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Subject: Re: LCP Key Risk Review Workshop (with Westney)
Date: Monday, May 21, 2012 8:22:06 AM
Attachments: [_png](#)
[_png](#)
[LCP-PT-MD-0000-RI-PL-0001-01.pdf](#)
[Nalcor ERM Risk Register - LCP.xls](#)

Rob,

Yes Thursday's workshop is a go. It would be beneficial if you could attend. There is no set agenda, rather a detailed discussion on various key risks in a progress fashion, thus we can work with your schedule to accommodate your conflict. Just advise when you will not be available.

As for scope, the main objective of this workshop is to review and discuss the top or key risks the project faces from now through to start-up and system steady state operation. We have held similar sessions historically (last 3 - 4 years), from which we developed a listing of such key risks.

For your review I am attaching the Project's Risk Management. This Plan defines a Key Risk as "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. All of the key Risk identified historically are contained in the ERM risk register (also attached); we need to validate these during Thursday's workshop. In addition to validating these risks, we will also spend some time quantifying time and cost exposure that these risks could have on the Project - we use this information to develop cost and schedule contingency recommendations.

You will note that I am copying the other meeting invitees on this email to share this background information.

Please let me know if you have any other questions.

Regards,

Jason



Nalcor ERM Risk Register - LCP.xls



LCP-PT-MD-0000-RI-PL-0001-01.pdf



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You owe it to yourself, and your family, to make it home safely every day. What have you done today so that nobody gets hurt?

Rob Henderson---05/20/2012 04:47:08 PM---Hi Jason, Is the workshop still going ahead on Thursday? I just had a meeting on the Emera agreement

From: Rob Henderson/NLHydro

To: Jason Kean/NLHydro@NLHydro

Date: 05/20/2012 04:47 PM

Subject: LCP Key Risk Review Workshop (with Westney)

Hi Jason,

Is the workshop still going ahead on Thursday? I just had a meeting on the Emera agreements due diligence process and I have an unavoidable conflict on Thursday afternoon and tentatively an hour of conflict in the morning. I would like to make the risk review workshop if and when possible.

It would be helpful to get an overview of the workshop and the planned agenda so that I can see what I can do to move around the hour conflict on Thursday morning.

Thanks,

Rob



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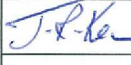




Nalcor Energy – Lower Churchill Project



Project Risk Management Plan

LCP-PT-MD-0000-RI-PL-0001-01

Comments: This document supersedes MSD-RI-005 Strategic Risk Management Process	Total # of Pages (Including Cover): 33
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B1	30-Jun-11	Issued for Use	 J. Kean	 S. O'Brien	 G. Fleming	 R. Power	 P. Harrington
A1	4-May-2011	For Review/ Comments	J. Kean / J. Evans				
Status/ Revision	Date	Reason For Issue	Prepared By	Checker	Marine Crossings Manager Approval	Project Manager (Muskrat Falls & Island Link) Approval	Project Director Approval
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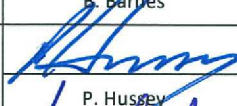
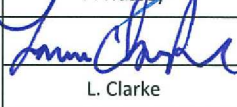
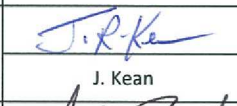
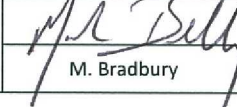
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1.0 Purpose

This *Project Risk Management Plan* is one of several key management plans under the umbrella of [LCP-PT-MD-0000-PM-PL-0001-01 Project Execution Plan \(Scope and Approach\)](#) that detail how the Nalcor Energy-Lower Churchill Project (NE-LCP or the Project) will be managed in order to achieve the goals and objectives stated in the Project Charter. This Management Plan provides:

- Overall risk approach / philosophy adopted by Nalcor for the Project;
- Roles and responsibilities of both Nalcor and the EPCM consultant as it relates to risk management;
- Key interfaces for risk management activities between Nalcor and the EPCM consultant; and
- Risk management process used on the Project.

2.0 Scope

This *Project Risk Management Plan* is a key component of the NE-LCP Risk Management Program illustrated in Figure 1. Together these documents provide the core direction as to how risk management will be conducted within the Project.

This Management Plan is applicable during the planning and execution of Phase 1 of the Project, including the following project elements:

- Nalcor owner activities including environmental assessment, aboriginal affairs, power sales, regulatory, financing, and labor relations
- Muskrat Falls Hydroelectric Facility
- Labrador – Island Transmission Link
- Maritime Link

This *Project Risk Management Plan* addresses all project risks, however does not specifically address the completion of specific health, safety and environmental risk assessments (e.g. hazard operability reviews “HAZOPs”, or process hazard analysis). While general project risks will be evaluated in accordance with these criteria, details of specific risks assessments related to these items are contained in the respective management plans.

Figure 1: NE-LCP Risk Management Program

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. Contingency does not cover scope changes outside the Project's parameters, events such as strikes or natural disasters, escalation or foreign currency impact.

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.

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. 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.

Pareto's Principle

Also known as the 80-20 rule, states that, for many events, roughly 80% of the effects come from 20% of the causes. Application to risk management suggest that 80% of the risk exposure comes from 20% of the project's risk.

Project Change

A deviation which represents a change or departure from the Project baseline scope, estimate, schedule, intended plant quality, HSE targets, project policy, or execution plan that causes an addition or reduction to the Original Control Budget or baseline Project Control Schedule including correction for scope / estimate omissions, or change in execution approach.

Project Change Notice

A mechanism used to facilitate the processing of Project Changes.

Project Management Team

The Project Management Team (PMT) is led by the Project Director and is made up of project leaders and key functional representatives. The PMT meets periodically, to identify issues that may affect cost and schedule and to determine how such issues should be resolved.

Project Scope

A concise and accurate description of the end products or

deliverables to be expected from the project and that meet specified requirements as agreed between the Project stakeholders. It represents the combination of all project goals and tasks, and the resources and activities required to accomplish them.

Project Team	Personnel assembled to develop and execute a project from planning through start-up. The Project Team (PT) is dedicated to managing the overall project including significant focus on monitoring and controlling the EPCM consultant's and contractor's performance in execution of the work.
Risk	An uncertain event or condition that, if it occurs, has a positive or negative effect on a project's objectives.
Risk Brokering	The process of allocating project risks to various providers (of technology, engineered equipment, engineering & construction services, insurance, and financing) such that each provider's levels of cost and risk are optimized.
Risk Action Plan	Action plan prepared to address all non-Key Risks identified in the Sub-Project Risk Register.
Risk Frame	Form used to document Key Risk details, unmitigated risk exposure, risk response / resolution strategy, and status.
Risk Register	A database or register of the identified project risks.
Risk Response Plan	Management strategy and action list prepared for Key Risks.
Risk Resolution Team	Multi-functional group, acting as a resource to the Project Director, who select the highest priority risks (can include identification of that risk) for management based upon defined criteria and assist Risk Owners with the development of response plans.
Sub-Project	Sub-division of LCP Projects contained in the Work Breakdown into components to assist with the planning, executing and controlling of the work. Reference Project Controls Management Plan LCP-PT-MD-0000-PM-PL-0001-01 for details.
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

EPCM	Engineering, Procurement and Construction Management
ERM	Enterprise Risk Management
FEL	Front End Loading
HAZID	Hazard Identification Review
HAZOP	Hazard Operability Review
HSE	Health, Safety and Environment
LACTI	<u>L</u> eads, <u>A</u> ccountable, <u>C</u> onsulted, <u>T</u> echnical and <u>I</u> nformed Chart
MoC	Management of Change
NE-LCP	Nalcor Energy – Lower Churchill Project
PCN	Project Change Notice
PMT	Project Management Team
PT	Project Team
WBS	Work Breakdown Structure

5.0 Reference Documents and/or Associated Forms

LCP-PT-MD-0000-PM-PL-0001-01	Project Execution Plan
LCP-PT-MD-0000-PM-LS-0001-01	Project Dictionary
LCP-PT-MD-0000-PC-PI-0001-01	Project Controls Management Plan
LCP-PT-MD-0000-PR-PL-0001-01	Procurement Management Plan
LCP-PT-MD-0000-PC-PL-0001-01	Project Change Management Plan
LCP-PT-MD-PR-PL-0001-01	Procurement Management Plan
LCP-PT-MD-0000-RI-RP-0001-01	Gate 2 Project Risk Analysis
MSD-LE-001	Insurance Philosophy
MSD-RI-001	Project Risk Management Policy

MSD-RI-002

Project Execution Risk and Uncertainty Ranking Matrix

MSD-RI-003

Project Execution Risk & Uncertainty Management
Guidelines

MSD-RI-004

Risk Management Philosophy

6.0 Responsibilities

- | | |
|---|---|
| Project Director | <ul style="list-style-type: none"> • Chairs the Risk Resolution Team and accountable for implementation of this Risk Management Plan • Approves Risk Response Plans for Key Risks and subsequent updates, or seeks approval of Risk Response Plan (as required) from LCP Executive Committee |
| Project Manager(s) or Scope Manager
(reports to Project Director) | <ul style="list-style-type: none"> • Responsible for implementation of this Risk Management Plan within their sub-Project • Management of risk within their sub-Project or area of responsibility |
| Risk Owner | <ul style="list-style-type: none"> • Can be any individual within the organization (e.g. Area Manager), including EPCM Consultant • Develops the Risk Response Plan for Key Risks or Risk Action Plan for other project risks • Spearheading the implementation of the Risk Response Plan • Advising the Nalcor Risk Coordinator and Project Manager of any implementation issues with Risk Response Plan • Take action to adjust mitigation efforts as appropriate for Risk Response Plan |
| Risk Resolution Team | <ul style="list-style-type: none"> • Multi-functional group, acting as a resource to the Project Director, who select the highest priority risks (can include identification of that risk) for management based upon defined criteria and assists Risk Owners with the development of Risk Response Plans, including assistance with the assistance of optimal risk brokering. • Monitors the implementation status of Risk Response Plans |
| LCP Executive Committee | <ul style="list-style-type: none"> • Approves the selected list of highest priority risks made by the Risk Resolution Team • Approves selective Risk Response Plans (as required due to their delegation of authority or nature of the risk) • Making decisions on risk mitigation trade-offs (corporate / project trade-offs) |

-
- Removing roadblocks to enable Risk Response Plans to be implemented
- NE-LCP Project Risk Coordinator**
- Schedules and facilitates risk assessments
 - Lead the population of the sub-project risk register, including interface with EPCM Consultant's Risk Manager to participate in EPCM Consultant's risk activities
 - Facilitates discussions to identify the Risk Owners for each risk
 - Facilitate the identification of the Key Risks (i.e. top 20)
 - Provide updated risk listing to procurement or package engineer for contracting strategy preparation and subsequent commercial negotiations
 - Ensures Risk Response Plan is prepared for Key Risks in a consistent fashion
 - Ensures Risk Action Plans are developed and implemented for all Project Risks
 - Monitors the status of Risk Response Plan implementation (i.e. collecting updates) – must be in touch with all risk owners – eye on the ball
 - Produces Risk Response Plan status reports
 - Facilitates the Risk Resolution Team meetings
 - Attend LCP Executive Committee meetings as appropriate
 - Reviews Risk Response Plans for Project Change considerations and Project Changes for risk considerations (as required)
- Sub-Project Risk Register Lead**
- Organizes and consolidates the sub-project risk register by category
 - Leads the preliminary risk ranking on the sub-project risk register
 - Coordinating with Risk Owners to develop and implement Risk Action Plans
 - Informing Risk Coordinator of overall risk status
- Risk Advisor (Westney)**
- Provides process expertise and specialized tools for conducting risk assessments
 - Assists with the assessment of financial exposure of Strategic Risks
 - Participates on Risk Resolution Team reoccurring meetings
 - Acts as independent risk broker
- Nalcor ERM Committee LCP Representative**
- Providing the linkage between the Project Risk Register and the Corporate Risk Register in terms of risk identification, risk rating and ongoing monitoring of mitigation strategies.
 - Conveying details of best practices in project risk management as practiced by the NE-LCP to the benefit of the ERM Committee and Nalcor Energy generally.

