From: Muise, Jason
To: Brewer, Donna; McIntosh, Gordon; Martin, Craig; Cowan, John; Day, Elizabeth; Quinlan, Krista; Grandy, Cory; Pelletier, Randy; Peyton, Sterling; Muise, Jason; Newhook, Vanessa; Feehan, Jim
Subject: RE: SNC Risk Assessment - 2013
Date: Thursday, July 6, 2017 5:14:54 PM
Attachments: Project Controls Management Plan_LCP-PT-MD-0000-PC-PL-0001-01.pdf
Project Risk Management Plan_LCP-PT-MD-0000-RI-PL-0001-01_B1.pdf
CE-51(R1)-Public.pdf

Charles

This report, and the subsequent public discussion, has lead me to read through the various Nalcor documentation related to project controls, and risk management processes used on the project.

Reference is made to the attached "Project Risk Management Plan" which outlines Nalcor's risk management process. Nalcor have divided risk into both "tactical" and "strategic". Tactical risk were defined as those associated with the base capital estimate, as a result of uncertainties from:

1) project definition and scope omission,
2) construction methodology
3) performance factors, and
4) price. It excludes price escalation.

The second risk category "Strategic risks" were defined as background risks which were outside the controllable scope of the project team, related to external issues, such as regulatory, financial etc.

Document LCP-PT-MD-000-PC-PI-001-01 provided on the Nalcor Portal, provides further guidance as to how strategic and tactical risks should be allocated in the Cost Estimate for the project. The allowance for the tactical risk was included in the Original Control Budget, and I believe every revised budget which has been presented over the last 4 years. The calculation for the tactical risk provision contained within the DG2 estimate was included within exhibit CE-51, provided to the PUB during the 2012 review. The risk allocation in DG2 was $526 million, relating to about 16% of the estimate at the time.

However both the Project Controls Management Plan and the Risk Management plan clearly references that the Strategic risk would be covered by a "Management Reserve" which was owned not by the Project Team, but by the Gatekeeper of the project (ie; CEO of Nalcor).

Figure 14 of the attached Project Controls Procedure illustrates this concept.

I do not believe that any cost estimate provided to the public included any allowance for Strategic risks, and I have never heard of a "Management Reserve" until I read the attached document. It is unclear if Nalcor ever maintained a "Management Reserve" outside the control budget at any time since the project was sanctioned?

What is documented is that at DG2, there was a decision made by Nalcor to not include any management reserve for Strategic risks. This was due to the potential upside offered by the FLG.

This is documented within the public domain in exhibit CE-52 provided to the PUB http://www.pub.nl.ca/applications/MuskratFalls2011/files/exhibits/abridged/CE-52(R1)-Public.pdf

Reviewing the summary between DG2 and DG3 cost estimates http://muskratfalls.nalcorenergy.com/wp-content/uploads/2013/03/Key-Changes-Affecting-Muskrat-Falls-Project-Estimates.pdf I do not believe there was any strategic risk reserve added in the DG3 cost estimate communicated to the public. In fact the total contingency was reduced between DG2 and DG3, and the FLG impact was included in the DG3 CPW analysis.

The level of project contingency was viewed to be too low by the Independent Engineer as early as their November 2013 report.

EY in their 2016 report also identified that Nalcor were not costing Strategic risks in their estimates. EY took exception to Nalcor's methods:

► risks defined by Nalcor as strategic are not allowed for in the financial forecast;

► the potential cost and schedule impacts of all individual risks are recorded in the Project's risk register but are not systematically reflected in the overall reported forecasts for cost and schedule; and

► some anticipated material cost variances have only been reflected in the forecast cost when they are contractually committed.

Within the 2013 report SNC as EPCM contractor effectively delivered a quantitative probabilistic assessment of the entire risk envelope for the project. The likely financial impact of the risk was nearly an order of magnitude higher than the contingency allowed by Nalcor within the DG3 estimate. Although the total cost estimate at Financial Close in late 2013 was slightly higher than the DG3 estimate, there was clearly no contingency at levels recommended by SNC Lavalin some 6 months prior.

It is also unknown if there was a separate "Management Reserve" which was held by Nalcor outside of the original project budget, as was suggested by the Project Controls Plan.

Like most followers of this project I am deeply troubled by the allegation that this report was presented to senior Nalcor management back prior to financial close of the project.

But I am also troubled by the notion of a "Management Reserve" which was documented to be held by the CEO of Nalcor, but to my knowledge never communicated to the Public, or included within the financial reporting. I would like Nalcor to offer commentary on this "Management Reserve", however I acknowledge this historical review may be outside the remit of the Oversight Committee.

What is within the mandate of the oversight committee is (i) that the current cost estimates include provisions for the likely impact of all risks; and (ii) financial disclosure is in compliance with Canadian GAAP and IFRS requirements for projects of this nature.

On the second point I would request that EY scope be extended to provide specific guidance on

forecasting of future costs when reporting "Property Plant and Equipment" under both IFRS and Canadian GAAP. Alternatively the Department of Finance may be able to clarify the requirements for reporting liabilities on the balance sheet on this type of capital works development. From my own experience when applying accounting standards for construction contracts that all foreseeable costs should be included in forecasting including risks which Nalcor describe as being strategic. I do recognize that this would have different applicability in this case with a Crown Corporation, in a regulated environment.

Clearly we must all agree that future reporting by Nalcor must meet recognized accounting standards for project cost control. We must also agree that for the Oversight Committee to serve any real value, that Nalcor need to provide full transparency on the future project forecast to complete, which is inclusive of any and all elements which will contribute to the final cost of the project, and have a potential impact of rates to the Newfoundland consumer.

