Strait Cable Manufacturing	800 d	23-Nov-13	31-Jan-16	-1	3
59	**Ready to Install Cabot Strait Cable**	**0 d**	**1-May-16**	**1-May-16**		
60	Cabot Strait Cable Installation (with weather window)	206 d	1-May-16	7-Jun-17	-1.5	2
61	Maritime System Upgrades and Reinforcements	738 d	23-Nov-13	30-Nov-15	-12	3
62	System Testing and Commissioning	246 d	26-Aug-17	28-Apr-18	-2	6
63	**Maritime Link Ready for Power**	**0 d**	**28-Apr-18**	**28-Apr-18**		
64	**Full Commercial Power**	**0 d**	**30-Jun-18**	**30-Jun-18**		
	Last Line					

Time-Risk Assessment Results



Time-Risk Tornado Chart



Predictive Range vs. Schedule (Months)

Schedule Activities with Significant Time Risk

The analysis shows that these seven activities have the greatest impact on project timing and, therefore, should receive considerable attention.

	Months P25*	Months P75*
≈ Phase 2 Concept Optimization Studies	1	2.5
≈ Generation EA	4	6.5
≈ Maritime Link Comm. Struct. LOI	1.5	5
≈ Maritime Link EA	1	3.5
≈ Main Civil Str. Excav. & Con.	-1	4.5
≈ Complete Install. & Comm.	-0.5	3.5
≈ Comm. T/G Unit 1 & Serv.	0	2

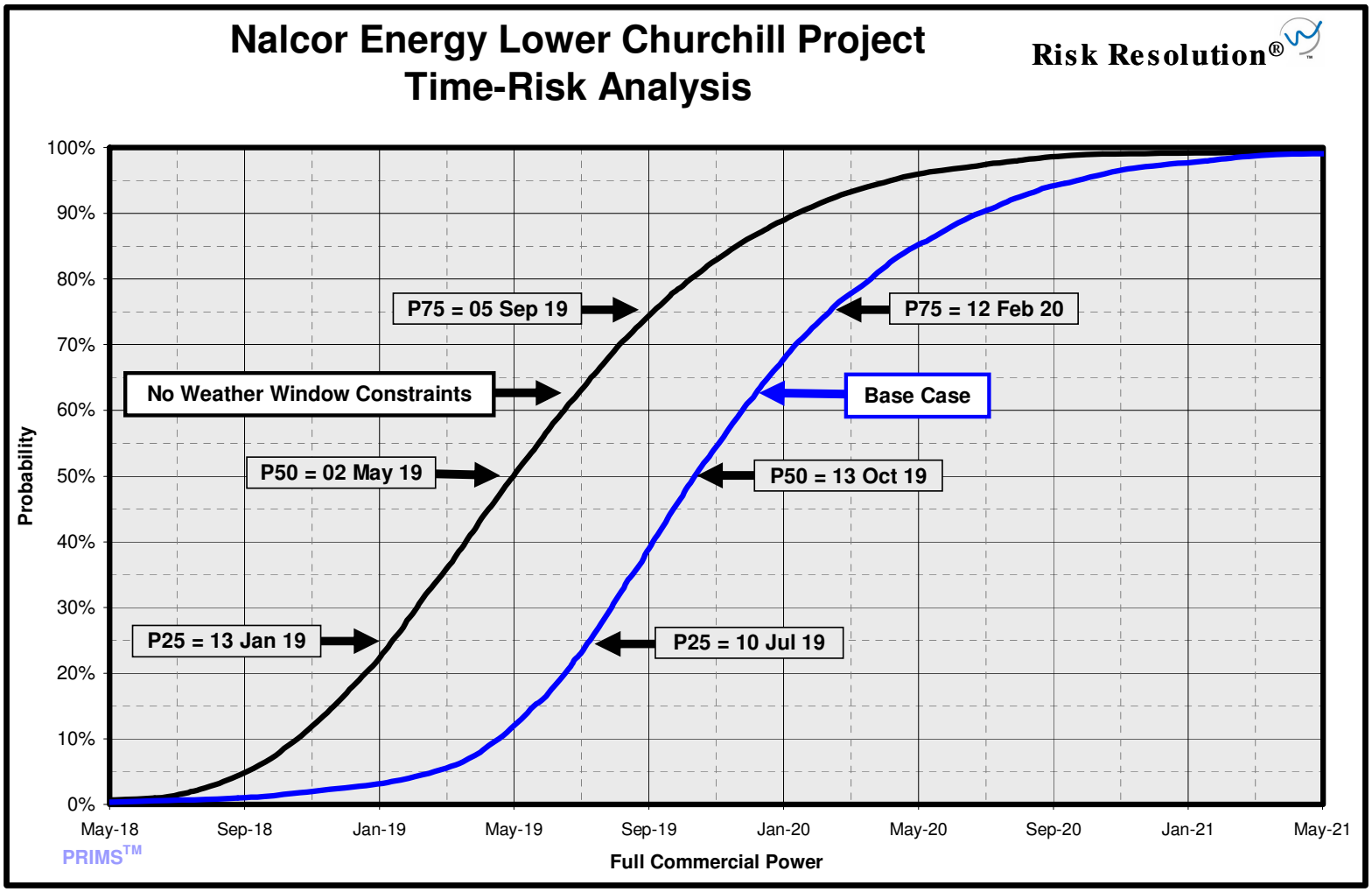
Additional Impact of Weather Window Constraints