EPCM Consultant's General Project Manager	<ul style="list-style-type: none"> • Ensure that EPCM Consultant provides EPCM services consistent with Nalcor's Risk Philosophy and Risk Management Plan. • Participate on Risk Resolution Team • Review Risk Action Plans for potential Project Changes
EPCM Consultant's Risk Manager	<ul style="list-style-type: none"> • Responsible for implementation of Consultant's risk management plan • Establishing a working interface with Nalcor Risk Coordinator • Ensures Risk Action Plans are developed and implemented (for risks within EPCM consultant's scope)
Supply Chain	<ul style="list-style-type: none"> • Responsible for development of contracting and procurement plans that consider risk inventory for the package • Risk brokering during the negotiation of the commercial terms of the package with the contractor or supplier


7.0 Risk Management Philosophy

Nalcor Energy's [Risk Management Policy](#) for the Lower Churchill Project (document [Project Risk Management Policy MSD-RI-001](#)), as shown in Figure 2, makes a strong commitment towards identifying and management all project risks. With consideration of this Policy Statement, the Project's risk management program described in this Management Plan is structured to encapsulate the following beliefs held by Nalcor.

- Proactive risk awareness and management is a key enabler of "flawless execution."
- Predictability of outcome will be vastly improved when achievable objectives are first established. A full understanding of project risks early in the project's lifecycle will provide the greatest opportunity to complete the necessary work required to fully understand these risks (i.e. Risk-Driven Front End Loading) from which achievable objectives will be established.
- Quality decision making will be facilitated through a comprehensive understanding of project risks and how they can be managed with least impact on the Project. Such risk-informed decision making, illustrated in Figure 3, will be a standard for the Project.
- Consistent with Pareto's Principle, we believe a few, select, complex risk (15 – 20) will provide the greatest exposure for the Project. These Key Risks will be subject of heavy focus by Nalcor's Project Management Team and the Risk Resolution Team.

- Many risks are multi-dimensional and complex requiring creative solutions. Cost effectively managing risks will require risks to be allocated to various stakeholders who are best positioned to manage them through Risk Brokering. This process of Risk Allocating will be featured significantly through the procurement process for the project's supply and construction contracts.
- Risk management is an on-going, continual looped process as the project progresses through the Gateway Phases (i.e. Plan-Do-Check-Act process).
- Consistent with practice up to Decision Gate 2, the Project will continue to use the Risk Resolution Team (see Figure 4) to support the development and validation of Risk Response Plans, however its membership will be adjusted to reflect the progression of the Project.

Figure 2: Project Risk Management Policy Statement



Lower Churchill Project

Risk Management Policy

The Lower Churchill Project Management Team is committed to planning and executing the Lower Churchill Project in such a way as to minimize the potential negative effects of risks and to maximize opportunities. We will serve the needs of all our internal and external customers, stakeholders and our shareholder by tangibly demonstrating this commitment through compliance with our Risk Management System and by making continual improvement an integral part of our activities.

Our Philosophy

- Proactive risk management is fundamental to achieving the Lower Churchill Project's objectives.
- All participants in the Lower Churchill Project are responsible for identifying & mitigating risk and identifying & developing opportunities.
- Empowerment comes through strong leadership and involvement of all personnel.

Our Goals

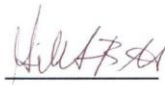
- Create a culture that supports proactive project risk management that is viewed by all Team Members as an enabler to successfully achieve the Lower Churchill Project's objectives.
- Identify, assess, respond to and manage all key risks and uncertainties.
- Allocate project risk to the party who can most efficiently and effectively manage the risk.
- Improve decision-making by thoroughly understanding project risks and uncertainties.

Our Commitments

- We will ensure this Policy is known and clearly understood by all persons associated with the Lower Churchill Project.
- We will work to identify, assess, respond to and manage all key project risks and opportunities consistent with guidelines and tools advocated by this Policy.
- We are committed to managing project risks and opportunities from the following perspectives: occupational health and safety, environmental, technical, schedule, cost, operational reliability/quality, and reputation/image.


This Policy Statement supports and complements other policies within the Lower Churchill Project Integrated Management System. This Policy Statement is not intended to replace or duplicate Newfoundland and Labrador Hydro Corporate risk management policies with respect to market and financial loss risk mitigation activities.

Endorsed by:




 Vice-President
Lower Churchill Project

20 Dec 07
 Date



 Project Manager
Lower Churchill Project

18 Dec 07
 Date



 Strategic Planning Lead
Lower Churchill Project

18 Dec 07
 Date

Figure 3: Risk-informed Decision Making Approach

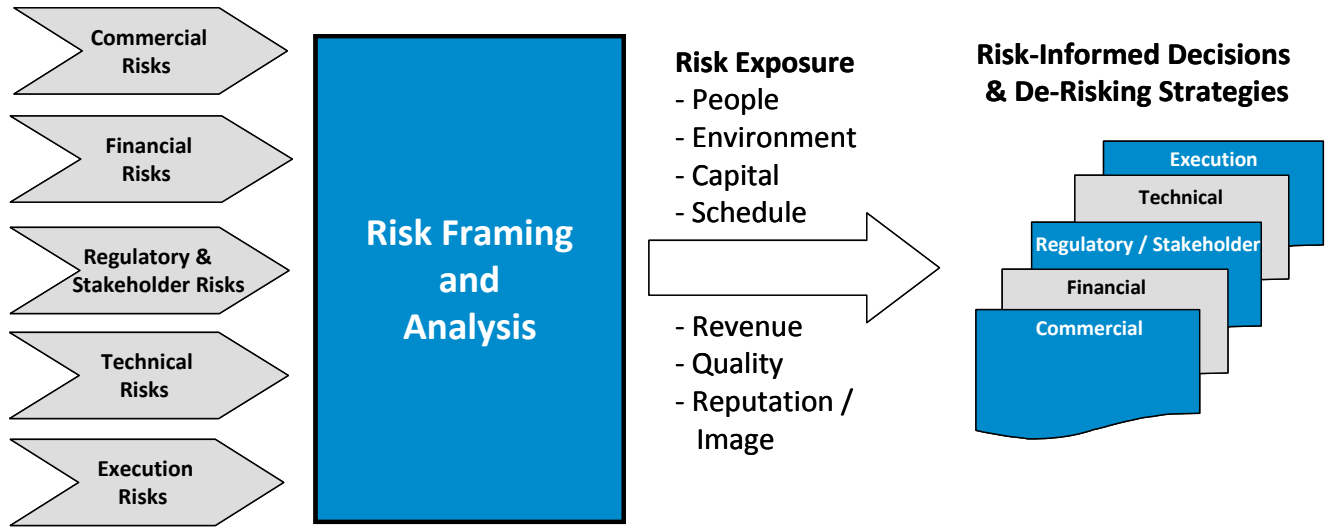
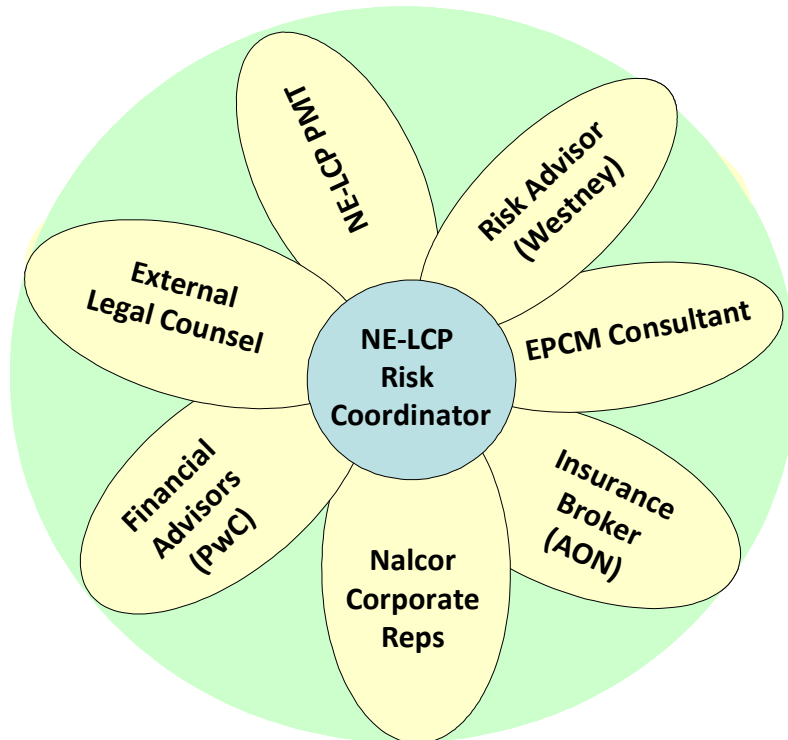


Figure 4: Risk Resolution Team Post Decision Gate 2



8.0 Overview of Risk Management Process

8.1 Risk Management Process Cycle

The risk management process used to effectively manage risks during the planning and execution stages of the Nalcor Energy – Lower Churchill Project is depicted in Figure 5. This risk management process is comprised of four main steps which combine to form an ongoing cycle.

Figure 5: Illustration of Risk Management Process Cycle



Step 1 – Identify and Organize Risks

All risks are captured on sub-project risk registers. The risks are then organized by major activity and type of risk; this organization facilitates both efficiency and effectiveness in the handling of the risks.

Step 2 – Assess and Prioritize Risks

Each risk is given a “first-cut” priority ranking which is a function of the risk’s likelihood of occurrence and its potential consequence. From there, approximately 15-20 of the more complex and higher profile risks (Key Risks) are selected to be overseen by the Risk Resolution Team. Risk Assessments are performed to evaluate both the individual and collective impacts of risks on the project, and to provide insight into the value of possible risk mitigations.