I look forward to our next discussion.

Jason

From: Bown, Charles
Sent: Friday, June 23, 2017 3:23 PM
To: Brewer, Donna <dbrewer@gov.nl.ca>; McIntosh, Gordon <GordonMcIntosh@gov.nl.ca>; Martin, Craig <CMartin@gov.nl.ca>; Cowan, John <JCowan@gov.nl.ca>; Day, Elizabeth <ElizabethDay@gov.nl.ca>; Quinlan, Krista <KristaQuinlan@gov.nl.ca>; Jacobs, Heather <heatherj@gov.nl.ca>; Grandy, Cory <corygrandy@gov.nl.ca>; Pelletier, Randy <RandyPelletier@gov.nl.ca>; Peyton, Sterling <SterlingPeyton@gov.nl.ca>; Muise, Jason <JasonMuise@gov.nl.ca>; Newhook, Vanessa <VanessaNewhook@gov.nl.ca>; Feehan, Jim <JimFeehan@gov.nl.ca>
Cc: 'Jim Feehan' <j.feehan@[redacted]; 'jason muise' <muise.jason@[redacted]>; 'Vanessa Newhook' <vnewhook[redacted]>; 'Sterling Peyton' <sterling.peyton@[redacted]
Subject: SNC Risk Assessment - 2013

Committee Members:
I have attached a copy of the SNC-Lavalin Risk Assessment report 2013 as referenced in the Premier's news conference today.
Charles

Nalcor Energy – Lower Churchill Project

nalcor energy
LOWER CHURCHILL PROJECT

Project Controls Management Plan

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

Comments:	Total Page Count (including cover): 96 97

Approvals and Revision History							
B1	7-Mar-11	Issued for Use	J. Kean	T. Chudy	B. Marsh	T. Scott	D. Pardy
A1	10-Jan-11	Issued for Comment					
			Kean/Pardy				
Status / Revision	Date	Reason For Issue	Prepared By	Checked By	Checked By	Checked By	Project Controls Lead

confidential
Jason Muise
nl
Jun 27, 2017 20:23

Additional Signatures (where required)

B1	7-Mar-11	Issued for Use			D. Green	J. Kean	P. Harrington
Status / Revision	Date	Reason For Issue			Quality Manager	Dept. Manager Approval	Project Manager Approval

Professional Engineers Stamp:
(where required)

Table of Contents

1.0 Purpose

An effective *Project Controls Management Plan* (PCMP) is critical to the success of the Nalcor Energy – Lower Churchill Project (NE-LCP or the Project). As stated by Peter Drucker, *"What cannot be measured, cannot be managed*", thereby reaffirming the importance of the Project controls function during the planning and execution of any project.

The PCMP resides within NE-LCP's Project Management System Structure and Hierarchy. It further develops how the Project will be controlled by implementing a system to provide information on Project status enabling prompt and proactive management of Project cost, schedule and scope including potential problem areas This PCMP also describes the Project Controls Organization and how it will interface with other organizational elements of the NE-LCP, roles and responsibilities, scope of responsibility, and other information on Nalcor's overall approach / philosophy for effective control of scope, cost and schedule throughout Gateway Phases 3 and 4.

This document should be read in conjunction with documents LCP-PT-MD-0000-PM-PL-0001-01 Project Execution Plan (Scope and Approach), LCP-PT-MD-0000-PC-LS-0001-01 Project Work Breakdown Structure and Code of Accounts and associated functional management plans.

Although the PCMP lays a foundation for Nalcor's scope, cost and schedule control requirements, it is not intended that this document be issued to EPCM or EPC contractors that may be engaged in the execution of Project. Accordingly, all such contracts will include detailed coordination procedures to translate the requirements of this management plan into specific contractual requirements.

2.0 Scope

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

- LCP PMT, general and support functions
- Muskrat Falls Hydroelectric Facility
- Labrador – Island Link Transmission Link
- Maritime Link

At this time, the Maritime Link has not been finalized in terms of its Project Management approach. Accordingly, this PCMP does not currently address the project controls plan associated with the Maritime Link. This PCMP will be updated following further development and definition of the Maritime Link.

3.0 Definitions

NE-LCP-PT-MD-0000-PM-LS-0001-01 Project Dictionary is the approved dictionary of definitions for the LCP.

Accrual	This represents the estimated value of all goods and services provided to the Project up to a point in time (e.g. month end), but not recorded in the Project's financial system(s). The value of Incurred Cost less recorded cost represents an accrual for Project purposes. As part of the month end close out process, this value is recorded in both PRISM and JD Edwards.
Actual Cost	Actual value of costs charged to the Project and recorded in the financial records. Also referred to as Booked Cost.
Allowance	Costs added to the base estimate, based on experience, for identified but un-quantified items. EXAMPLE: An allowance may be established in the budget for a Rewards and Recognition program.
Authorization for Expenditure	The mechanism used to facilitate management approval and subsequent control of capital appropriations against approved NE-LCP Budgets.
Analogous Estimate	An estimate based on previous similar projects.
Base Estimate	Reflects most likely cost for known and defined scope associated with Project's specifications and execution plan.
Baseline	In project control, the reference plans in which cost, schedule, scope and other project performance criteria are formally compared against for assessment of progress and performance, and the comparison benchmark for identifying cost and schedule deviations.
Budget Holder	Person accountable for developing, scheduling, controlling, forecasting and delivering against a particular Project scope.
Budgeting	A process to develop a cost plan by allocating estimated costs or prices for an approved work plan to controllable cost accounts or activities and time phasing the cost in accordance with the approved Project schedule.
Cash Flow	The movement of cash into and out of the Project