≈ Weather Window	5.5	6

Base Case Predictive Range vs. Plan:
P25 = 12.5 months and P75 = 19.5 months

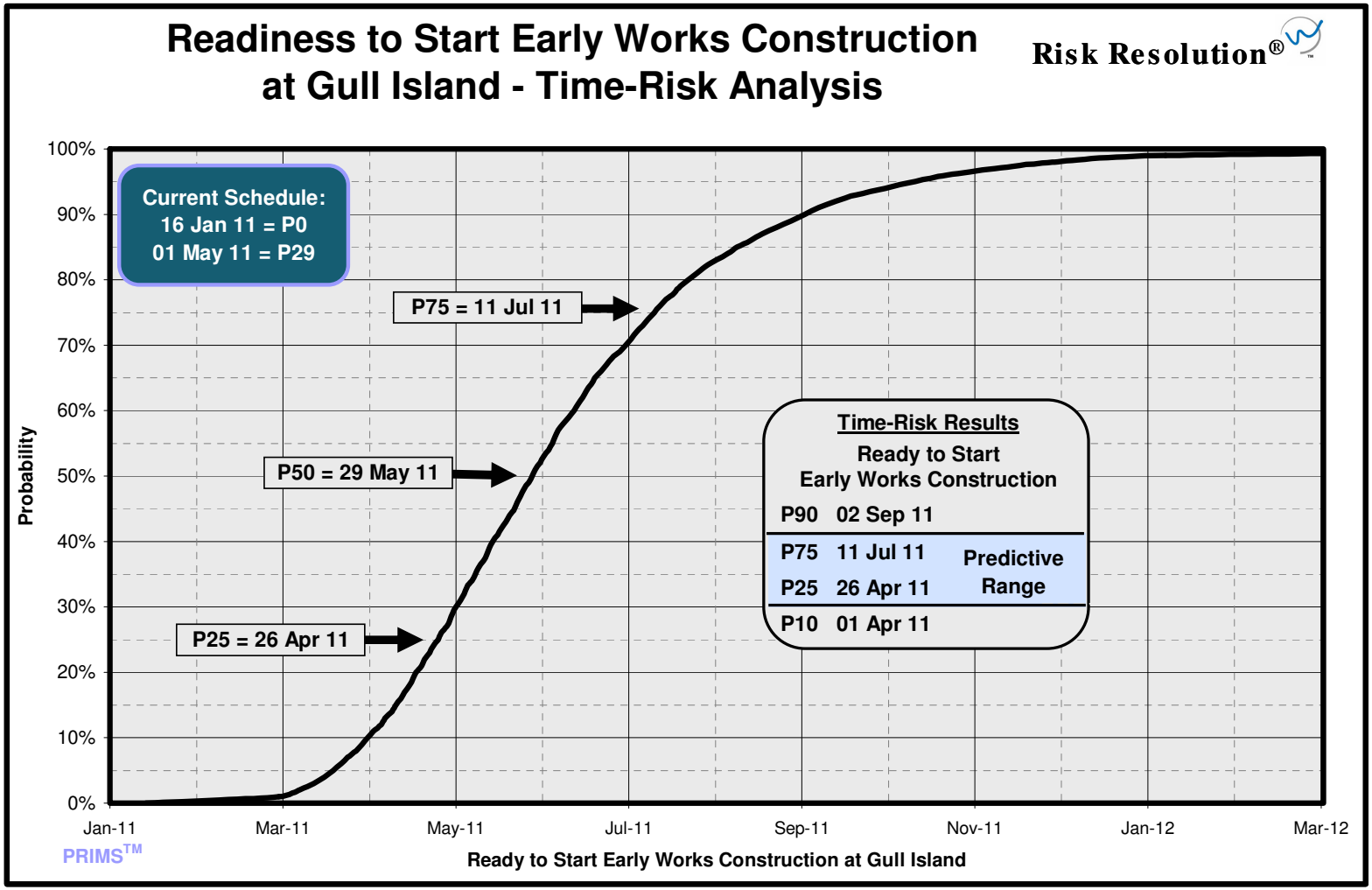
***Values may not be added to give total exposure.**

Effect of Weather Window Constraints



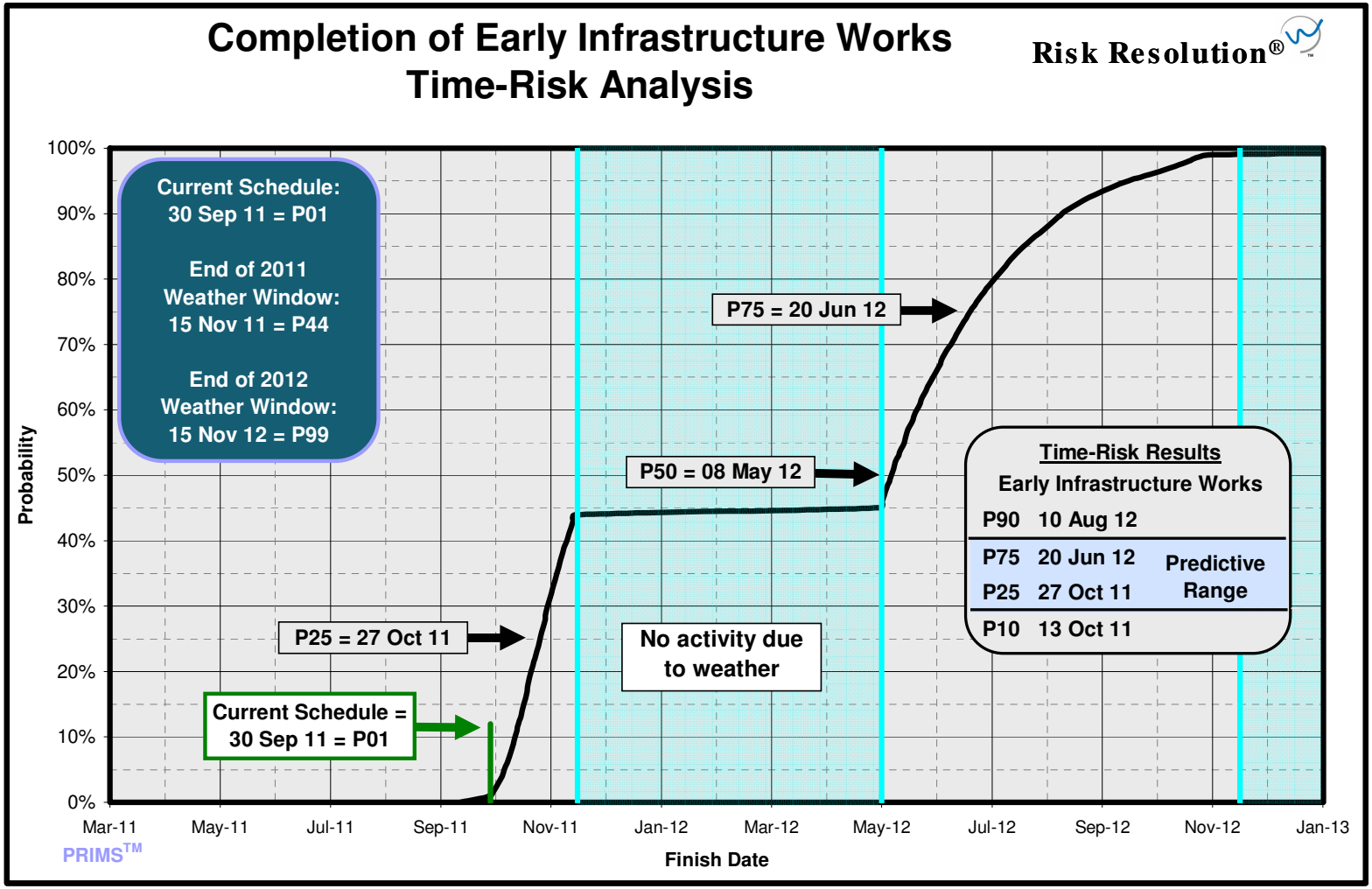
Even without weather constraints, the analysis suggests that the probability of having full commercial power by the Master Schedule target date of June 30, 2018, is less than 5%.