Step 3 – Address Risks

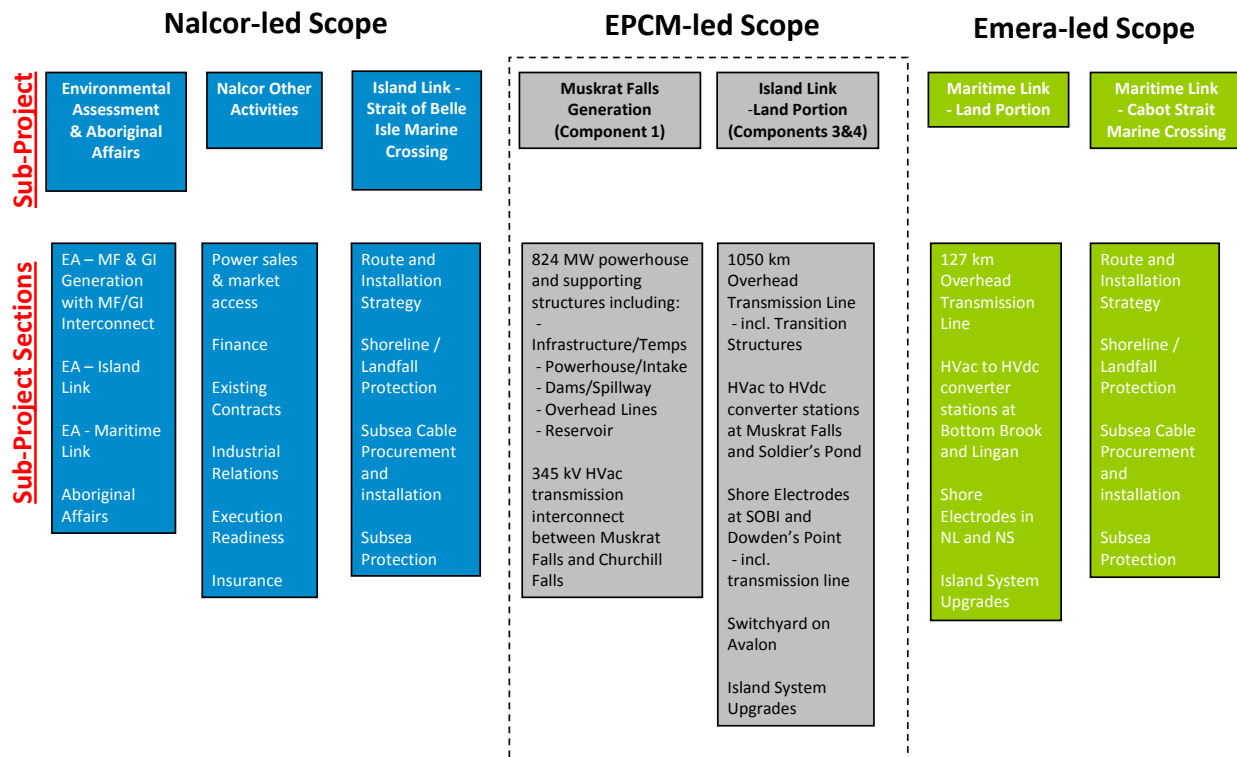
Each Key Risk is managed using a Response Plan which is developed using a Nalcor Key Risk Frame, as contained in Attachment B1. The Response Plan will detail the recommended strategy for managing the risk (i.e., avoidance, mitigation, allocation, or acceptance). The majority of risks are not elevated to Key Risk status and are managed using Action Plans (see Attachment B.2 for template) which are specified on the sub-project risk registers. Each risk's Risk Owner is responsible for leading the development and implementation of that risk's Response Plan or Action Plan.

Step 4 – Monitor and Control Risks

The Response Plans and Action Plans are reviewed on a regular basis and are adjusted as conditions warrant to promote optimal outcomes. The frequency of reviews ranges from monthly to quarterly depending on the organizational entity involved in the review.

8.2 Scope of Nalcor's and EPCM Consultant's Responsibilities

Figure 6 (below) shows the division of responsibilities between Nalcor and the EPCM Consultant for Phase I of the Lower Churchill Project. The overall project is divided into sub-project areas; these sub-project areas are used as the basis for designating the sub-project risk registers used in the Risk Management Process.

Figure 6: Depiction of Risk Register Responsibilities

Nalcor will have the responsibility for overseeing: the Strait of Belle Isle (SOBI) Marine Crossing; and General Project Risks (including issues related to overall project execution, Environmental Assessment, Aboriginal Affairs, Financing, Regulatory, Power Sales, and Labor Relations).

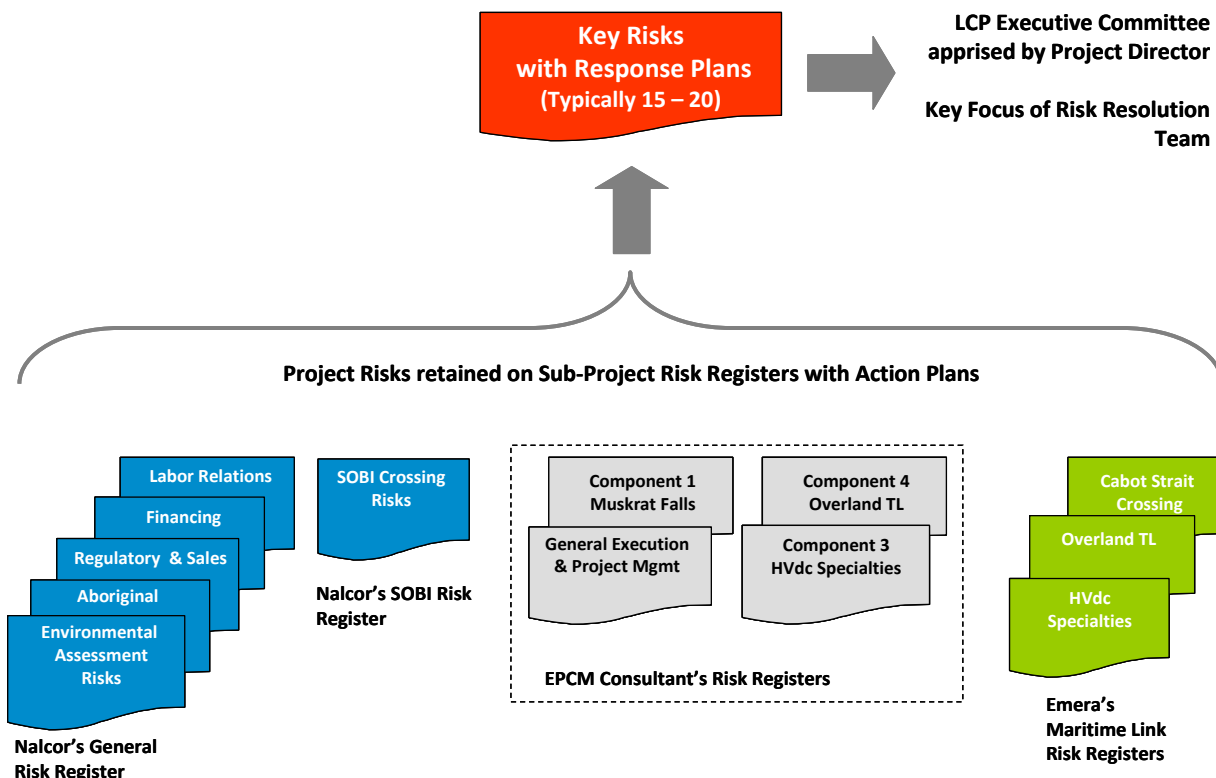
The EPCM Consultant will oversee sub-project risk registers pertaining to: Muskrat Falls Generation (Component 1), HVdc Specialties (Component 3), Overland Transmission (Component 4), and General Execution of Project Management within its area of responsibility.

At current it is envisioned that Emera, as lead for the Maritime Link, will be responsible for overseeing the risks associated with the Maritime Link. Risk register synergies with other portions of the Project will be explored as the planning for the development of this asset continues (e.g. common marine crossing risk register for SOBI and Cabot Strait).

8.3 Flow of Risks from Sub-Project Risk Registers to List of Key Risks

Figure 7 (below) portrays the flow of project risks from the sub-project risk registers to the List of Key Risks which are overseen by the Risk Resolution Team / LCP Executive Committee. Response Plans are used to manage the Key Risks while Action Plans are used to manage the risks that are retained on the sub-project risk registers.

Figure 7: Flow of Project Risks from Sub-Project Risk Registers



8.4 Division of Nalcor's and EPCM Consultant's Responsibilities in Risk Management Process

Table 1 (below) depicts the various responsibilities that Nalcor and EPCM Consultant have throughout the Risk Management Process.

Table 1: Risk Management Division of Responsibility Matrix

CORE ACTIVITY	RESPONSIBILITY ASSIGNMENT		
	Nalcor Energy	EPCM Consultant	INTERACTION NOTES
Identifying and Organizing Risks			
Initial population risk register			
For Nalcor-led Sub-Project risks	R		EPCM Consultant to participate upon request
For EPCM Consultant-led Sub-Project risks		R	Nalcor to participate
Organizing risks by category			
For Nalcor-led Sub-Project risks	R		
For EPCM Consultant-led Sub-Project risks		R	Nalcor to provide guidance as required
Identifying risk owners			
For Nalcor-led Sub-Project risks	R		
For EPCM Consultant-led Sub-Project risks		R	Nalcor to provide input as required
Assessing and Prioritizing Risks			
Conduct preliminary rankings for Nalcor-led Sub-Project risks			
For Nalcor-led Sub-Project risks	R		
For EPCM Consultant-led Sub-Project risks		R	Nalcor to participate
Develop list of Key Risks to be overseen by Risk Resolution Team	R		EPCM Consultant to provide input
Determine schedule for cost and time risk workshops			
For Nalcor-led Sub-Project risks	R		
For EPCM Consultant-led Sub-Project risks	R		Nalcor is responsible for informing EPCM
Determine schedule for health, safety and environmental risk assessments			E.g. HAZIDs, HAZOPs, PHAs
For Nalcor-led Sub-Project risks	R		
For EPCM Consultant-led Sub-Project risks		R	
Conduct cost and time risk assessments			
For Nalcor-led Sub-Project risks	R		
For EPCM Consultant-led Sub-Project risks	R		EPCM Consultant will participate
Conduct health, safety and environmental risk assessments			
For Nalcor-led Sub-Project risks	R		
For EPCM Consultant-led Sub-Project risks		R	
Addressing Risks			
Develop and approve Response Plans for Key Risks	R		EPCM Consultant to provide input into Response Plan
Implement Response Plans for Key Risks	R		EPCM Consultant to provide implementation support
Develop and approve Actions Plans for Project Risks			
For Nalcor-led Sub-Project risks	R		
For EPCM Consultant-led Sub-Project risks		R	Nalcor to provide input into Action Plans and approve if its triggers a Project Change
Implement Action Plans for Project Risks			
For Nalcor-led Sub-Project risks	R		
For EPCM Consultant-led Sub-Project risks		R	
Address Risks through the Procurement Process			
For Nalcor-led Sub-Projects	R		
For EPCM Consultant-led Sub-Projects		R	Nalcor to provide input as required
Secure Project Insurance Program	R		EPCM Consultant to provide support to the placement of the Project's insurance program.
Monitoring and Controlling Risks			
Review and adjust Response Plans for Key Risks	R		EPCM Consultant to provide input as applicable
Review and adjust Actions Plans for Project Risks			
For Nalcor-led Sub-Project risks	R		
For EPCM Consultant-led Sub-Project risks		R	EPCM Consultant to provide regular status reports

9.0 Identifying and Organizing Risks

9.1 Initial Risk Identification

All project risks associated with Phase 1 of the Lower Churchill Project will be placed on a sub-project risk register. As portrayed in Figure 6, Nalcor will oversee sub-project risk registers pertaining to: the SOBI Crossing; and General Project Risks (including issues related to overall project execution, Environmental Assessment, Aboriginal Affairs, Financing, Regulatory, Power Sales, and Labor Relations), and EPCM Consultant will have the responsibility for overseeing sub-project risk registers pertaining to: Muskrat Falls Generation (Component 1), HVdc Specialties (Component 3), Overland Transmission (Component 4), and General Execution of Project Management.

To assist with the initial population of a sub-project risk register, it is recommended that the Sub-Project Risk Register Lead (EPCM Consultant Risk Manager for EPCM Consultant-led sub-project risk registers) create a preliminary list of the risks which pertain to that particular sub-project. A workshop can then be held, with broad participation from multiple disciplines, to further develop the list of risks for the risk register. This workshop will be facilitated by the LCP Project Risk Coordinator (EPCM Consultant Risk Manager for the EPCM Consultant-led sub-project risk registers).

Inputs into this process will include the risk identification activities completed up to Decision Gate 2 as documented in [Gate 2 Project Risk Analysis](#), document [LCP-PT-ED-0000-RI-RP-0001-01](#).

Note: It is anticipated that the EPCM Consultant will use its corporate standard risk register and software as the basis for establish of a risk register.

9.2 Organizing Risks by Category

Organizing the risks on the sub-project risk registers is critical to the risks being efficiently and effectively managed. The Sub-Project Risk Register Lead will have primary responsibility for organizing risks on the sub-project risk register.