Current Control Budget	The Original Control Budget plus the estimated value of any approved scope additions or deletions.
Current Forecast	The current control budget plus the estimated value of any forecasted Project changes.
Code of Accounts	A Code of Accounts is an index to facilitate finding, sorting, compiling, summarizing, or otherwise managing information associated with that code.
Committed Cost	The estimated value of an obligation made by the Project for the provision of goods or services; represented by a Financial Commitment.
Corrective Action	A term used to describe an action which restores the course of a project in line with the plan. This term is generally associated with a Quality function that strives to keep a project delivering to plan. Corrective Action(s) can have an impact on project resources (Schedule, Budget) as these resources may be required to cause a corrective action to occur. Corrective Action(s) are not considered to be a part of the change management process as they represent the level of effort required to deliver ***according*** to plan and not the effort needed to change from plan. Corrective Action is not a Deviation or Project Change as these actions represent intentional departures from (or) change in the project plan.
Cost Breakdown Structure	The breakdown of Project cost which integrates the Work Breakdown Structure and Cost Control Account together into a standard numerical presentation.
Cost Control Account	The Cost Control Account is a unique code applied against each item of cost for the Project.
Cost Element	A unit of costs, typically in the form of non-manual labour (engineering and staffing), materials, fabrication, subcontracts, construction equipment or direct construction labour.
Cost Flow	The projection of how costs will be incurred, time phased over the duration of the Project.

Decision Gate	A Decision Gate is a predefined moment in time where the Gatekeeper has to make a decision whether to move to the next stage, make a temporary hold, recycle, or to terminate the Project.
Deviation Alert Notice	The Mechanism used to alert that a deviation or project change is anticipated.
Earned Value	A measure of the value of work performed. Earned value uses current Project budgets and progress-to-date to show whether the incurred costs are on budget and/or whether the tasks are ahead or behind the baseline plan. A method for measuring Project productivity and performance, it compares the amount of work that was performed with the effort actually expended to determine if cost and schedule progress was achieved as planned.
Escalation	Provision for changes in price levels driven by economic conditions, including inflation.
Estimating	A process of evaluating all the costs and durations of the elements of a project or effort as defined by an agreed-upon scope and includes an indicator of accuracy (e.g., order of magnitude estimate, budget estimate or definitive estimate).
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.
Estimate Contingency Rundown	Originally expressed as a percentage of the Budget or Forecast. As the Project progresses and Project definition improves, this percentage decreases against the Current Control Budget and the current Forecast. The reduction of the percentage over time is known as Contingency Rundown.
Forecast Change Notice	A recommendation prepared by the Cost Engineer / Controller recommending an adjustment to the final forecast cost or completion schedule.

Forecast Final Cost	The anticipated cost of a project or component when it is complete. It represents the value of the Incurred Costs plus the estimated value of work left to complete, including approved Forecast Change Notices. Also referred to as Estimate at Completion (EAC).
Financial Commitment	A legal agreement (agreement, WTO or PO) between NE-LCP and a third party which authorizes NE-LCP to proceed with the award/instruction to the third party to provide goods and/or services for an agreed price or in accordance with an agreed pricing structure. The value of the Financial Commitment is represented by the cumulative value of the original amount and any approved variation orders to the contracts or change orders to the purchase order (which may or may not be a Project scope change).
Financial Commitment Authorization	The process of providing approval to proceed with a Financial Commitment. Such approval is secured using a Requisition.
First Power	A point in time at which a power generation facility produces first commercial power.
FOREX	Foreign exchange
Frontline	Method for visually representing progress on a bar chart schedule by filling of the bar to indicate the progress as of a specific reporting period.
Full Power	The point in time at which a power generation facility is capable of sustaining full nameplate capacity for ten (10) consecutive days.
Gatekeeper	Individual responsible for making the decision at a Decision Gate of the Gateway Process.
Incurred Cost	The total estimated cumulative value of all goods and services provided to the Project up to a point in time. For physical construction works, also referred to as Work-in-Place.
Inflation	General changes in price levels caused by changes in the value of currency and other broader monetary impacts.
JD Edwards	Nalcor Energy's corporate financial control and accounting system.

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).
Original Control Budget	The budget that represents the original approved scope of work and work plan.
Organizational Breakdown Structure	Hierarchical structure designed to identify the area of an organization that is responsible for each part of a Project.
Physical Component	A breakdown of major physical elements identified/associated with the Project.
Position Register Database	A data base which records every position that exists or is planned for the Project together with a unique position identification number and information relevant to the organization breakdown structure, cost and contractual details
PRISM	Project management tool used by NE-LCP to produce Project estimates, baselines and control budgets, to record and report costs and to track Project progress.
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 Key Dates	A schedule event with zero duration and no effort (there is no work associated with a milestone) that signifies the completion of a major goal, event or a decision point in the Project, but not considered a Project Milestone as defined in the Target Milestone Schedule LCP-PT-ED-0000-EP-SH-0001-01.
Project Milestone	A schedule event with zero duration and no effort (there is no work associated with a milestone) that signifies the completion of a major goal, event or a decision point in the Project. All Project Milestones are defined in Target Milestone Schedule LCP-PT-ED-0000-EP-SH-0001-01.