Gull Island Early Works Construction



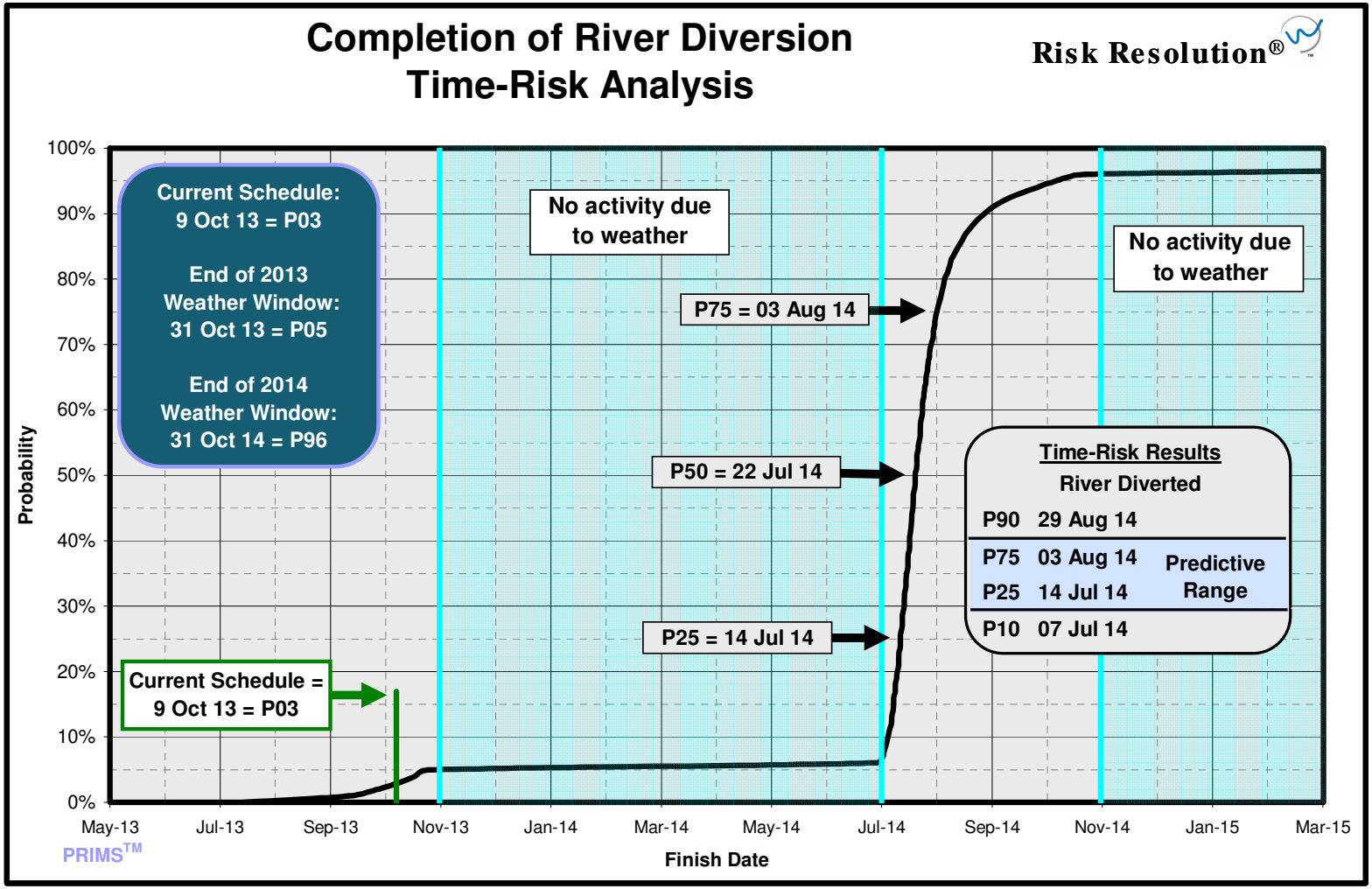
In this analysis, the timing of the milestone Ready to Commence Early Infrastructure Works is largely driven by the predecessor activities Generation EA Approval and the Completion of Engineering and Procurement Required for Early Works.

Gull Island Construction



In this analysis, the weather window constraint has a significant impact on the timing of the Completion of Early Infrastructure Works.

Gull Island River Diversion



For the purpose of this analysis, the milestone River Diversion is constrained by Financial Close.

Strategic-Risk Assessment

Basis of Assessment

The Strategic-Risk Assessment does not consider the impact of tactical risks (i.e., estimate contingency) on the costs of the Lower Churchill Project. This assessment dealt solely with Capex issues; revenue and Opex issues were noted for the economic model.

The strategic risks were identified and framed by the Nalcor team and verified with the LCP Risk Resolution Team. Nalcor representatives met with Westney consultants at Westney's Houston office to discuss possible outcomes for both the Unmitigated and Mitigated cases. The final ranging was by the Nalcor team, but it was vetted and questioned by the Westney participants. The Monte Carlo simulation was performed by Westney.