Initially, it may be helpful to group risks by major activity or physical component of the Work Breakdown Structure. Risks should be further organized by type of risk. The following ten categories of risk are used on the sub-project risk register:

- 1) Commercial
- 2) Commissioning and Start-up
- 3) Completeness
- 4) Environmental

- 5) Construction
- 6) External
- 7) Interface
- 8) Organizational / Enterprise
- 9) Regulatory
- 10) Technical

After this level of organization has taken place, the list of risks should be reviewed to see what consolidation/elimination is appropriate.

Finally, to assist future risk assessments, a determination should be made for each risk as to whether it is a tactical risk or a strategic risk. In general, if the sub-project team has the authority to address a risk, it is a tactical risk; if a level of the organization above the sub-project team is required to address a risk, then it is a strategic risk.

9.3 Identifying Risk Owners

The NE-LCP Project Risk Coordinator (EPCM Consultant's Risk Manager for EPCM Consultant-led sub-project risks) has primary responsibility for identifying the Risk Owner for each risk. This identification would typically be made during the workshop discussion at the time the risk is placed on the risk register. Afterwards, it is important that the Sub-Project Risk Register Lead (or NE-LCP Project Risk Coordinator as appropriate) confirm with the Risk Owner that he/she understands and accepts the responsibilities associated with being the Risk Owner.

9.4 Updating Risk Registers based upon Gathered Intelligence

The Sub-Project Risk Register Leads and NE-LCP Project Risk Coordinator (EPCM Consultant's Risk Manager for EPCM Consultant-led sub-project risk registers) will work together to update or add risks to the sub-project risk registers based on discussions in management meetings, information gathered from Risk Assessments, or other new intelligence. The Sub-Project Risk Register Leads will also have primary responsibility for updating the status of each risk on the sub-project risk register as appropriate.

9.5 LACTI Chart for Identifying and Organizing Risks

<u>Description of Activity</u>	LCP Executive Committee	LCP Project Director	LCP Risk Resolution Team ¹	LCP Project Risk Coordinator	Sub-Project Risk Register Lead	Risk Owner	Risk Advisor (Westney)	EPCM Consultant General Proj. Mgr. ²	EPCM Consultant Risk Manager ²	Nalcor ERM Committee LCP Rep.	LCP Change Mgt. Coordinator
Initial Population of Sub-project Risk Register		A	I	L	C	C	T	I	C	I	
Organises Risks by Category on Sub-project Risk Registers (incl. designating tactical/strategic & consolidating risks)		A	I	C	L	C	T	I	C		
Identify Risk Owner for each Risk		A	I	L	C	C	T	I	C		
Update Risk Registers based on Intelligence Gathered from LCP Executive Committee, Risk Resolution Team, Risk Workshops, Contractors, and General Surveillance	C	A	C	L	C	C	T	C	C		C

Legend:

- L LEADS - Who leads the activity
- A ACCOUNTABILITY - Who has accountability for the activity
- C CONSULTED - Who needs to be consulted during the activity
- T TECHNICAL - Who provides technical input on the activity
- I INFORMED - Who should be informed, but is not actively participating in the activity

¹ Financial Advisor, Legal Advisor, and Insurance Advisor participate on Risk Resolution Team as appropriate.

² As appropriate, EPCM Contractor participates on LCP Risk Resolution Team and as a Sub-Project Risk Register Lead and as Risk Owner.

10.0 Assessing and Prioritizing Risks

10.1 Determining Preliminary Risk Rankings

The Sub-Project Risk Register Lead, with assistance from the NE-LCP Project Risk Coordinator (EPCM Consultant Risk Manager for EPCM Consultant-led sub-project risk registers) and other members of the sub-project team as appropriate, will assess the likelihood of occurrence and the potential consequence(s) of each risk on the sub-project risk register. There are six categories used for potential consequences:

- People (Occupational Health and Safety)
- Environmental (Physical)
- Capital Cost

- First Power Target Date
- Product Quality (Availability, Reliability, and Performance)
- Reputation / Image

Each risk's likelihood of occurrence combined with its potential consequence(s) produces a first-cut priority ranking for the risk (Critical, Serious, Moderate, or Low). The [Project Execution Risk and Uncertainty Ranking Matrix](#), document [MSD-RI-002](#), provides additional details on this ranking process and is intended to be used in the evaluation of all project risks, including by the EPCM consultant.

Nalcor Area or Scope Managers will validate all first-cut rankings for risks related to their areas of responsibility.

10.2 Develop List of Key Risks to be Overseen by Risk Resolution Team / LCP Executive Committee

A critical aspect of Nalcor's [Risk Management Philosophy](#), reference document [MSD-RI-004](#), is the Risk Resolution Team (with involvement from the LCP Executive Committee as appropriate) managing a select number (approximately 15-20) of complex risks which provide the greatest exposure for the Project. The 15-20 Key Risks to be overseen by the Risk Resolution Team are selected from all of the risks on all sub-project risk registers as well as the risks on the Decision Gate 2 Strategic Risk Frames, reference document [Gate 2 Project Risk Analysis LCP-PT-MD-0000-RI-RP-0001-01](#). The NE-LCP Project Risk Coordinator has responsibility for facilitating the Key Risk selection process with the Risk Resolution Team.

10.3 Risk Assessments (Tactical-Risk, Strategic-Risk and Time-Risk Analyses)

The NE-LCP Project Risk Coordinator has primary responsibility for developing a schedule for Risk Assessments (Tactical-Risk, Strategic-Risk, and Time-Risk analyses) to evaluate risks at the sub-project and total project levels. It will often be desirable to have early "baseline" Risk Assessments (i.e. Decision Gate 2 risk assessment) to be updated later at appropriate stages.

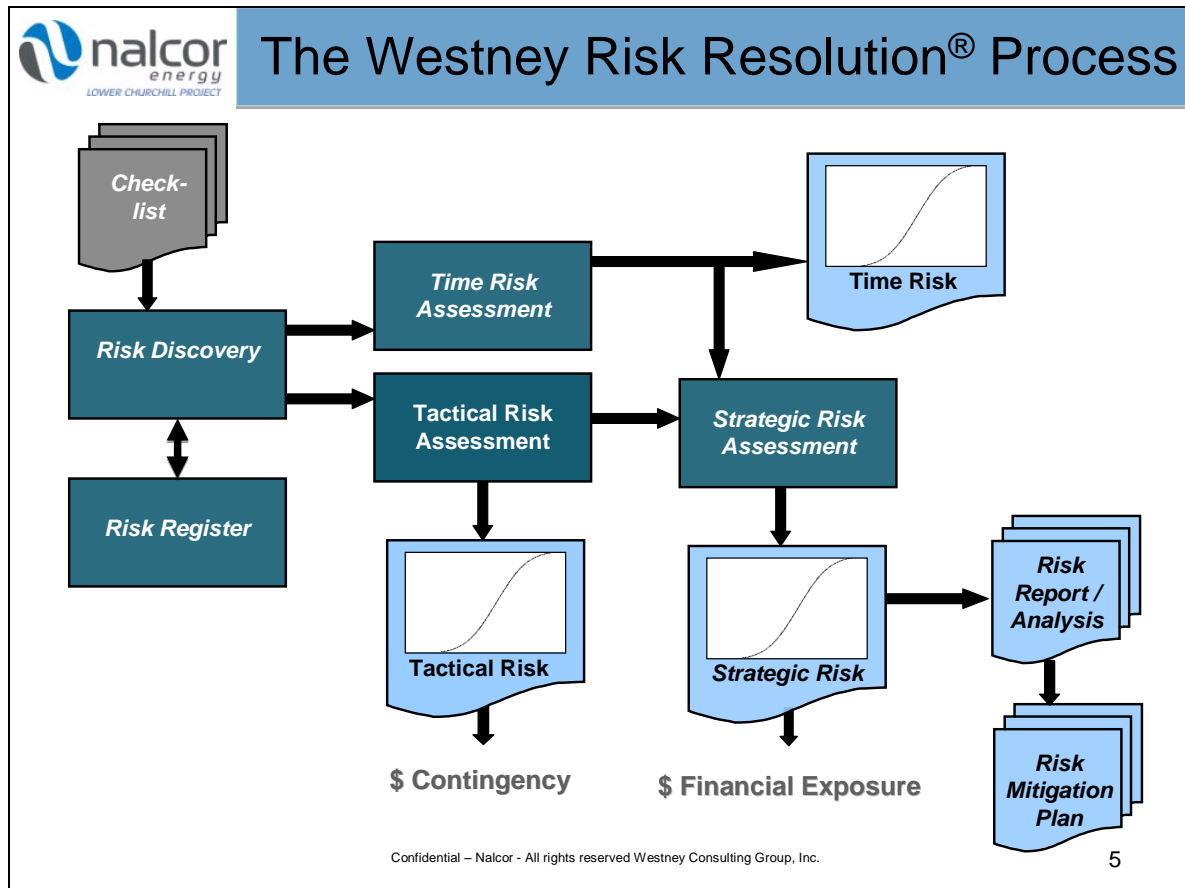
The NE-LCP Project Risk Coordinator, working with the Risk Advisor (Westney Consulting Group), will facilitate the discovery (document review and interviews) and workshop discussions associated with the Risk Assessments. It is intended that a broad range of project knowledge holders participate in the discovery process and Risk Workshops. Nalcor's Strategic Risk Frames will be used to describe the attributes of each Key Project Risk.

The Risk Advisor (Westney) will be responsible for performing the analysis and creating reports to document findings. The analysis, including Monte Carlo-type simulation techniques, will be structured to gain insights on important issues identified by Nalcor; these issues may pertain to

individual risks or groups of risks. Risk Assessments may consider both the impact of risks as well as the impact of potential mitigations. The Risk Assessment results are carefully considered in the determinations of both project contingency and management reserve levels (reference [Project Controls Management Plan](#), document LCP-PT-MD-0000-PC-PI-0001-01).

The Risk Assessment process is illustrated in Figure 8 below.

Figure 8: Westney's Risk Assessment Process



10.4 Health, Safety and Environmental Risk Assessments

As deemed required, focused health, safety and environmental risk assessments (e.g. HAZIDs, HAZOPs, etc.) will be undertaken. Details on the process for undertaking these specific risk assessments can be found in [Health and Safety Management Plan LCP-PT-MD-HS-PL-0001-01](#) and [Environmental Management Plan LCP-PT-MD-EV-PL-0001-01](#).

Depending on the relevant risk ranking, a health & safety or environmental risk may become a Key Risk.

10.5 Confirm List of Key Risks based upon Gathered Intelligence

On a regular basis, the NE-LCP Project Risk Coordinator will facilitate reviews with the Risk Resolution Team to confirm that the list of Key Risks is current based on discussions in management meetings, information gathered from Risk Assessments, or other new intelligence. The LCP Project Risk Coordinator will update the list of Key Risks as appropriate.

10.6 LACTI Chart for Assessing and Prioritizing Risks

<u>Description of Activity</u>	LCP Executive Committee	LCP Project Director	LCP Risk Resolution Team ¹	LCP Project Risk Coordinator	Sub-Project Risk Register Lead	Risk Owner	Risk Advisor (Westney)	EPCM Consultant General Proj. Mgr. ²	EPCM Consultant Risk Manager ²	Nalcor ERM Committee LCP Rep.	LCP Change Mgt. Coordinator
Conduct Preliminary Risk Rankings	I	A	I	C	L	C	T	I	C		
Develop List of Key Risks to be Overseen by Risk Resolution Team / LCP Executive Committee	C	A/C	C	L	C	C	T	C	C	I	
Determine Schedule for Risk Assessments (Tactical-, Strategic-, and Time-Risk Assessments)	I	A	C	L	C	C	T	C	C		
Conduct Risk Assessments (including discussion and evaluation of key individual risks)	C	A	C	L	C	C	T	C	C		
Update Lists of Key Risks based on Intelligence Gathered from LCP Executive Committee, Risk Resolution Team, Risk Workshops, Contractors, and General Surveillance	C	A	C	L	C	C	T	C	C	I	C

Legend:

- L** LEADS - Who leads the activity
- A** ACCOUNTABILITY - Who has accountability for the activity
- C** CONSULTED - Who needs to be consulted during the activity
- T** TECHNICAL - Who provides technical input on the activity
- I** INFORMED - Who should be informed, but is not actively participating in the activity

¹ Financial Advisor, Legal Advisor, and Insurance Advisor participate on Risk Resolution Team as appropriate.