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.
Requisition	Documents the internal review and approval process; to be secured prior to procuring goods and services. A requisition form initiates the purchasing or contracting process, which will result in the issue of a purchase order or an agreement. Also called purchase requisition.
Risk	An uncertain event or condition that, if it occurs, has a positive or negative effect on the Project's objectives.
Scope Change	A Project Change that results due to the addition of deletion of scope to meet functional requirements or due to regulatory requirements. Scope Change Deviations within the project boundaries cause the need to adjust the control budget through allocation of estimate contingency to support the implementation of the scope change, therefore impacting the Current Control Budget. In the case of Scope Change Deviations outside the project boundaries, Management Reserve must be allocated to support implementation of this scope change.
Tactical Risk	Refers to risks associated with the base capital cost estimate as a result of uncertainties with the four (4) components of the estimate: (1) Project definition / scope, (2) construction methodology and schedule, (3) price or (4) performance. It excludes escalation and inflation.
Trend	The outcome of a cost, schedule analysis with indicates the potential future state of the Project based on actual and past performance overlaid on approved Project baselines
Work Breakdown Structure	A grouping of work elements that organizes and defines all components of the Project. The WBS is a multi-level framework that organizes and graphically displays elements representing work in logical relationships. It divides the entire Project into its component elements in order to establish a framework for effective management control of the Project scope, schedule and budget.

4.0 Abbreviations and Acronyms

Reference NE-LCP-PT-MD-0000-PM-LS-0001-01 Project Dictionary for a complete listing. Below are relevant abbreviations to this Management Plan

AACE	Association for the Advancement of Cost Engineering
AC	Actual Cost
AFE	Authorization for Expenditure
CCA	Cost Control Account
CAPEX	Capital Expenditure
CBS	Cost Breakdown Structure
CCB	Current Control Budget
CCE	Current Control Estimate
COA	Code of Accounts
EAC	Estimate at Completion
EPC	Engineer, Procure & Construct
EPCM	Engineering, Procurement and Construction Management
FCN	Forecast Change Notice
FFC	Final Forecast Cost
FOREX	Foreign Exchange
GI	Gull Island
IC	Incurred Cost
IL	Island Link
IPS	Integrated Project Schedule
LCP	Lower Churchill Project
MF	Muskrat Falls
ML	Maritime Link
MOC	Management of Change
MSS	Management Summary Schedule
NE-LCP	Nalcor Energy – Lower Churchill Project
NOC	National Occupation Classification
OBS	Organization Breakdown Structure
OCB	Original Control Budget
OPEX	Operating Expenditure
PBS	Package Breakdown Structure
PCN	Project Change Notice
PCS	Project Control Schedule
PEP	Project Execution Plan
PCMP	Project Controls Management Plan
PMT	Project Management Team
PO	Purchase Order
SOBI	Strait of Belle Isle
WBS	Work Breakdown Structure
WTO	Work Task Order

5.0 Reference Documents

LCP-PT-ED-0000-EP-SH-0001-01	Target Milestone Schedule
LCP-PT-ED-0000-EP-SH-0002-01	Project Control Schedule
LCP-PT-ED-0000-EP-SH-0003-01	Management Summary Schedule
LCP-PT-MD-0000-PM-LS-0001-01	Project Dictionary
LCP-PT-MD-0000-FI-PR-0001-01	Capital Expenditure Authorization Procedure
LCP-PT-MD-0000-PM-PL-0001-01	Project Execution Plan (Scope and Approach)
LCP-PT-MD-0000-FI-PL-0001-01	Project Finance and Accounting Management Plan
LCP-PT-MD-0000-PC-LS-0001-01	Project Work Breakdown Structure and Code of Accounts
LCP-PT-MD-0000-PM-PL0003-01	Work Planning Management Plan
LCP-MD-PT-0000-IM-PL-0001-01	Information Management Plan
LCP-PT-MD-0000-PM-PL-0002-01	Project Change Management Plan
LCP-PT-ED-0000-EN-RP-0001-01	Lower Churchill Project – Basis of Design
MSD-PM-008	Lower Churchill Project Gateway Process
MSD-PJ-005	LCP Progress and Performance Measurement Guideline
34R-05	Basis of Estimate (AACE)
31R-03	Reviewing, Documenting the Estimate (AACE)

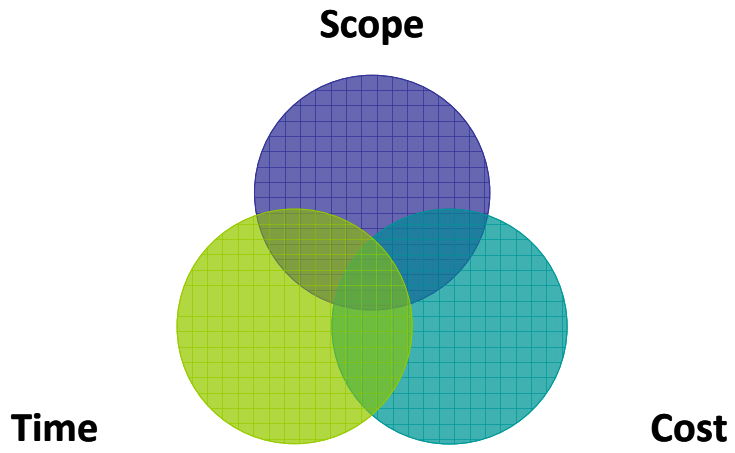
6.0 Project Control Philosophy

Project Controls is a process for controlling the investment of resources in an asset. The basic function of Project Controls can best be described as control or stewardship of scope, cost and schedule for a Project (reference Figure 1).

Stewardship is a structured process for establishing management control and achieving cost and schedule optimization. The overall objectives of the stewardship process are to:

- Reinforce Cost and Schedule Stewards' accountability and responsibility to identify cost drivers and improvement opportunities;
- Foster continuous communication, alignment and teamwork;
- Meet schedule milestones;
- Control scope creep;
- Prevent cost growth;
- Identify and capture cost and schedule reduction opportunities;
- Identify and mitigate cost and schedule vulnerabilities;
- Eliminate cost and schedule surprises; and
- Enable fact based decision making relative to scope, cost and schedule trade-offs.