Assessment Results

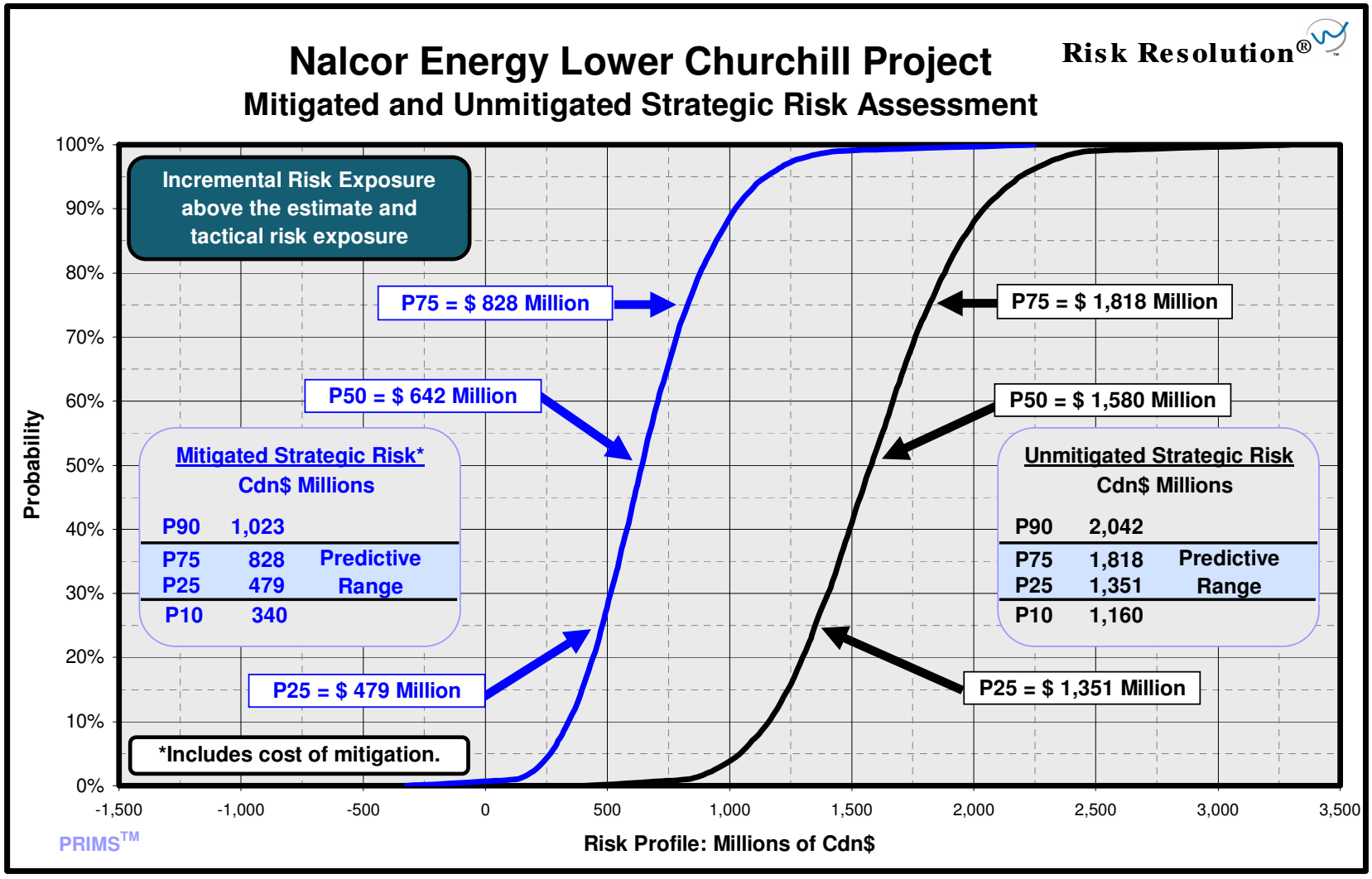
Strategic Risk Exposure

The Strategic Risk Exposure is the range of the costs that might be incurred that currently would not be incorporated into the estimate. A decision will be required as to whether these risks become costs in the estimate or remain as Risk Exposure above the estimate.

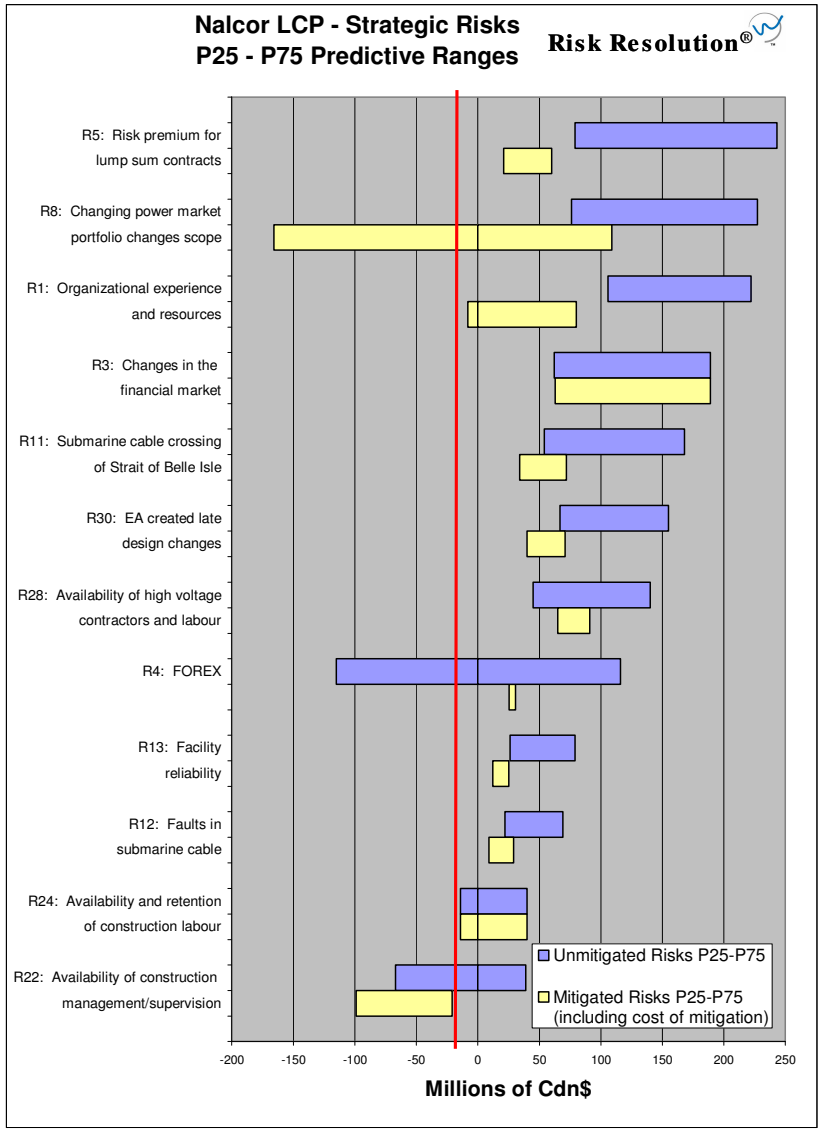
	Predictive Range	
	P25 (mil)	P75 (mil)
Unmitigated Risk Exposure	$1,351	$1,818
Mitigated Risk Exposure*	$479	$828

*Includes mitigation costs of $80 - $154 mil.
All currency is in C$.

Strategic-Risk Exposure



Strategic-Risk Tornado Chart



Strategic-Risk Exposure

All Values in C$ Millions

Mitigated Strategic Risks with Significant Impact

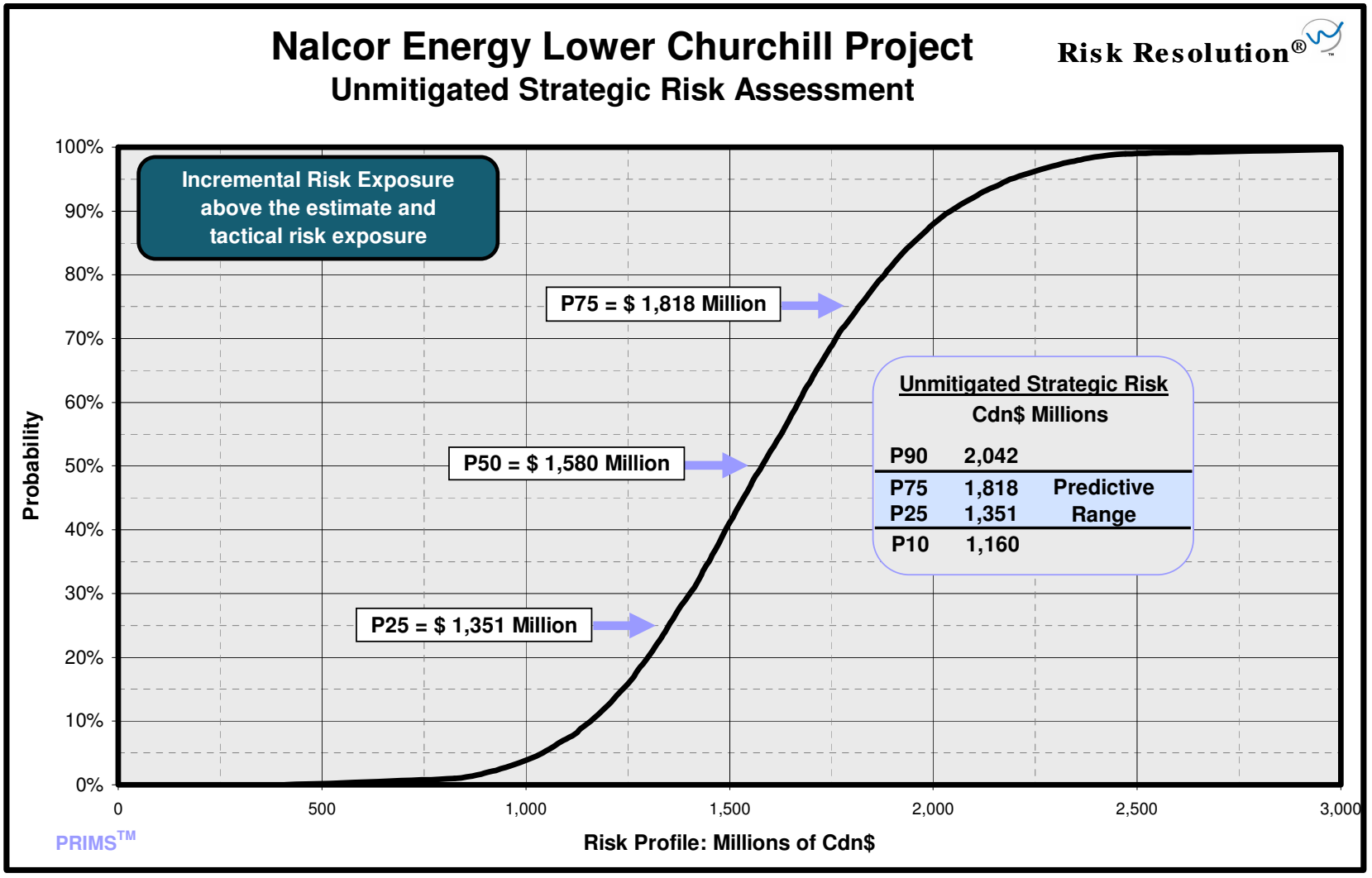
Mitigated Predictive Range (P25 to P75)