² As appropriate, EPCM Contractor participates on LCP Risk Resolution Team and as a Sub-Project Risk Register Lead and as Risk Owner.

11.0 Addressing Risk

11.1 Developing and Implementing Response Plans to Address Key Risks Overseen by Risk Resolution Team

The Risk Owner for each Key Risk has the primary responsibility for developing the Response Plan for that risk. The Response Plan will detail the recommended strategy for managing the risk (i.e., avoidance, mitigation, allocation, or acceptance). The Risk Owner will consult with members of the Risk Resolution Team as appropriate when developing the Response Plan. Findings from Risk Assessments should also be used to help shape the Response Plans. Nalcor Key Risk Frames (see Attachment B.1) are used to structure the Response Plans.

The NE-LCP Project Director will approve each Response Plan or, when required, seek higher-level approval for the Response Plan. The Risk Owner for each Key Risk will be responsible for leading the implementation of the Response Plan.

11.2 Developing and Implementing Action Plans to Address Project Risks on Sub-Project Risk Registers

The vast majority of risks are not elevated to Key Risk status, and they continue to reside on the sub-project risk registers; Action Plans are used to manage these Project Risks. The Risk Owner for each Project Risk has the responsibility for developing that risk's Action Plan, as per Attachment B.2. The Risk Owner will be responsible for consulting the Sub-Project Risk Register Lead and other resources as appropriate in developing the Action Plan.

The applicable Nalcor Project Manager (or delegate) will approve each Action Plan. The Risk Owner for each Project Risk will be responsible for leading the implementation of the Action Plan.

11.3 Addressing Risks through the Procurement Process

Another important aspect of the Project's Risk Management Philosophy is effectively using the procurement process to address risks. Area or Scope Managers (or delegates) will work with the contracts coordinator/specialist and the Sub-Project Risk Register Leads to develop a risk inventory for each contract package.

The procurement strategy for each contract package will then consider the optimal risk brokering for the identified risk inventory. The NE-LCP Project Risk Coordinator is responsible for working with the contracts coordinator/specialist to facilitate any required risk brokering reviews and approvals.

For further details, reference the [Procurement Management Plan LCP-PT-MD-PR-PL-0001-01](#).

11.4 Project Insurance Procurement

The Insurance Advisor (broker) will act as the technical advisor during the procurement of the Project's insurance program, which entails a thorough understanding of the project and its associated risks discovered throughout the application of this Management Plan. Details on the strategy for placement of the Project's insurance program are contained within [Insurance Philosophy MSD-LE-001](#).

11.5 LACTI Chart for Addressing Risks

<u>Description of Activity</u>	LCP Executive Committee	LCP Project Director	LCP Risk Resolution Team ¹	LCP Project Risk Coordinator	Sub-Project Risk Register Lead	Risk Owner	LCP Supply Chain Management	LCP Business Services Manager	Nalcor Insurance Advisor	Risk Advisor (Westney)	EPCM Consultant General Proj. Mgr. ²	EPCM Consultant Risk Manager ²	Nalcor ERM Committee LCP Rep.	LCP Change Mgt. Coordinator
Develop and Implement Response Plans to Address Key Risks Overseen by Risk Resolution Team / LCP Executive Committee ³	A/I	A/C	T/C	C	C	L				T	C	C	I	I
Develop and Implement Action Plans to Address Project Risks Retained on Sub-Project Risk Registers ³		A	I	C	C	L				T	I	C		I
Address Risks through the Procurement Process ⁴	I	A	C	C	C	C	L			T	C	C		I
Secure Construction All-Risk Policy	I	A	C	C	C	C		L	T	C	C	C	I	

Legend:

- L LEADS - Who leads the activity
- A ACCOUNTABILITY - Who has accountability for the activity
- C CONSULTED - Who needs to be consulted during the activity
- T TECHNICAL - Who provides technical input on the activity
- I INFORMED - Who should be informed, but is not actively participating in the activity

¹ Financial Advisor, Legal Advisor, and Insurance Advisor participate on Risk Resolution Team as appropriate.

² As appropriate, EPCM Consultant participates on LCP Risk Resolution Team and as a Sub-Project Risk Register Lead and as a Risk Owner.

³ The results of Risk Assessments should be used to help shape Response Plans (and Action Plans as appropriate).

⁴ Supply Chain Management with the Scope or Area Manager will be responsible for developing of a contracting strategy which considers risk brokering.

⁶ Nalcor insurance group with AON as broker will technical support for the placement of the CAR policy.

12.0 Monitoring and Controlling Risk

12.1 Monitoring and Adjusting Response Plans for Key Risks Overseen by Risk Resolution Team

The Risk Owner for each Key Risk will be responsible for providing a monthly update on the status of the Response Plan to the NE-LCP Project Risk Coordinator. The NE-LCP Project Risk Coordinator will issue a Response Plan Status Report, see Attachment B.3, which will be reviewed with the LCP Management Team on a monthly basis and reviewed with the Risk Resolution Team on a quarterly basis. After each quarterly review with the Risk Resolution Team, the NE-LCP Project Director will review highlights of the Response Plan Status Report with the LCP Executive Committee.

Response Plans may be adjusted based on feedback from the reviews. The NE-LCP Project Director will approve any adjustments to a Response Plan or, when required, seek higher-level approval for the adjustment.

12.2 Monitoring and Adjusting Actions Plans for Project Risks on Sub-Project Risk Registers

The Risk Owner for each Project Risk will be responsible for providing a monthly update on the status of the Action Plan to the Sub-Project Risk Register Lead. All updates of Action Plans are captured in the Sub-Project Risk Registers. Each Sub-Project Risk Register Lead will prepare an Action Plan Status Report which will be provided to Project Managers and Area Managers on a monthly basis.

Action Plans may be adjusted based on feedback. The applicable Nalcor Project Manager (or delegate) will approve each Action Plan adjustment.

12.3 LACTI Chart for Monitoring and Controlling Risks

<u>Description of Activity</u>	LCP Executive Committee	LCP Project Director	LCP Risk Resolution Team ¹	LCP Project Risk Coordinator	Sub-Project Risk Register Lead	Risk Owner	Risk Advisor (Westney)	EPCM Consultant General Proj. Mgr. ²	EPCM Consultant Risk Manager ²	Nalcor ERM Committee LCP Rep.	LCP Change Mgt. Coordinator
Review (and adjust as appropriate) Response Plans to Address Key Risks Overseen by Risk Resolution Team / LCP Executive Committee	A/I	A/C	T	L	C	C	T	C	C	I	I
Review (and adjust as appropriate) Action Plans to Address Project Risks Retained on Sub-Project Risk Registers		A	I	C	L	C	T	I	C	I	I


Legend:


- L** LEADS - Who leads the activity
- A** ACCOUNTABILITY - Who has accountability for the activity
- C** CONSULTED - Who needs to be consulted during the activity
- T** TECHNICAL - Who provides technical input on the activity
- I** INFORMED - Who should be informed, but is not actively participating in the activity


¹ Financial Advisor, Legal Advisor, and Insurance Advisor participate on Risk Resolution Team as appropriate.² As appropriate, EPCM Consultant participates on LCP Risk Resolution Team and as a Sub-Project Risk Register Lead and as a Risk Owner.**A.0 Activity Flowchart (Excel Format)****A.1 N/A****B.0 Attachments/Appendices****B.1 Key Risk Frame Template****B.2 Risk Action Plan Template****B.3 Key Risk Monthly Status Report – SAMPLE**


				Assumptions					
				Int rate	0.06		0.05		
				Term	30		50		
				PV of Interest	\$1,219,306,747.35				
		Leverage	Debt						
MF	2.9	0.6	1.74		1,740,000,000.00		1,575,000,000.00		
LIL	2.1	0.75	1.575		(\$126,409,105.99)		(\$86,273,358.39)		
				1	(\$126,409,105.99)	104,400,000.00	1,717,990,894.01	78,750,000.00	1,567,476,641.61
				2	(\$126,409,105.99)	103,079,453.64	1,694,661,241.66	78,373,832.08	1,559,577,115.30
				3	(\$126,409,105.99)	101,679,674.50	1,669,931,810.16	77,978,855.77	1,551,282,612.68
				4	(\$126,409,105.99)	100,195,908.61	1,643,718,612.78	77,564,130.63	1,542,573,384.92
				5	(\$126,409,105.99)	98,623,116.77	1,615,932,623.55	77,128,669.25	1,533,428,695.78
				6	(\$126,409,105.99)	96,955,957.41	1,586,479,474.97	76,671,434.79	1,523,826,772.17
				7	(\$126,409,105.99)	95,188,768.50	1,555,259,137.48	76,191,338.61	1,513,744,752.39
				8	(\$126,409,105.99)	93,315,548.25	1,522,165,579.74	75,687,237.62	1,503,158,631.62
				9	(\$126,409,105.99)	91,329,934.78	1,487,086,408.53	75,157,931.58	1,492,043,204.81
				10	(\$126,409,105.99)	89,225,184.51	1,449,902,487.05	74,602,160.24	1,480,372,006.66
				11	(\$126,409,105.99)	86,994,149.22	1,410,487,530.28	74,018,600.33	1,468,117,248.61
				12	(\$126,409,105.99)	84,629,251.82	1,368,707,676.10	73,405,862.43	1,455,249,752.65
				13	(\$126,409,105.99)	82,122,460.57	1,324,421,030.67	72,762,487.63	1,441,738,881.89
				14	(\$126,409,105.99)	79,465,261.84	1,277,477,186.52	72,086,944.09	1,427,552,467.59
				15	(\$126,409,105.99)	76,648,631.19	1,227,716,711.72	71,377,623.38	1,412,656,732.58
				16	(\$126,409,105.99)	73,663,002.70	1,174,970,608.43	70,632,836.63	1,397,016,210.82
				17	(\$126,409,105.99)	70,498,236.51	1,119,059,738.94	69,850,810.54	1,380,593,662.97
				18	(\$126,409,105.99)	67,143,584.34	1,059,794,217.29	69,029,683.15	1,363,349,987.73
				19	(\$126,409,105.99)	63,587,653.04	996,972,764.33	68,167,499.39	1,345,244,128.73
				20	(\$126,409,105.99)	59,818,365.86	930,382,024.20	67,262,206.44	1,326,232,976.78
				21	(\$126,409,105.99)	55,822,921.45	859,795,839.66	66,311,648.84	1,306,271,267.22
				22	(\$126,409,105.99)	51,587,750.38	784,974,484.04	65,313,563.36	1,285,311,472.20
				23	(\$126,409,105.99)	47,098,469.04	705,663,847.09	64,265,573.61	1,263,303,687.42
				24	(\$126,409,105.99)	42,339,830.83	621,594,571.93	63,165,184.37	1,240,195,513.40
				25	(\$126,409,105.99)	37,295,674.32	532,481,140.25	62,009,775.67	1,215,931,930.68
				26	(\$126,409,105.99)	31,948,868.41	438,020,902.67	60,796,596.53	1,190,455,168.82
				27	(\$126,409,105.99)	26,281,254.16	337,893,050.84	59,522,758.44	1,163,704,568.87
				28	(\$126,409,105.99)	20,273,583.05	231,757,527.90	58,185,228.44	1,135,616,438.92
				29	(\$126,409,105.99)	13,905,451.67	119,253,873.58	56,780,821.95	1,106,123,902.48
				30	(\$126,409,105.99)	7,155,232.41	(0.00)	55,306,195.12	1,075,156,739.21
				31				53,757,836.96	1,042,641,217.78
				32				52,132,060.89	1,008,499,920.28
				33				50,424,996.01	972,651,557.91
				34				48,632,577.90	935,010,777.41
				35				46,750,538.87	895,487,957.89
				36				44,774,397.89	853,988,997.40
				37				42,699,449.87	810,415,088.88
				38				40,520,754.44	764,662,484.93
				39				38,233,124.25	716,622,250.79
				40				35,831,112.54	666,180,004.94
				41				33,309,000.25	613,215,646.80
				42				30,660,782.34	557,603,070.75
				43				27,880,153.54	499,209,865.89
				44				24,960,493.29	437,897,000.80
				45				21,894,850.04	373,518,492.45
				46				18,675,924.62	305,921,058.68
				47				15,296,052.93	234,943,753.22
				48				11,747,187.66	160,417,582.49
				49				8,020,879.12	82,165,103.23
				50				4,108,255.16	0.00