Figure 1: Stewardship of 3 Core Areas



The Project control philosophy or approach for the NE-LCP is rooted in the following guiding principles:

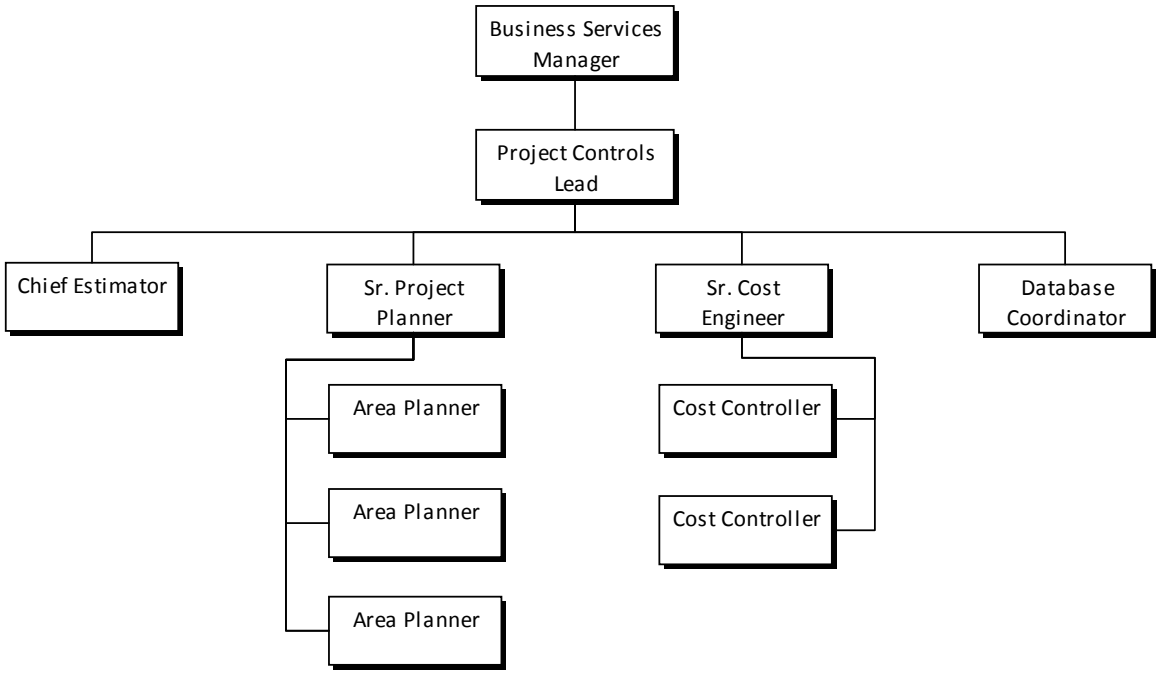
- Scope, cost and time (schedule) are intricately linked and therefore must be holistically managed as one.
- "Project control" is a line management responsibility and not the responsibility of the Project Controls Team. The Project Controls Team provides the data needed to control the Project.
- One of the keys to an effective Project control system is the quality of the information it uses and how that information flows. Good Project information is wasted if it is not communicated quickly, correctly and consistently.
- In order to effectively control the Project, the data must be controlled and should be based on a hierarchical structure; for NE-LCP it shall be the Work Breakdown Structure and Cost Code of Accounts.
- Responsibility for control should be with those best able to influence and control the Project. NE-LCP PMT will maintain key Project control competencies; however the EPCM Consultant, Contractors, Subcontractors and Suppliers are to manage their part of the Project at a more detailed level.
- NE-LCP PMT is to provide clear responsibilities to the EPCM consultant, Contractors, Subcontractors and Suppliers for Project control. NE-LCP PMT will also work closely with them, using a coaching and guiding approach and be prepared to get involved at whatever level of detail is required to effectively manage the Project..
- Exercise control at an optimum level – strike the right balance between the levels of detail to which stewardship is being performed and the ability to provide effective Project control as an Owner. When considering to what level and extent control should be applied, a number of factors should be considered. These include Project size and complexity, level of definition, level of risk associated with the Project and the number and complexity of internal and external interfaces.

- Focus on front-end planning in order to establish a realistic cost and schedule baseline for the Project's scope.
- Baselines against which cost and time will be monitored must be established and clearly communicated.
- A Trend analysis (i.e. the perceived sequence of deviations from the baseline) should be used for forecasting cost and time. The basis for forecasting must be verifiable and consistently applied.
- Ensure seamless flow of processes and data between Cost Control and Accounting in order to support the business needs (e.g. accurate and timely accruals).
- Work with the EPCM Consultant, Contractors, Subcontractors and Suppliers to establish and implement consistent standards and expectations.
- Adopt a continuous improvement mindset; leverage lessons learned.
- Recognize that change is inevitable throughout the course of the Project, however proactively forecasting change is a key Project control function.
- Cost and schedule estimates should be structured and sufficiently detailed to facilitate the timely establishment of control baselines.
- Escalation will be managed as a risk fund using a separate cost account in the Control Budget that is managed using Change Management.

7.0 Project Controls Organization, Roles and Responsibilities

The Project Control Team working within the Nalcor PMT under the Business Services Function, will assume the lead role in the consolidation of information and the co-ordination of the planning and scheduling, cost estimating, and cost control. The Project Controls Team will provide PMT management with decision-making information by establishing appropriate levels of monitoring systems to ensure that control information is clearly defined and that roles and responsibilities of all participants are understood. Figure 2 provides the organization structure of the Project Controls organization.