	P25 *	P75 *
≈ Changes in Financial Market	63	189
≈ Power Market Required Changes	-166	109
≈ Transmission Workforce	65	91
≈ Organizational Capacity	-8	80
≈ Strait of Belle Isle Crossing	34	72
≈ EA's cause design changes	40	71
≈ Lump Sum Risk Premiums	21	60

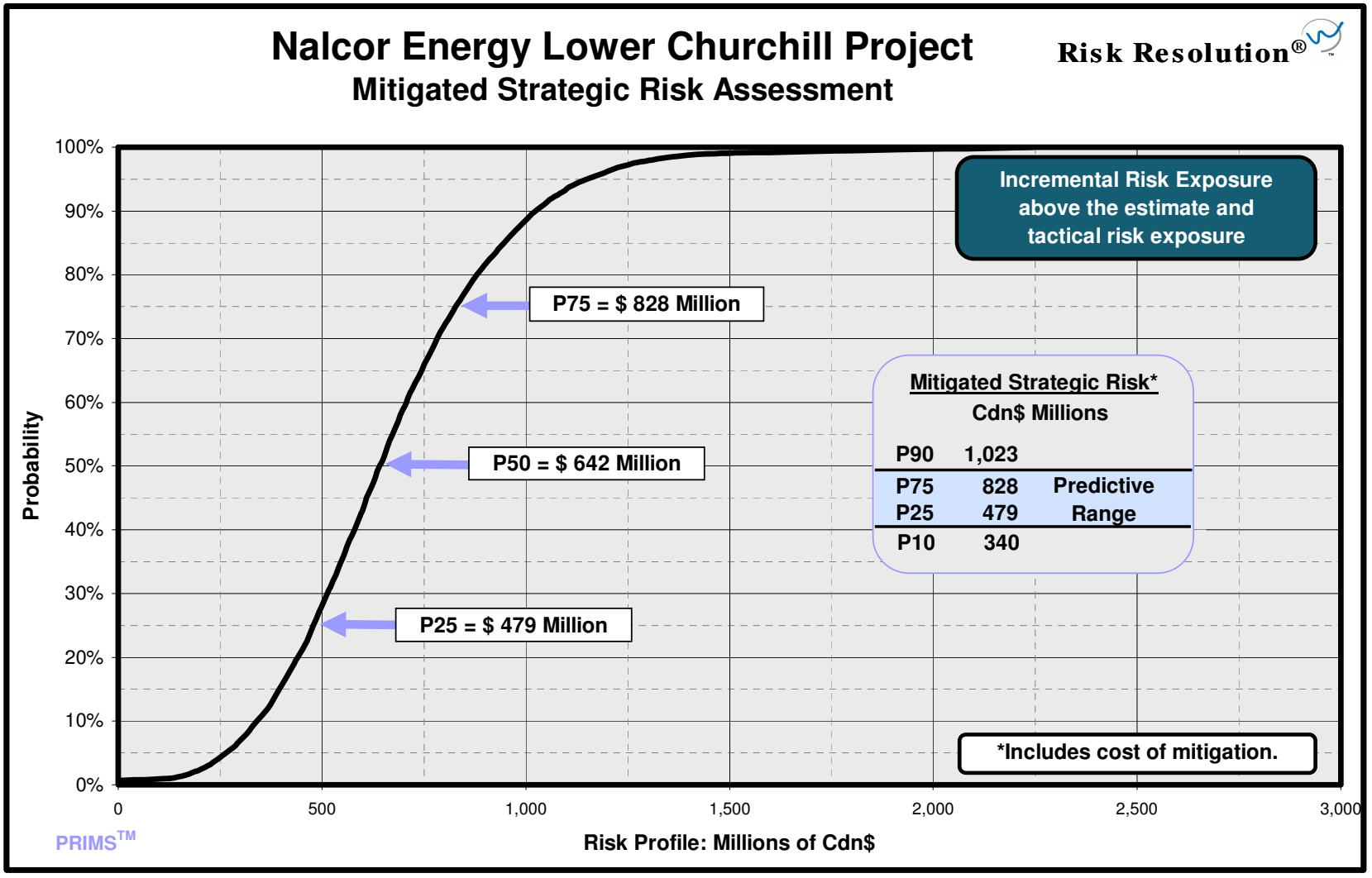
Project Mitigated Risk Exposure
Predictive Range: P25 = $479 to P75 = $828

***Values may not be added to give total exposure.**

Unmitigated Risk Exposure



Mitigated Risk Exposure



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Strategic Risks Considered in Analysis

Key Risks / Potential Benefits

Bold Comments are Mitigations

Impact (Millions)
Unmitigated
Mitigated
Cost of Mitigation

Organizational Risks

1 Organizational experience and resources for a project of this size

- Processes, Resources, and Governance
- Specific experience of large hydro project
- **Mitigation represents early and aggressive effort to address each issue**
  - **Recruiting experienced people**
  - **Installing best of practice processes and governance**
  - **Plans to secure experienced consultants and contractors**

$50 to $350
-$50 to $175
$0

Interface Risks

2 Time required under Crown Corporation rules to gain approval

- Delayed decisions leading to schedule slippage and cost increases
- Loss of vendor and contractor interest
- Loss of team morale
- **Mitigation - Communicate impact of issue to stakeholders and proactively work at executive level**

$18 to $48
$9 to $24
$0

Financial Risks

3 Changes in the financial market

- Increased interest rate spreads
- Preferred financing instruments may not be available in quantities or on terms and conditions projected
- **Little mitigation possible**