interest rate impact


				Nalcor Energy - Lower Churchill Project			Corporate Goals						A1 = Avoid M = Mitigate T = Transfer A2 = Accept											
				Risk Register			1 = Safety 2 = Environment 3 = Business Excellence			4 = People 5 = Community														
				Updated: Septmber 2011																				
Risk Description	Encompassed within the following LCP Risk Frame	Risk Category	Corporate Goals Impacted	Primary Risk Owner	Secondary Risk Owner	Early Warning Signs / Leading Indicators		Risk Rating Rationalization	Risk Likelihood	Risk Impacts	Risk Rating	Risk Strategy				Description of Risk Strategy	Residual Risk Following Implementation of Mitigation Strategy	Residual Risk	Residual Risk	Residual Risk Rating				
						Measure	Trend					1 to 5	1 to 5		A1			M	T		A2	Likelihood 1 to 5	Impact 1 to 5	
As a result of a lack of a safety culture, HSE performance is poor, which could lead to reputation and financial implications for Nalcor.	R9	O	1	LCP - PM	LCP - HSE Mgr	- Safety Performance Triangle - Leading / Lagging Indicators - HSE Team recruitment and development of Management System. - Contractor HSE Performance	The Project is striving to build a safety culture. Recruitment plans in place for a HSE Manager. HSE performance is a key metric and consideration for selection of the EPCM consultant for the Project.	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 challenges of creating a safety culture on several worksites with a diversity group of contractors.	3	4	Medium					Avoid the likelihood of this risk occurring 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.	Reduced likelihood and impact.	2	3	Medium				
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.	R12	O	3	LCP - PM	LCP Design & Integrity Manager	- Industry trends re cable failure (e.g. NorNed performance)	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. Significant progressing on understanding this issue has been made in 2010 by SOBI Task Force. Historically failure has been predominantly at cable joints.	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 cable.	3	4	Medium					Avoid and mitigate 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.	Reduced likelihood and impact.	2	3	Medium				
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.	R13	O	3	LCP - PM	LCP Design & Integrity Manager		Hydro's last hydro project (Granite Canal) had a lengthy commissioning period.	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.	2	4	Medium					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 incentives in major supply contracts linked to start-up	Reduced likelihood and impact.	2	3	Medium				
As a result of a loss of credit worthiness, required debt or equity capital may not be available, leading to/resulting in the Project not proceeding to sanction.	-	F	3	CFO	Treasurer	D/E ratio and Credit Rating.	Nalcor creditworthiness is improving with the injection of equity from the shareholder, moving D/E towards that of an integrated oil and gas company. Nalcor is now seeking a credit rating assessment.	An event which would cause the Project not to proceed to sanction is considered an extreme impact. Likelihood of this risk occurring is very low since the Federal government is expected to guarantee project debt, coupled with contingent equity commitment from the Province.	2	5	Medium					Mitigate this risk by taking steps to ensure a credit rating that is investment grade. This will engender confidence in investors including the Province (equity infusion/backstopping) and debtholders. It will also instil confidence in the Federal Govt. thereby supporting the federal loan guarantee decision. The accomplishment of this objective entails strategies that secure the ultimate cash flows of the project such as; effective project execution capability, cost and schedule certainty, contingent equity, regulatory certainty, recovery of and return on rate base, effective transmission capability and FERC compliance.	Impact remains at 5 (extreme), however the likelihood could drop to 1 (rare) assuming an investment grade credit rating is obtained. .	1	5	Medium				
As a result of the discontinuation of shareholder investment, required debt or equity capital may not be available, leading to/resulting in the Project not proceeding to sanction.	-	F	3	CFO	Treasurer	Willingness of the provincial government to make equity funding available.	Equity investments made for Oil & Gas recently.	An event which would cause the Project not to proceed to sanction is considered an extreme impact; the likelihood is rated at 1 (very low) due to the Shareholder's stated public commitment for the Project as well as the potential availability of alternate sources of equity financing.	1	5	Medium					Mitigate this risk by ensuring the continuation of the Provincial Government Debt guarantee; and continue to pursue project investment based on the guarantee. A residual exposure will have to been accepted as a fact of doing business.	No change.	1	5	Medium				
As a result of default of a major customer on its commitments under PPA contract, the company is unable to fund its obligations.	-	F	3	VP-LCP	LCP PS & MA Manager	Off takers financial strength and historical business dealings.	Debt for the Phase 1 development (MF + IL) can be covered by the Island generation needs, which have minimal sales risk	An event which would result in substantial financial losses and suspension of the construction program is considered a Major impact; the likelihood is rated at 1 (very low).	1	4	Low					Avoid risk by strategically aligning interest by negotiating commercial construct on the Maritime Link to monetize value of Muskrat Falls resources not required for the Island. Some acceptance of residual risk will be required.	Reduced impact due to penalties. No change in likelihood.	1	2	Low				


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As a result of a lack of recovery/liquidity in capital markets, LCP may be unable to access required debt capital, leading to increased demand for equity and/or delay.	-	F	3	CFO	Treasurer	Market indices (S&P, TSX, DJIA, NASDAQ)	Financial markets have seen some recent improvement, however are still very volatile.	Would not expect a delay of more than a year. In view of the promise of a Federal guarantee, the likelihood is rated at 2 (unlikely). A second consideration is province's commitment letter that provides assurances as to certainty around regulated returns.	3	4	Medium				Mitigate risk through close monitoring of market indices and progress on the environmental assessment; acquisition of power purchase agreements and debt capital upon finalization of the environmental assessment process. Also take steps to solidify comitments made by the Feds re the guarantee and those made in the Commitment Letter...legislative means preferred by financiers.	Likelihood drastically reduced and impact less than 3 months delay.	1	3	Low	
As a result of low oil prices, the shareholder may not be able to contribute required equity capital, leading to/resulting in the Project not proceeding to sanction.	-	F	3	CFO	Treasurer	Reduced oil royalties could result in deficit provincial budgets; decrease in oil exploration	Current trend for oil prices is showing steady increases.	An event which would lead to a greater than 12 month delay is considered an extreme impact; the likelihood is rated as posible.	3	5	High				The presence of the federal guarantee and the provincial commitments with respect to cost recovery from ratepayers will allow for greater leverage and less reliance on equity.	Impact therefore reduced because less equitry reliance. Likelihood reduced due to less burden on shareholder.	2	3	Medium	
As a result in changes in the Financial Market, preferred financing instruments may not be available in the quantity and terms desired, leading to additional financing cost.	R3	F	3	CFO	Treasurer	Debt base rates.	Climbing borrowing rates and spread to address risk.	Risk impact considered extreme or greater than \$100 m in NPV assuming a 200 basis point impact. Likelihood is possible until legislation in place guaranteeing recovery in rates per the Provincial Commitment Letter.	3	5	High				Ensure provincial commitment to have all financing costs included in rates is embedded through legislation provided still least cost and no rate shock. Federal loan guarantee.	Impact reduced via legislative pass thru assuming still least cost and no rate shock. Likelihood reduced to minimal with Federal Loan Guarantee. and llelihood reduced.	1	3	Low	
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.	R4	F	3	VP-LCP	Treasurer	Strength and trend of Canadian Dollar.	US dollar is continuing to weaken thereby reducing US currency exposure.	Assume 10% swing in rates based upon \$18 non-CDN expenditure, thereby could be classified as a Major Event. Given the uncertainty in the financial market this event is considered possible.	3	4	Medium				- 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. Embed in legislation pass thru of costs provided still least cost option and no rate shock.	Given the uncertainty around timing of purchases, it is unlikely that the entire exposure would be hedged. At best, only 50% of it as a best guess, so \$50 m in remaining exposure which is still major. Presence of legilative pass thru would reduce impact to moderate. Likelihood of a market move	3	3	Medium	
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.	R8	F	3	VP-LCP	LCP PS & MA Manager	Number and extent of design changes (i.e. increase in project scope prior to start of engineering.)	A significant number of design / concept optimizations current remain open and under investigation.	Assume worst case impact of < \$100M cost growth, thereby classified as a Extreme Event. Given the current stage of design and in view of cost change notices of which we are already aware, this risk is considered possible. The inclusion of these additional costs in rate base is still uncertain pending the embedding of the Provincial Commitment Letter terms in legislation.	3	4	Medium				- Avoid risk by engage 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 2. - Transfer some of the risks to 3rd parties through the Commercial Construct for Transmission. Transfer risk to ratepayers through assurance of recovery in rates as long as still least cost option. and no rate shock.	Likelihood may be reduced by maximizing FEL and legislative pass thru as long as still least cost and no rate shock.	2	3	Medium	
As a result of the harsh environmental challenges, associated with installing a submarine cable across the SOBI, construction and installation challenges may occur, leading to significant cost and schedule exposure.	R11	F	3	LCP - PD	LCP Design & Integrity Manager	Viability of submarine cable option for SOBI.	Detailed work completed in 2009 and 2010 have facilitated a better understanding of this risk, thereby reducing the likelihood of materialization.	Assume worst case impact is that cable system can be installed and finally commissioned, however at a substantial cost growth. Based upon the work completed in 2010, the risk of occurrence has been reduced from Likely to Possible.	3	5	High				- Continued to work the SOBI solution engaging the most competent expertise available to ensure a robust, basic design solution. - Embed in legislation pass thru of overruns providing still least cost and no rate shock.	Reduced likelihood with implementation of risk strategy. Potential impact may be reduced once cable price has been confirmed.....excepting rate shock.	2	3	Medium	
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.	R23	F	3	MF&LIL PM	MF Area Mgr	Detection of uncertainties in geotechnical surveys	Field programs conducted in 2010 has not revealed any surprises, however questions remain regarding the detailed build-up of major quantities.	An event having significant financial exposure and construction schedule delays classified as a Extreme event; while it might occur thus is rated as Possible.	3	5	High				- Mitigate the risk by maximizing geotechnical investigations to determine conditions. - Review and validate plant & structures layout, as well as develop a representative model of same in CADTIA that will allow for the more accurate estimation of key quantities. - Embed in legislation pas thru of overruns provided still least cost and no rate shock.	Reduced likelihood with implementation of risk strategy, excepting rate shock.	2	3	Medium	
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.	R26	F	3	MF&LIL PM	MF Area Mgr	- Global demand for hydro. - # of creditworthy suppliers	Hydro demand very strong over past 2 - 3 years and forecasted similar trend for next 5 years.	An event having some financial exposure classified as a Major event; while it likely that this event will occur thus is rated as Likely.	4	4	High				Mitigate the risk by: - Engaging 3 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. - Push for bid prior to Gate 3. Residual risk will have to be accepted since cost will be driven by underlying global demand	With bid locked down, impact of further changes should be limited.	4	3	Medium	
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.	R27	F	3	CFO	LCP Project Services Manager	Market indices for raw and finished products.	Price of commodities have began to rebound from the downturn of early 2009.	An event that could increase costs by over \$100 m (extreme impact). Based upon historical trend and allowances for escalation contained in the Gate 2 estimate, it is considered possible that inflation would exceed the current allowances inherent in current project economics.	3	5	High				TfR/Mitigate risk by: - Consider commodity hedging strategy to reduce exposure. - Embed Provincial commitment for pass thru of cost increases to rates in legislation provided still least cost and no rate shock. .	Likelihood of the event occurring unchanged but impact largely mitigated with legislated pass thru. Extreme levels could compromise pass thru though if rate shock the result.	3	3	Medium	
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.	R28	F	3	LCP - PM	LCP Commercial Manager	- Global build of new transmission - # of linepersons graduating from college in Canada.	Current trend points to strong demand for new Tx as a result of push on renewables in the US.	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.	5	4	High				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. - Embed Provincial commitment for pass thru of cost increases to rates in legislation provided still least cost and no rate shock. .	Reduced impact and likelihood with implementation of risk strategy.	4	3	Medium	