Figure 2: Project Controls Team Organization Structure – Gateway Phases 3 and 4



The functional responsibilities of Project Controls team are as follows:

General

- Monitoring and supporting adherence to control processes and structure;
- Establishing and maintaining the project cost and schedule baselines;
- Coordinating the project work plan and budget authorizations;
- Reporting performance relative to appropriate baselines including the preparation of monthly reports and special progress reports;
- Supporting the MOC process implementation;
- Where required, such as the SOBI sub-project and the Environmental Assessment activity, providing detailed, day to day, (planning, budgeting & cost control) services.
- Developing and maintaining the Project Work Breakdown Structure (WBS) and Code of Accounts (COA);
- Producing and maintaining the PCMP;
- Establishing and maintaining the project management information system;
- Providing clarity on Project Controls requirements to all levels of management
- Defining specific Project Controls interface and reporting requirements for the EPCM consultant, contractors, subcontractors and suppliers;
- Defining any special analysis or reporting requirements to conform with contractual terms;
- Implementing control tools necessary to support the Project.

Cost

- Preparation of consolidated cost reports
- Maintaining up to date forecasts of remaining work;
- Facilitating the release of work by ensuring that authorizations are in place;
- Preparing cost reports; and
- Coordinating the preparation of project estimates.

Planning & Scheduling

- Developing an overall integrated project schedule based on detailed schedules of all elements of the Project;
- Provide schedule overview, including integrity reviews,
- Work across all Project elements to ensure the identification of critical issues which may impact progress; and
- Ensuring that all Project elements work plans recognize interfaces with other elements.

The general Project Control responsibilities within the Nalcor PMT are outlined below, while detailed Role Descriptions for the Project Controls Team are contained within the Role / Scope Descriptions within the Project's online information portal.

Project Director Accountable for overall Project delivery against sanctioned cost, schedule and scope.

Project Manager Reporting to the Project Director, are accountable for the delivery of a subproject in accordance to the Project's Governance and Management Plans. There will be two (2) Project Managers for the Lower Churchill Project: Muskrat Falls + Island Link Project Manager and Maritime Link Project Manager. These individuals have Scope / Area Managers reported to them for which they have delegated delivery responsibility.

Scope / Area Managers Scope / Area Managers (also referred to as Cost and Schedule Stewards) are PMT members who have direct responsibility, accountability and ownership for budgets and specific components of the Project. Project control responsibilities include:

- Management of costs and schedules associated with the execution of the Project.
- Review and agree to the cost, schedule, progress measurement and management of change plans submitted by contractors and ensure they meet the overall requirements and are properly executed as defined in this plan.
- Progress measurement and achievement of milestones.
- Provide stewardship of their respective Project component

responsibilities.

- Input to monthly reports and meet all other reporting requirements as needed.
- Identify cost and schedule drivers and optimization opportunities.
- Examine Deviation Alert Notices and PCNs for comprehensiveness, accuracy and the 'knock-on' effect from other elements prior to presentation to the Change Control Board.
- Review and provide input to the analysis of Project performance and cost and schedule forecasts as developed by the EPCM consultant, contractors, subcontractors and suppliers and the PMT.
- Ensure that cost reduction is actively pursued within their sphere of influence.
- Ensure that initiatives originating from their Project component responsibilities are promptly and clearly communicated to other areas that may be impacted.
- Ensure that initiatives originating from other areas of the Project (such as corrective actions to stop unfavorable Trends) will not adversely impact their Project component responsibilities.

Business Services Manager

- Accountable for the effective execution control of the Project, including the provision of Project Control functional support to the PMT.
- Owner of this plan with overall responsibility and authority for establishing, monitoring, communicating and verifying its effectiveness.
- Approval of all changes to the Project Final Forecast Cost.
- With the Project Director, approves the Project Monthly Status Report.

Project Controls Lead

- Lead the provision of Project Controls expertise and services to support Nalcor's management of the Project.
- Responsible for the preparation of estimates, budgets, schedules and plans necessary for the effective control of the Project.
- Responsible to implement the PCMP.
- Coordinate communication of the procedures outlined in this plan to Project personnel and arrange training, as required.
- Responsible for ensuring Project Management is fully appraised of up-to-date cost and schedule status.
- Chair Monthly Project Cost and Cost Stewardship meeting.
- Involved in preparation of the WBS, the Code of Accounts and the Gate 2 & 3 Estimate and Schedule.
- Involved in preparation of the overall cost and progress control system.
- Coordinate preparation of the Project Monthly Status Report.
- Coordinate the collecting, consolidating, analyzing and reporting of Project cost and schedule control information provided by the Project Managers to ensure overall Project status is assessed and potential

problem areas are identified. Prepares overall cost forecasts and cost analyses.

- Active participation in the Project MOC process including updating of the Approved Budget and the Control Schedule and periodically publishing a MOC Log.
- Ensure cost and progress control processes are established and implemented by contractors and that analysis of performance is reported to enable all Project Team members to take effective control of costs and progress.
- Coordinate the gathering, compiling, analyzing and reporting all areas of the Project progress.
- Agree to contractor's progress measurement system. Ensure that all known activities are included in the basis for progress measurement.
- Monitor EPCM Consultant, Contractors, Subcontractors and Suppliers progress control and reporting systems for accuracy of information and compliance with the contract requirements
- Provide progress information to the Project Manager on a monthly basis.