$0 to $330
$0 to $330
$0

Strategic Risks Considered in Analysis

Key Risks / Potential Benefits

Bold Comments are Mitigations

Impact (Millions)
Unmitigated
Mitigated
Cost of Mitigation

Financial Risks

4 Foreign currency exchange risk

- Approximately $2.8 B of estimate is in non-CAD $ expenditures (e.g., U.S., Kroner, Euro)
- Potential for 10% swing in exchange rates
- **Mitigated Case assumes hedging of all currency risks**

-$280 to $280
$0
$28

5 Risk Premium for obtaining lump sum contracts

- Market shifting from seller's market to buyer's market for contractors and vendors
- Contractor and vendor creditworthiness continues to be a concern for potential financiers
- **Reduce exposure by using independent risk brokering to improve risk allocation and/or increase equity contribution**

$0 to $420
$0 to $100
$2

Commercial Risks

6 Extra year required to secure long-term PPA's

- Concern about time to secure agreements to support financial close
- **Mitigate potential exposure by awarding engineering contract at Gate 2b only when clarity on market access is available**
- **Risk is not entirely within Nalcor's control, thus some acceptance of this risk is required**

$24 to $54
$0 to $24
$5

Strategic Risks Considered in Analysis

Key Risks / Potential Benefits

Bold Comments are Mitigations

Impact (Millions)
Unmitigated
Mitigated
Cost of Mitigation

Commercial Risks

7 Federal government support for generation and transmission projects

- Federal government visible support of the project in any form would benefit the confidence in the market that the project will proceed
- **Active pursuit of support by executive management**

Not quantified in analysis

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8 Changing power market portfolio requires changes in project scope

- The power market for this project could influence new routes and capacities for power sales
- **Mitigate by engaging counterparties and validating project scope assumptions ASAP and maximizing Front-End Loading prior to sanction**

$0 to $400
-$300 to $400
$2

HSE Risks

9 Good HSE record is critical for project success

- Remote and difficult site
- Multiple work faces
- Potential for contamination of river
- **Mitigation includes early and proactive program to promote and secure commitment to best practices**
- **Engage and retain contractors who are leaders in safety performance**

$0 to $100
$5 to $25
$15

Strategic Risks Considered in Analysis

Key Risks / Potential Benefits

Bold Comments are Mitigations

Impact (Millions)
Unmitigated
Mitigated
Cost of Mitigation

Engineering / Technical Risks

10 Availability of resources to achieve a quality design

- Limited capacity within NL for hydro, resulting in need to mobilize resources outside the Province
- Hydro design market level of demand not seen since 1988
- Many reductions in hydro engineering resources in last decade
- **Mitigations include:**
  - **Taking early and aggressive action to secure required engineering competencies and resources**
  - **Scheduling sufficient time for engineering completion prior to start of construction**
  - **Implementing a project-wide Quality Management System and embed QA requirements in all contracts**

$20 to $70
-$10 to $10
$0

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11 Submarine cable crossing of Strait of Belle Isle

- Many firsts:
  - Buried shore approaches due to icebergs
  - Weather window very short
  - Sea currents at 5 to 7 knots will be very challenging
  - Viability of trenching technology is questionable
  - Limited capacity of installation vessels
- **Mitigations include:**
  - **Evaluate all available opportunities as soon as possible**
  - **Engage best consultants for subsurface conditions**
  - **Additional studies, particularly on trenching technology**

$0 to $290
$0 to $100
$15

Strategic Risks Considered in Analysis

Key Risks / Potential Benefits

Bold Comments are Mitigations

Impact (Millions)
Unmitigated
Mitigated
Cost of Mitigation

Engineering / Technical Risks

12 Faults in submarine cable during commissioning and post installation

- Recent installations in Europe experiencing faults
- Faults in buried Belle Isle section expensive to repair
- **Mitigations include using a conservative, robust design**
- **Using lessons learned from recent installations**
- **Evaluating insurance coverage**

$0 to $120
$0 to $50
$0

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13 System reliability during commissioning and start-up

- Many hydro projects have had reliability issues in recent years
- **Engage experienced engineering contractors**
- **Conduct system studies**
- **Consider commercial insurance products**

$0 to $140
$0 to $35
$5

Environmental Approvals & Permitting Risks

14 Securing generation project release from Environmental Assessment

- Highly problematic
  - Regulators decision-making process
  - Use of process to protest project
  - Alternatives requested
- **Bolster team resources to allow for efficient management and support of the EA process**
- **Step up consultation efforts, esp. w/ aboriginal groups**

$30 to $58
$0
$2 to $10

Strategic Risks Considered in Analysis

Key Risks / Potential Benefits

Bold Comments are Mitigations

Impact (Millions)
Unmitigated
Mitigated
Cost of Mitigation

Environmental Approvals and Permitting Risks

15 Environmental process impact on design

- Design changes may be required as a result of environmental concessions
- **Work to understand issues and accommodate realistic solutions early in design process to minimize downstream effects on procurement and construction**

$20 to $50
$20 to $50
$0

16 Unanticipated design changes impact environmental process

- Due to changes, the design may no longer be consistent with concepts previously submitted for regulatory approval
- **Screen for issues early and try to work acceptable solutions that avoid schedule impact**
- **Include EA Manager in approval process for design changes**

$0 to $60
$0 to $18
$0

Stakeholder Risks

17 Schedule impact due to delay in ratification of IBA by Labrador Innu Nation

- Ratification delay due to non-alignment within the Innu community
- **Maintain close ties with aboriginal leaders and be responsive to the needs of various aboriginal groups**

$0 to $24
$0
$0 to $20

Strategic Risks Considered in Analysis

Key Risks / Potential Benefits

Bold Comments are Mitigations

Impact (Millions)
Unmitigated
Mitigated
Cost of Mitigation

Stakeholder Risks

18 Lack of support from other aboriginal groups

- Other aboriginal groups may claim a lack of consultation during the project EA process which may result in the EA process being stayed
- **Aggressively engage and consult all potentially impacted aboriginal groups**

$5 to $35
$3 to $18
$2

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19 Non-governmental organization / stakeholder protest

- Protest could come at critical stage of construction or during the EA process
- **Implement a stakeholder communication plan**
- **Focus on getting Nalcor's message out on the benefits of the project**

$0 to $25
$0 to $10
$0

Gull Island Construction Risks

20 Availability of experienced hydro contractors

- Industry consolidation and lack of hydro activity for 20 years has limited available and viable contractors
- Contractor market improving due to weakening demand
- **Engage worldwide market and "sell the project" to stimulate interest**
- **Use innovative contracting strategy to make project attractive to contractors with risk / benefit balance**