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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,	R21	F	3	LCP - PM	LCP Commercial Manager		Current trend indicates that a good chance that this will materialize, however will be influenced by a number of external factors.	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.	0	0	Incomplete					Mitigate 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 mitigated this risk. - Consider this risk in the contract package definition.	No change.	0	0	Incomplete
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.	R29	F	3	LCP - PM	LCP Commercial Manager	- Market demand for HVdc technology - Market consolidation or entry of new players - Financial strength of existing Market players	Currently 3 main suppliers, however varying views on the capability of each may limit to 1 on some components.	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.	4	2	Medium					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.	Reduced likelihood.	3	2	Low
As a result of climate change driven drought, low water inflows to reservoirs may occur, which could lead to the hydroelectric facilities being unable to produce sufficient revenue.		S	3	VP - LCP	LCP PS & MA Manager	Reservoir levels at Churchill Falls.	Reservoir levels has remained consistent with historical trends.	An event which would result in substantial financial losses and operation interruptions is considered a Major impact; the likelihood is rated at 1 (rare or improbable) given our 40 + year knowledge of the Churchill river hydrology.	1	4	Low					Understand hydrology and evaluate economics using a Stress Test with water spillage or low water levels. Base firm power sales on conservative water inflows. Accept risk.	No change.	1	4	Low
As a result of the inability to secure transmission access, the Project may be unable to secure power purchase agreements, leading to/resulting in the Project not proceeding to sanction.	-	S	3	VP - LCP	LCP PS & MA Manager	Number of jurisdictions expressing an interest in the purchase of Lower Churchill Power.	Recent approval for transmission of Upper Churchill Recall Power through Quebec for US sale	An event which would cause the Project not to proceed to sanction is considered an extreme impact; the likelihood is rated at 3 (possible) due to the size of current existing transmission lines and the contemplation of the Maritime Transmission Route.	0	0	Incomplete					Application for transmission of larger blocks of power under Quebec OATT into Ontario & the US; continue to explore possible Labrador industrial loads	If the application for transmission through Quebec for larger blocks of power is successful, the impact remains a 5 (extreme), likelihood drops to 2 (unlikely).	0	0	Incomplete
As a result of and extended depression in oil prices, a change in the long term outlook for oil prices might occur during construction which could point to a loss of hydro-electric price advantage and thus lead to challenges of the Government's commitments regarding cost recovery.	-	S	3	VP - LCP	LCP PS & MA Manager	- Oil and natural gas price forecast. - price of Carbon	Long-term oil price is looking up, while the avoided cost in the Maritimes is based upon natural gas whose price outlook are the basis for economic modeling.	If cost recovery is questioned, at worst the impact would be equivalent to the differential between the two alternatives which in present value terms, should be limited to something less than \$100 m. The likelihood of this becoming an issue is considered rare because (1) it is unlikely that the long term projections in oil prices would be unduly influenced by temporary market anomalies, particularlry given the econmic dependance on oil, coupled with historical trends and (2) it would be unlikely that Government would renege on its commitment and accept this price risk on behalf of the taxpayer based on a projection.	2	4	Medium					Mitigate this risk by moving forward with legislative changes that confirm cost recovery in accordance with the Provincial Commitment Letter providing still least cost and no rate shock.	Impact should be contained.	2	3	Medium
As a result of LCP not being able to wheel smaller quantities of power through Quebec (300-500 MW), project revenues may not be sufficient to support debt servicing and operating requirements, leading to/resulting in the Project not achieving the envisioned economic rent.	-	S	3	VP - LCP	LCP PS & MA Manager	- OATT Applications - Recall power sales	Regie Hearing scheduled for January 2010 to hear Nalcor complaints. Recent success with application to push Recall power through PQ has resulted in firm booking that has available capacity for some Gull power.	An event which would result in substantial losses to Nalcor due to loss opportunity is considered an Major impact; the likelihood is rated at 2 (Unlikely) given the small amount of energy, recent success with Recall and available capacity booking, as well as the Province's equity position reducing the need for Debt.	0	0	Incomplete					Mitigate this risk by: - OATT applications and associated challenges to the Regie - Exploring the development of the Maritime Link at 1000MW capacity. Accept risk as work power sales strategy to mitigate it as best as possible.	Reduce impact since we have about 1TWh of capacity booked through PQ and assume we go the Maritime Route.	0	0	Incomplete
As a result of the accelerated growth and diversification of Nalcor Energy straining the organization's limited resources and hindering timely decision making, Nalcor may not recognize or be unwilling to make the necessary changes in organizational governance and devolution of financial authorities and decision making required to execute the Project, leading to poor Project execution and lost opportunities.	R1	S	3	CEO	VP-LCP	Turnaround time on Approvals / Decisions	This risk has been a very prevalent issue to date within the Project.	An event which would result in substantial losses to Nalcor due to claims from contractors is considered an Major impact; the likelihood is rated at 5 (Almost Certain) given that this has been an prevalent issue to-date within the Project.	5	4	High					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. Mitigating the exposure of this risk may be difficult. Consider readiness audit. An amount of residual risk that can not be avoided will have to be accepted by Nalcor.	Adjusted execution approach resulted in added cost to the project, however the residual risk impact will be reduced. As will the likelihood of an exposure to the project will reduce.	4	3	Medium

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As a result of the extended time required to obtain shareholder approvals as a Crown Corporation, key strategic decisions could be delay, resulted in schedule slippage, loss of contractor interest, and loss of team moral.	R2	S	3	CEO	VP-LCP	Timeline for decision making by Shareholder.	This risk has been very prevalent within the Project. Examples include approval to engage CEAA on the SOBI seismic work, GMNP decision, special reviews.	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 4 (Likely) given experience to-date.	4	4	High				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.	Implementation of risk strategy still results in delays but with lesser impact and likelihood.	3	3	Medium	
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.	R5	S	3	LCP - PM	LCP Commercial Manager	Risk appetite of financial market. Overall risk spectrum of LCP.	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.	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.	0	0	Incomplete				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.	Implementation of risk strategy reduces both impact and likelihood of event.	0	0	Incomplete	
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.	R6	S	3	VP-LCP	LCP PS & MA Manager	Engagement activities and pulse with potential anchor load customers.	Emera and NB Power are engaged however process to-date has been slow.	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.	0	0	Incomplete				Avoid this risk from materializing through: - Aggressively 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 implementation does not remove risk, but reduces the likelihood of occurrence.	0	0	Incomplete	
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. (OPPORTUNITY)	R7	S	3	CEO	LCP Communications	FLG negotiations status.	MOA on loan guarantee in place. Feds engaged. Dataroom nearing readiness.	Assume that Federals provide support requested as per Federal Ask the impact could be classified as Major. The likelihood is considered Possible.	3	4	Medium				- Active and aggressive pursuit by Executive - Atlantic Canada political alignment on the value of the Energy Gateway and how it will develop each region. - Continue to presue P3 Fund initiative. - Engage opposition parties to maintain support for the project. - Influence GHG Policy through all vehicles including Canadian Hydropower Association.	Implementation of strategy increases the likelihood of this opportunity occurring.	3	4	Medium	
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.	R10	S	3	LCP - PM	LCP Commercial Manager	- Track record for other projects - rework and late schedule. - Entry of new players into the marketplace.	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.	This event would result in a moderate financial impact due to a limited capital cost exposure. The likelihood is considered of be Likely given the small marketplace, plus forecasted demand for new transmission and hydro, in particular in Brazil, India and China.	4	4	High				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. - Embed Provincial commitment for pass thru of cost increases to rates in legislation provided still least cost and no rate shock. .	Reduced impact and likelihood with implementation of risk strategy.	3	3	Medium	
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.	R14	S	2. 5	LCP - PM	LCP E&AA Manager	-# of Information Requests submitted to the Panel. - Messages received during Consultation process. - Monitoring of topics and discussions taking place during all Environmental Assessment Hearings; - Ongoing open	HQ appear to be positioning for a legal challenge. Romaine currently has a claim against it by Quebec Innu re lack of consultation.	An event having significant reputation damage and some financial exposure for Nalcor is classified as a Moderate event;; the likelihood is rated at 2 (Unlikely) given the extensive amount of information submitted by Nalcor to the Joint Review Panel for the Generation Project EA.	2	3	Medium				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. - Conduct extensive preparation for Panel Hearings expected in early 2011.	Implementation of risk strategy reduces the likelihood of this risk materializing.	1	3	Low	

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Risk Description	Encompassed within the following LCP Risk Frame	Risk Category	Corporate Goals Impacted	Primary Risk Owner	Secondary Risk Owner	Early Warning Signs / Leading Indicators		Risk Rating Rationalization	Risk Likelihood	Risk Impacts	Risk Rating	Risk Strategy				Description of Risk Strategy	Residual Risk Following Implementation of Mitigation Strategy	Residual Risk	Residual Risk	Residual Risk Rating
						Measure	Trend		1 to 5	1 to 5			A1	M	T			A2	Likelihood 1 to 5	
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.	R15	S	3	LCP - PM	LCP E&AA Manager	- Commitments made as part of the EA process.	Significant commitments are and will be required to be made in order to get the Project through EA.	This event would result in a minor financial impact due to a limited capital cost exposure. The likelihood is considered of be Unlikely.	2	2	Low				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 required 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.	Implementation of risk strategy reduces the likelihood from Possible to Unlikely.	2	2	Low	
As a result of the outcome of the Island Link and Maritime Link Environmental Assess, late changes to the design or project scope may be required, resulting in cost and schedule impact.	R30	S	3	LCP - PM	LCP E&AA Manager	- Consultation issues - EIS Guidelines - how it addresses these issues - Extent media interest and tone of coverage	Woodland caribou issues on both the Island and in Labrador is 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.	This event could result in a Major financial impact if re-routing of the Tx line in Labrador was required. The likelihood is considered of be Possible.	3	4	Medium				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 required 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. - Embed Provincial commitment for pass thru of cost increases to rates in legislation provided still least cost and no rate shock. .	Implementation of risk strategy reduces the likelihood from Possible to Unlikely. Impact reduced by cost pass thru provided still least cost and no rate shock.	2	3	Medium	
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.	R16	S	3	LCP - PM	LCP E&AA Manager	- # of Design Change Notices from the Gate 2 Basis of Design	- Design optimizations are continuing and will do so until Construction starts (e.g. 345KV line CF to MF construction sequence, MF configuration).	An event having some schedule slippage of say 6 months (Major). Likelihood is considered Possible given the switch from Gull Island to Muskrat Falls first.	3	4	Medium				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.	Implementation of risk strategy reduces the impact.	3	2	Low	
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.	R17	S	2, 5	VP-LCP	LCP E&AA Manager	Progress of IBA discussions; demonstrated dissatisfaction with the process from various aboriginal groups.	New Dawn agreement successfully put in place; good cooperation from Innu. Agreements ratified.	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 ratified and about to be executed.	2	5	Medium				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. - Strength consultation activity with other aboriginal groups.	Likelihood could be reduced to Rare if agreemetrns executed. Impact unchanged. With an executed agreemetrn in place, potential delay time would correspondingly be reduced to between 1 - 3 months.	1	3	Low	