Chief Estimator

- Develop overall cost estimate preparation plan for the Project.
- Lead the preparation of the Class 3 Project Sanction Estimate.
- Work with EPCM Consultant to develop overall Project cost estimates consistent with the Project's definition / scope.
- Develop all Project cost estimates.
- Participate in all estimate assurance reviews.
- Work with Cost Engineer to translate approved Gate 3 cost estimate into Original Control Budget.
- Review of all bids against Gate 3 cost estimate.

Sr. Cost Engineer

- Coordinate the development and implementation of the cost management processes and systems to effectively and efficiently manage the NE-LCP budget.
- Ensure accurate recording of incurred values and forecast information.
- Translate the Gate 3 cost estimate into the Original Control Budget.
- Collect, consolidate, analyze and report Project cost and potential problem areas identified.
- Conduct extension performance trending analysis from which FCNs will be prepared.
- Prepare overall cost forecasts and cost analyses.
- Recommend all changes to the Project's Final Forecast Cost.
- Develop cash forecasts as determined by Controller's requirements.
- Prepare the Project Monthly Cost Report.
- Work with the MOC Coordinator to administer the MOC process including updating of the Current Control Budget and final forecast cost.

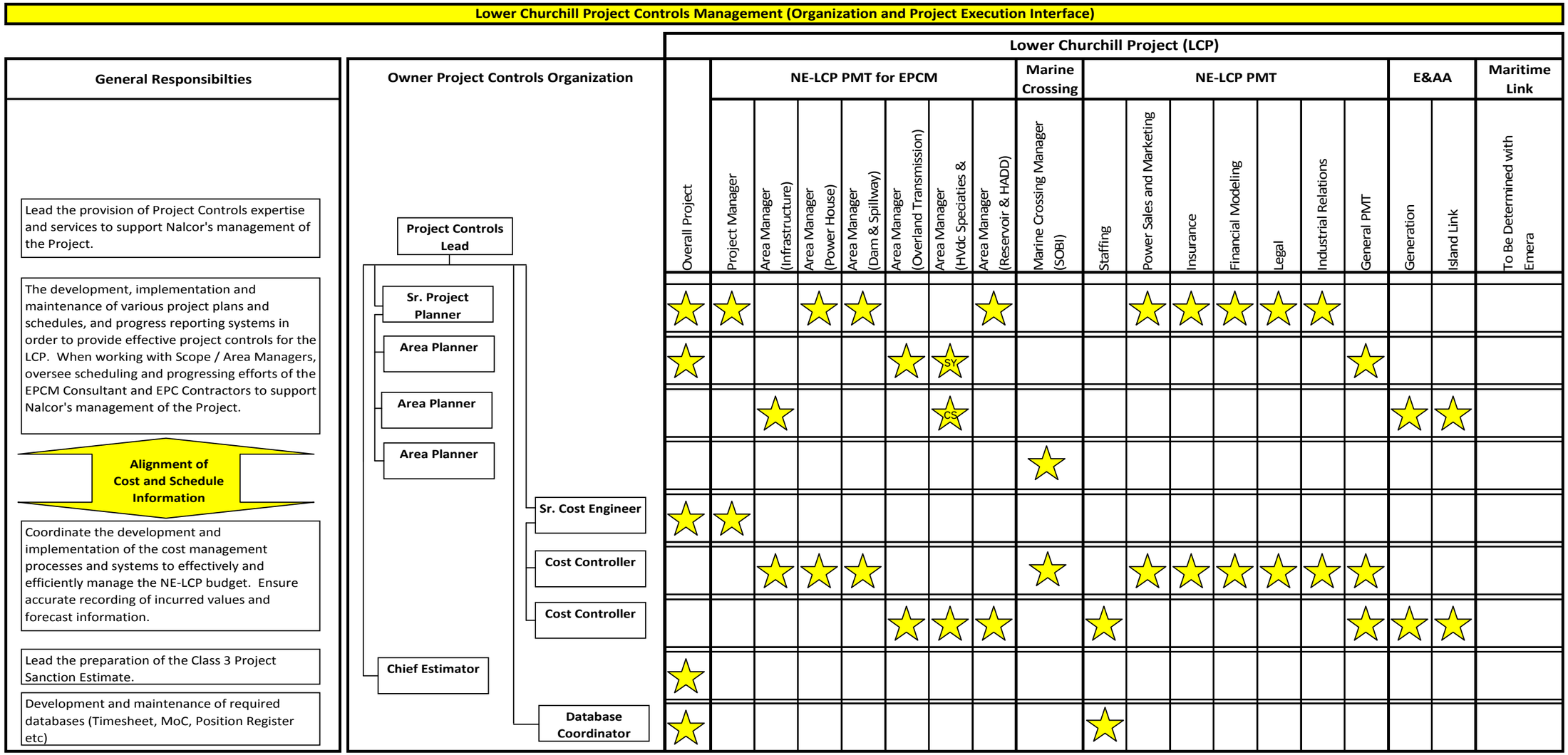
	• Mentoring / coaching Cost Controllers.
Sr. Project Planner	• Developing and maintaining the Integrated Project Schedule and Master Summary Schedule. • Establish, maintain and report performance relative to Project schedule baseline and Project progress monitoring baseline. • Oversee scheduling and progressing efforts of the EPCM consultant and EPC contractors to support Nalcor's management of the Project. • Provision of overall progress reporting for the Project. • Provide interpretation of the contractor schedules and progress information as well as forecasts for remaining work. • Provide schedule and progress visibility. • Oversee the provision of planning support the Area / Scope Managers. • Mentoring / coaching Area Planners.
Change Coordinator	• Fully responsible to ensure all activities related to the Project's Management of Change process are carried out. Responsibilities include operation of the Deviation Alert Notification system, Change Log Project change notification system, follow up and change closeout logs. This position reports to the Project Services Manager.
General Manager, Finance LCP	• Responsible for all financial activities for the Project including accounting, reporting, controls and financial systems. • Appoints the Project Controller and works with him/her to establish the overall accounting and financial controllership function within the Project.
Project Controller	• Responsible for the controllership function of the Project and acts as financial advisor to the General Manager Finance – LCP on all matters relating to the Project. • Responsible to establish and lead the management of the Controllers function for the Project, including the addressing of all accounting, finance, tax, treasury and audit requirements for the Project. • Ensure that consistent and sound procedures exist for timely and quality financial reporting which contributes to effective policy and decision making. • Interface with EPCM contractor to facilitate the provision of effective accounting, forecasting, controls, reporting and the accounts payable functions for the Project. • Track foreign currency gains and losses and provide to Project Controls. • Monthly accrual calculations using incurred cost provided by Project Controls. • Preparing project AFE's for approval and monitoring performance against the AFE's.