$0 to $100
$0 to $10
$0

Strategic Risks Considered in Analysis

Key Risks / Potential Benefits

Bold Comments are Mitigations

Impact (Millions)
Unmitigated
Mitigated
Cost of Mitigation

Gull Island Construction Risks

21 **Ability to use Newfoundland & Labrador contractors due to lack of creditworthiness**	– Conditions of project finance will demand contractors be creditworthy for value of scope – **Proactive program to educate contractors on issue** – **Work with contractors to find suitable partners or underwriters** – **Consider this risk in the contract package definition**	**$10 to $50** **$0 to $25** $0
22 **Availability of qualified construction management / supervision**	– Worldwide construction at historic high with peak early next decade; however, due to recession, there is a forecasted slowdown for the short to medium term – **Establish benefit/reward relationships with contractors** – **Actively recruit Newfoundlanders home**	**-$180 to $90** **-$180 to $0** $0 to $15
23 **Site conditions worse than geotechnical baseline**	– Contractors will not take unknown geotechnical risks without prohibitive risk premiums – **Maximize geotechnical investigations to determine conditions as well as possible before bidding**	**$0 to $75** **$0 to $75** $0

Strategic Risks Considered in Analysis

Key Risks / Potential Benefits

Bold Comments are Mitigations

Impact (Millions)
Unmitigated
Mitigated
Cost of Mitigation

Gull Island Construction Risks

24 Availability and retention of skilled construction labour

- Current worldwide peak construction over Q2 2011
- **Actively recruit Newfoundlanders home**
- **Recruit supervision that works well with Newfoundlanders**
- **Negotiate a labor agreement that supports trade flexibility**

-$40 to $100
-$40 to $100
$0

25 Availability of unskilled construction labour

- Remote jobsite and less desirable work
- **Promote opportunity for training and advancement**
- **Leverage underutilized labour pools**
- **Provide competitive opportunities for locals**

$0
$0
$0

Hydro Turbine Supplier Risks

26 Limited number of creditworthy hydro turbine suppliers

- "Seller's market" worldwide - order books full for 2010
- North America declining in importance as market
- **Actively engage the two existing "bankable" suppliers**
- **Explore contracting model and risk allocation strategy**
- **Decide early on strategy and selection of supplier**

$0 to $50
$0 to $50
$0

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Strategic Risks Considered in Analysis

Key Risks / Potential Benefits

Bold Comments are Mitigations

Impact (Millions)
Unmitigated
Mitigated
Cost of Mitigation

De-escalation / Inflation Risks

27 **De-escalation / hyper-inflation risks**	– Driven by global demand with future difficult to predict – Need to consider hyperinflation due to significant barriers to entry in the specialty supply marketplace – **Monitor market and understand supply / demand balances for goods and materials**	**$0** **$0** $0

Transmission Risks

28 **Availability of experienced high-voltage contractors and skilled labour**	– Limited number of qualified transmission contractors – Resource requirements very large compared to supply – **Actively pursue potential suppliers worldwide** – **Phase the transmission build in order to flatten resource demands** – **Actively support training of linespersons**	**$0 to $240** **$50 to $100** $2 to $20
29 **Limited number of HVdc specialties suppliers and installers**	– Basically two suppliers and installers of subsea cable – Location (especially Strait of Belle Isle) challenging – Tight weather window for installation – **Optimize packaging strategy of HVdc specialties equipment and services to entice key players** – **Select and engage early to ensure availability**	**$0 to $50** **$0 to $25** $2 to $10

Strategic Risks Considered in Analysis

Key Risks / Potential Benefits

Bold Comments are Mitigations

Impact (Millions)
Unmitigated
Mitigated
Cost of Mitigation

Transmission Risks

30 Island Link and Maritime Link EA's result in late design changes

- Sea-return electrodes faced challenges in other jurisdictions
- Significant public concerns raised regarding access routes
- Habitat destruction in the SOBI due to submarine cable
- **Work to understand environmental issues and promote realistic solutions early in the design process**
- **Complete early concept desktop studies on potential design changes that the EA could recommend**

$25 to $250
$25 to $100
$0 to $5

Shareholder Risks

31 Unwillingness of Shareholder to fund early construction on equity defers construction

- Current engineering and construction schedule assumes $2-3 B of equity injection prior to financial close in 2013
- Major go/no-go decision regarding equity spend is in late 2011 – concurrent with the next provincial election when there could be an unwillingness to commit to spending
- **Ensure early and ongoing alignment with the Shareholder on all aspects of the project**
- **Seek early commitment and release of capital for 2010 activities**

$0 to $96
$0 to $48
$0

Strategic Risks Considered in Analysis

Key Risks / Potential Benefits

Bold Comments are Mitigations

Impact (Millions)
Unmitigated
Mitigated
Cost of Mitigation

Environmental Assessment Risks

32 Delay in the release of the Island Link from EA

- Federal government decisions on type and level of federal EA required have not yet been made
- Uncertainty re: type and location of electrodes
- Uncertainty re: conduit or subsea option for SOBI
- **Make a strategic decision to go with a Comprehensive Review rather than a Screening Study to avoid recycle and schedule slippage**
- **Increase stakeholder consultation activities**

$0
$0
$0

Enterprise Risks

33 Uncertainty on commercial structure for transmission

- Ownership philosophy for the Maritime Link and Island Link not yet determined; Emera and NB Power are potential equity partners
- Uncertainty also exists as to whether this will be a merchant or regulated asset
- **Identify and evaluate all plausible options and develop recommendation based on alignment with Nalcor's and the Province's strategic objectives**
- **Aggressively engage Emera and NB Power**

$24 to $48
$0 to $24
$0

Supplemental Information

Predictive Range

Predictive Range: The term predictive range is used throughout this report when describing the results of Monte Carlo simulations for both Time-Risk and Strategic-Risk assessments. Specifically, the predictive range refers to the P25 to P75 band of results for a given assessment. Because the predictive range is comprised of the middle 50% of the results, it is usually thought to be the most relevant indicator of future outcomes when assessing a modeled situation.

Weather Windows for Time-Risk Activities

The following weather windows are used in the Time-Risk analysis:

1) Task 27: Early Infrastructure Works – Bridge and Access
May 1 – November 15

2) Task 32: Cofferdam Closure
July 1 – October 31

3) Task 50: SOBI Cable Installation
June 15 – October 15

4) Task 51: SOBI Cable Protection
May 1 – October 31

5) Task 60: Cabot Strait Cable Installation
May 1 – October 15

Reservoir Impoundment

Reservoir Impoundment Rates		
Month	**Average Flow (cubic m/sec.)**	**Number of Days to Fill**
Jan	1,820	40
Feb	1,818	41
Mar	1,697	45
Apr	1,498	54
May	2,368	28
Jun	2,056	34
Jul	1,607	48
Aug	1,487	54
Sep	1,422	58
Oct	1,592	49
Nov	1,708	44
Dec	1,768	42

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Strait of Belle Isle Submarine Cable Laying Duration

ATTACHMENT 1/2

Strait of Belle Isle Submarine Cable Laying
Approximate Duration Calculation

Assumptions:

Number of Cables:	5
Submarine Cable (km):	164.4
Land Cable (km)	11
Total Cable Length (km):	175.4
Total Cable Length (km):	166
Nominal Lay Rate (Km/day)	5.8
Cable Mass (kg/m):	60
Reel Capacity (t):	7,000
Reel Capacity (km):	117
No Submarine Reels Req'd:	1.4