				Nalcor Energy - Lower Churchill Project				Corporate Goals				A1 = Avoid M = Mitigate T = Transfer A2 = Accept											
				Risk Register				1 = Safety 2 = Environment 3 = Business Excellence				4 = People 5 = Community											
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Risk Description	Encompassed within the following LCP Risk Frame	Risk Category	Corporate Goals Impacted	Primary Risk Owner	Secondary Risk Owner	Early Warning Signs / Leading Indicators		Risk Rating Rationalization	Risk Likelihood	Risk Impacts	Risk Rating	Risk Strategy				Description of Risk Strategy	Residual Risk Following Implementation of Mitigation Strategy	Residual Risk	Residual Risk	Residual Risk Rating			
						Measure	Trend		1 to 5	1 to 5			A1	M	T			A2	Likelihood 1 to 5		Impact 1 to 5		
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.	R18	S	2, 5	LCP - PM	LCP E&AA Manager	Demonstrated dissatisfaction with the process from various aboriginal groups.	Quebec Innu in particular have been very vocal with respect to their dissatisfaction with lack of consultation. In Sept-10, Nalcor submitted an aboriginal consultation summary to the JRP, which should reduce the likelihood of this risk materializing.	An event having some financial and reputation impact for Nalcor is classified as a Minor event. Also a delay in this case would nto be expected to extend beyond 1 month. The likelihood is rated as (Possible).	3	2	Low					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.	Likelihood of occurrence reduces with implementation of risk strategy.	2	1	Low			
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.	R19	S	2, 5	VP-LCP	Communications	Opinion and media articles featuring the views of NGOs	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.	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 respond regarding the routing the HvdC Tx Line through GMNP.	3	2	Low					Avoid risk through: - Continue implementation of stakeholder communication and consultation plan, in particular with aboriginal groups. - 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. - Leveraging Quebec versus NL debate to rally support for this venture. Accept the fact that Nalcor will receive some negative attention for undertaking a project like LCP.	Likelihood of occurrence reduces with implementation of risk strategy. Reduce impact - less likelihood of schedule delays.	2	1	Low			
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 lesser than expected number of qualified contractors being interested.	R20	S	3	LCP - PM	LCP Commercial Manager	Global and Canadian construction trends.	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).	An event having major financial impact on the Project (\$50M - worst case). Likelihood is considered Possible given the current uncertainty in how the construction market will rebound from the current Recession.	3	4	Medium					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. Mitigate risk by engaging an EPCM with strong CM experience that could facilitate us breaking the scope into a number of smaller packages in order to partially offset this risk. Federal Govt support also a mitigating factor. Accept that this risk is not entirely avoidable and cover additional contingency to mitigate it. - Embed Provincial commitment for pass thru of cost increases to rates in legislation provided still least cost and no rate shock.	Reduced impact and likelihood with implementation of risk strategy.	2	3	Medium			
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.	R22	S	3	LCP - PM	LCP Commercial Manager	Global and Canadian construction trends.	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.	An event having some financial impact on the Project (\$10M worst case). Likelihood is considered Possible given the current uncertainty in how the construction market will rebound from the current Recession.	3	3	Medium					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. Embed Provincial commitment for pass thru of cost increases to rates in legislation provided still least cost and no rate shock.	July update acknowledges that it will be hard to compete on wages with Alberta. Reduced impact and likelihood with implementation of risk strategy.	2	1	Low			
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.	R24	S	3	LCP - PM	LCP Commercial Manager	Increased sick leave amongst the older demographic; rates of current enrolment in various applicable trades programs; out-migration to oil jobs in Alberta continues.	Oil Sands slowdown is currently reducing this likelihood of this risk occurring.	An event having major financial impact on the Project (\$20M - worst case). Likelihood is considered Possible given the current uncertainty in how the construction market will rebound from the current Recession.	3	4	Medium					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 - Emphasize legacy theme to entice homecoming Mitigate the exposure by: - Developing a construction schedule based upon achievable labor productivities - Negotiating a labor agreement that supports trade flexibility - Implement a constructability focus at the start of engineering to ensure plant can be efficiently constructed. - Tap into traditionally underrepresented groups such as women and aboriginals by encouraging training and education initiatives. - Embed Provincial commitment for pass thru of cost increases to rates in legislation provided still least cost and no rate shock.	Implementation of risk strategy reduces the likelihood of occurrence from Possible to Unlikely.	2	3	Medium			
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.	R25	S	3	LCP - PM	LCP Commercial Manager	Increased sick leave amongst the older demographic; rates of current enrolment in various applicable trades programs; out-migration to oil jobs in Alberta continues.	People working in Western Canada commute & send money home to Newfoundland; most Newfoundlanders working in Western Canada would prefer to be in NL. Given the 2009 downturn, this risk is not considered to be significant.	This risk is considered to have minimal financial impact given current economic situation. Similarly risk likelihood is considered possible.	3	1	Low					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)	Implementation of risk strategy reduces the likelihood of occurrence from Possible to Unlikely.	2	1	Low			
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.	R31	S	3	CEO	VP-LCP	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.	Commitment letter is indicative of shareholder support for the project financing strategy.	A greater than 12 month delay could be the impact, which is considered extreme. The possiblility of occurrence is considered unlikely in light of current discussion trend, the commitment letter and the fact that the Government is newly elected with a clear mandate.	2	5	Medium					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 approval of commitment letter and commencement of legislative changes	Implementation of risk strategy reduces likelihood. Impact should it occur would be unchanged.	1	5	Medium			

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						Measure	Trend					A1	M	T	A2			Likelihood 1 to 5	Impact 1 to 5	
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.	R32	S	3	VP-LCP	LCP-PM	Timing of issue of EA Guidelines.	EIS final guidelines not received until Q2- 2011. Anticipate submittal by Y/E and decision Q3 2012. DG2 predicated upon start of LIL construction Q2 12. Schedule stressed.	Event considered possible with impact being a delay of greater than 3 monthsl	3	4	Medium				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	No change.	2	1	Low	
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.	R33	S	3	CEO	VP-LCP	Pulse of negotiations on Maritime Link.	Term Sheet for development of the Muskrat Falls, Labrador-Island Transmission Link signed with Emera on November 28, 2010. JOA currently under development / negotiation. ML readiness for receipt of MF power in 2017 in doubt.	It is considered likely that there will be a delay in the delivery of the ML, but as the MF/LIL economics do not depend on the ML, the impact is considered minor.	4	2	Medium				Avoid risk by: - Continue to aggressively presue Maritime Link with Emera. - De-link Maritime Link from MF and IL construction go-ahead. - Strategically identify and evaluate all plausible options and develop recommendation based on alignment with the Nalcor's and the Province's strategic objectives. Seek early clarity and alignment on recommendation. Developing supporting strategy and execute. Mitigate exposure risk by: - Evaluating options for Nalcor led EA for Maritime Link	Implementation of risk strategy reduces likelihood from likely to possible.	3	2	Low	
As a result of legislative changes, the environmental assessment process may be delayed by several years, leading to/resulting in the Project not proceeding to sanction.	-	C	3, 2	VP-LCP	LCP E&AA Manager	Close monitoring of environmental legislative changes at both the Provincial and Federal levels; timely assessment of the impact of the changes on the Project.	With the Supreme Court of Canada January 21, 2010 decision re Red Chris Mine, the federal government reevaluated its previous EA track decision for the Project and concluded that further involvement was required.	The impact is rated at 5 (extremer) as there could be an extended delay, but not permanent failure; the likelihood is rated at 2 (unlikely) due to the inability to predict government actions.	2	5	Medium				Mitigate impact of risk by: - Closely monitor any proposed and/or enacted legislative changes; quickly assess the impact these changes may have on the environmental assessment process, and affect any possible strategy changes. Residual risk will still require acceptance. Advent of FLG should reduce likelihood . Embed Provincial commitment for pass thru of cost increases to rates in legislation provided still least cost and no rate shock. .	Early intervention at polictical levels might serve to mitigate potential delay to less than a year.	2	3	Medium	
As a result of a number of competing mega-projects occurring locally, the Project has challenges attracting and retaining the quality of required Owner's team resources, resulting in the inability to adequately perform the Owner's oversight / management role.	-	S	3	LCP - PM	LCP Commercial Manager	- Turnover among team - Market rates	Turnover among team continues to be minimal. Q3-10 start to see the results of the competition in the market for capable individuals.	This event would result in a moderate financial impact due to a limited capital cost exposure. The likelihood is considered of be Likely given the small marketplace, plus anticipated demand for skilled individuals in NL over the coming months.	5	4	Medium				Avoid risk by: - Structuring an overall team effectiveness program that includes a retention scheme mechanism. - Make Nalcor LCP the Project of Choice - Recruit and develop younger talent. Mitigate risk by being very competitive in the market.	Reduced impact and likelihood with implementation of risk strategy.	3	3	Low	
As a result of limited engineering and design definition for the current 320kV Maritime Link and the high-level cost estimate available, there is a significant amount of estimate uncertainty (tactical risk), results in added cost and schedule slippage.	-	F	3	LCP - PM	LCP Design & Integrity Manager	- Cost growth against target - Number of design changes / deviations from Gate 2 Basis of Estimate	Recent market intelligence has confirmed the significant risk of cost growth for overhead transmission lines.	An event having significant financial exposure and construction schedule delays classified as a Extreme event; while it might occur thus is rated as Possible.	3	5	High				- Mitigate the risk by completing a bottom-up review of the cost estimate for the overhead transmission - Completion of third party benchmarking - Some amount of uncertainty will remain which will have to be accepted.	Reduced likelihood with implementation of risk strategy.	2	5	Medium	
Risk probability				Risk Impacts																
1 - Rare - < 0.01% chance				1 - Insignificant																
2 - Unlikely - 0.01 to 1% chance				2 - Minor																
3 - Possible - >1% - 50% chance				3 - Moderate																
4 - Likely - >50% - 90% chance				4 - Major																
5 - Almost Certain - > 90% chance				5 - Extreme																

Nalcor Energy - Lower Churchill Project
Risk Management Scorecard
Risk Management Scorecard - Before Mitigation

Likelihood	Almost Certain	5	0	0	0	3	0
	Likely	4	0	2	0	3	0
	Possible	3	1	2	1	11	6
	Unlikely	2	0	1	1	2	4
	Rare	1	0	0	0	2	1
			1	2	3	4	5
			Insignificant	Minor	Moderate	Major	Extreme
			Impact				

Risk Level	Quantity
High	11
Medium	23
Low	6
Incomplete	5
Total	45

Notes: The map shows the number of risks that fall into each cell of the matrix.
 For illustrative purposes only

Nalcor Energy - Lower Churchill Project
Risk Management Scorecard
Risk Management Scorecard - After Mitigation

Likelihood	Almost Certain	5	0	0	0	0	0
	Likely	4	0	0	3	0	0
	Possible	3	0	3	5	1	0
	Unlikely	2	5	1	12	0	1
	Rare	1	0	1	4	1	3
			1	2	3	4	5
			Insignificant	Minor	Moderate	Major	Extreme
			Impact				

Risk Level	Quantity
High	0
Medium	24
Low	16
Incomplete	5
Total	45

Notes: The map shows the number of risks that fall into each cell of the matrix.
 For illustrative purposes only