Assumption: 12h/d operation

Cable Laying Season:	Days
May	0
June	15
July	31
August	31
September	30
October	15
Total per year	122 (17.4 wks)

Note: 1 Week = 7 days

CABLE LAYING OPERATION — *Lab* — *Nfld*

Cable	Reel	Length (km)	Cumm. Length (km)	Weight (t)	Cumm Weight (t)	Load @ Factory (d)	Transit Norway to Canada (d)	Fuel / Provisions / Layover (d)	DP Calibration (d)	Float to Shore Pull-in & Jointing (c)	Trenching (d)	Splice Existing (d)	Lay Cable (d) [at nominal lay rate]	Drop / Protect (d)	Runoff / Float to Shore / Terminate (d)	Fuel / Provisions / Layover (d)	Protection (d)	Transit Canada to Norway (d)	CONTINGENCY 10% Loading/Travel Contingency (d)	CONTINGENCY 50% Operating Contingency (d)	CONTINGENCY 75% Cable Pull-In Contingency (d)	CONTINGENCY 15% Administrative Contingency (d)	Cable Total (d)	Cumulative Total (d)	Cumm Cable Layed (km)	Start	End	Laying Season
1	1	34.1	34.1	2,046	2,046	0	0	1	1	2	0	0	5.7	0	1	0	0	0	0.0	2.8	2.3	0.3	16.1	16	34.1	15-Jun	1-Jul	1
2	1	34.1	68.2	2,046	4,092	0	0	0	0	2	0	0	5.7	0	1	0	0	0	0.0	2.8	2.3	0.0	13.8	30	68.2	1-Jul	14-Jul	1
3	1	34.1	102.3	2,045	6,139	0	0	2	0	1	0	0	5.7	0	1	1	0	16	1.6	2.8	1.5	0.5	33.1	63	102.3	14-Jul	16-Aug	1
4	2	31.1	133.4	1,864	8,002	4.8	18	1	1	1	0	0	5.1	0	1	0	0	0	2.3	2.6	1.5	0.3	38.6	101	133.4	16-Aug	24-Sep	1
5	2	31.1	164.4	1,864	9,866	0	0	0	0	1	0	0	5.1	0	1	0	0	0	0.0	2.6	1.5	0.0	11.2	113	164.4	24-Sep	5-Oct	1
																		Contingency	3.9	13.7	9.0	1.1	16.1 wks				
																		Total	27.6 d				1.3 wks Margin					
																		Contingency	3.9 wks			24.5%						

Notes/Assumptions:

Cables will be laid from the Labrador side to the Newfoundland side
Tunnel cable lengths excluded from laying duration (included in pull-in & jointing)
Trenching/protection operations are assumed to be non-driving with respect to the laying operations (i.e. no interference between operations)
Many cells have comments detailing assumptions.

Items to confirm/clarify:

Vessel transit speed (per DC1130 appears to be ~ 7 knots (16d per 3200 nm)
Crew rotations (period/duration)
CLV fuel capacity (how many fueling layovers required)
Cable loading rate at factory (appears to be ~ 13 km /day per DC1130, but Oceanteam advises 8km/day for NorNed)
Ability of CLV to fuel near work field (St. Barbe?)

BEST CASE
= 113 - 27.6
~ 85d

File: SOBI Cable Laying duration working REV 23May08

Page 1 of 1

Date: 9/15/2009
Prepared: T Scott

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LOWER CHURCHILL PROJECT

Cabot Strait Submarine Cable Laying Duration

ATTACHMENT 2
2/2

Cabot Strait Submarine Cable Laying
Approximate Duration Calculation

Assumptions:

Number of Cables:	2	
Submarine Cable (km):	365	
Land Cable (km)	6.4	
Total Cable Length (km):	372	
Nominal Lay Rate (Km/day)	5.8	Assumption: 12h/d operation
Cable Mass (kg/m):	44	
Reel Capacity (t):	7,000	
Reel Capacity (km):	159	
No Submarine Reels Req'd:	2.3	

Cable Laying Season:	Days
May	31
June	30
July	31
August	31
September	30
October	15
Total per year	168 (24.0 wks)

Note: 1 Week = 7 days

CABLE LAYING OPERATION — *Nfld* — *N.S.*

Cable	Reel	Length (km)	Cumm. Length (km)	Weight (t)	Cumm Weight (t)	Load @ Factory (d)	Transit Norway to Canada (d)	Fuel / Provisions / Layover (d)	DP Calibration (d)	Float to Shore Pull-in & Jointing (d)	Trenching (d)	Splice Existing (d)	Lay Cable (d) [at nominal lay rate]	Drop / Protect (d)	Runoff / Float to Shore / Terminate (d)	Fuel / Provisions / Layover (d)	Protection (d)	Transit Canada to Norway (d)	CONTINGENCY 10% Loading/Travel Contingency (d)	CONTINGENCY 50% Operating Contingency (d)	CONTINGENCY 75% Cable Pull-in Contingency (d)	CONTINGENCY 15% Administrative Contingency (d)	Cable Total (d)	Cumulative Total (d)	Cumm Cable Layed (km)	Start	End	Laying Season
1	1	158.9	158.9	6,993	6,993	0	0	1	1	2	0	0	27.0	1	0	1	0	18	1.8	14.0	1.5	0.5	68.8	69	158.9	1-May	8-Jul	1
1	2	26.1	185.0	1,149	8,141	11.9	20	1	1	0	0	2	4.0	0	1	0	0	0	3.2	3.0	0.8	0.3	48.1	117	185.0	8-Jul	25-Aug	1
2	2	128.5	313.5	5,653	13,794	0	0	1	0	2	0	0	21.7	2	0	1	0	0	0.0	11.9	1.5	0.3	41.4	158	313.5	25-Aug	6-Oct	1
2	3	62.2	375.7	2,735	16,530	4.8	18	1	1	0	0	2	10.2	0	1	0	0	0	2.3	6.1	0.8	0.3	47.5	205	375.7	1-May	17-Jun	2
			375.7	0	16,530	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	205	375.7	17-Jun	17-Jun	2
																		Contingency	7.3	35.0	4.5	1.4	29.4 wks					
																		Total Contingency	48.1 d				-5.4 wks Margin					
																			6.9 wks			23.4%						

Notes/Assumptions:

Cables will run from MacDougall's Gulch, NL to Lingan, NS
Cables will be laid from theNewfoundland side to the Nova Scotia side
Trenching/protection operations are assumed to be non-driving with respect to the laying operations (i.e. no interference between operations)
Many cells have comments detailing assumptions.
Draft DC1140 report indicates potential to work later in the year, but May - Oct. is considered optimal

Season 1	158 d
Season 2	47 d
	206 d

Items to confirm/clarify:

Vessel transit speed (per DC1130 appears to be ~ 7 knots (18d per 3200 nm)
Crew rotations (period/duration)
CLV fuel capacity (how many fueling layovers required)
Cable loading rate at factory (appears to be ~ 13 km /day per DC1130)
Requirement of CLV to refuel during laying operation

BEST CASE
206 - 48
= 158d

File: Cabot Strait Cable Laying Spreadsheet - 12June08

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Date: 9/15/2009
Prepared: T Scott