Each NE-LCP Team Member

- Control costs and schedules within their Project component responsibilities.
- Identify possible cost reduction opportunities and schedule savings.
- Identify Trends and potential Trends that will aid in the control and forecasting of scope, cost and schedule changes.

Figure 3 details on the Project Controls organization will functionally support the Nalcor PMT, in particular the Scope / Area Managers who are the Cost and Schedule Stewards for the Project.

Figure 2: Project Controls Team Project Execution Interface – Gateway Phases 3 & 4



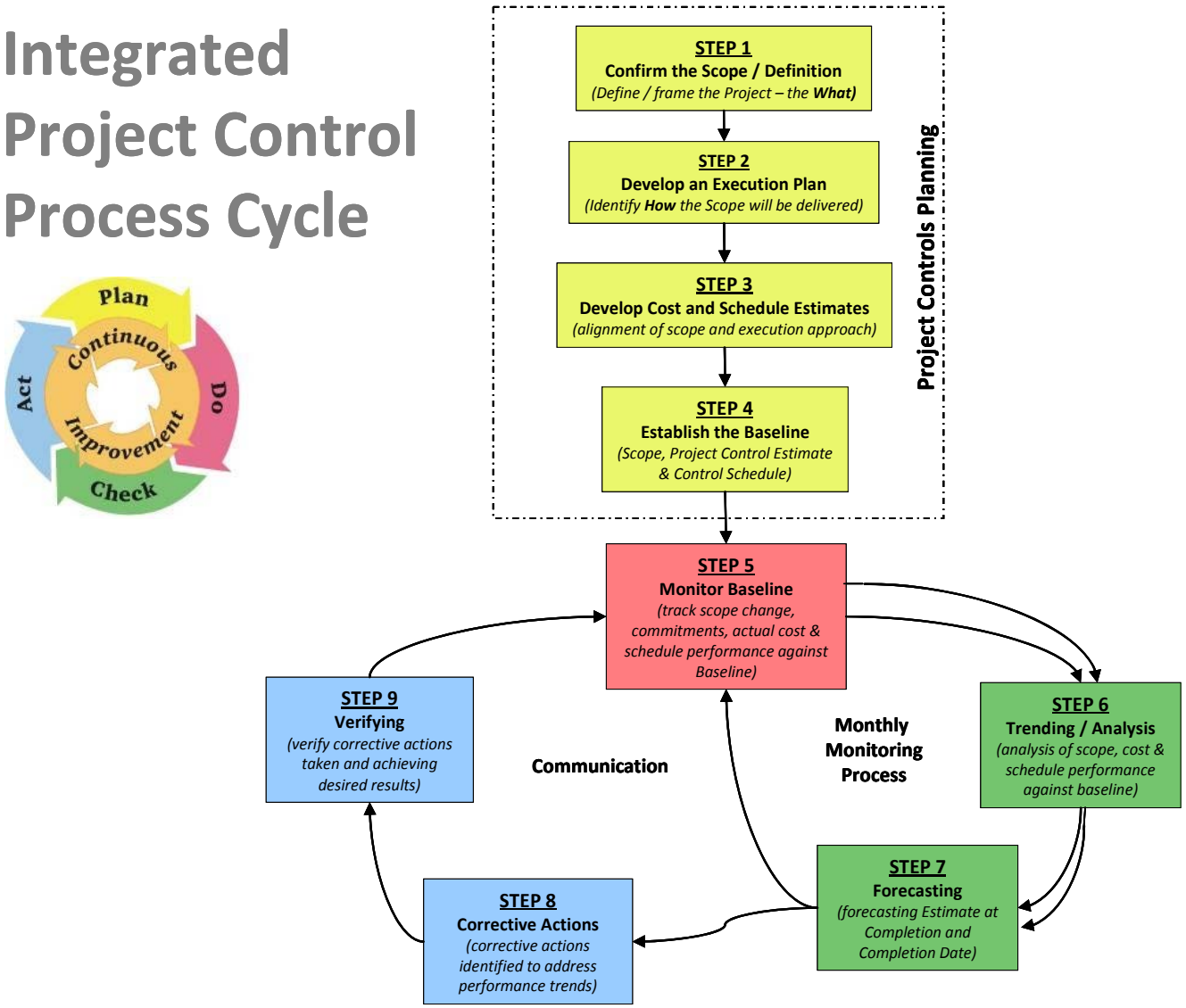
Interface Contact	Overview of Scope of Work
Area Manager Infrastructure	Access Roads, Construction Power, Construction Communications, MF Accomodations and Services, Port Facilities, Marshalling Yards, Bridges, Offsite Support, etc
Area Manager Power House	Intake, Gates, Trashracks, Turbines, Generators, Transformers, Powerhouse, OH Cranes
Area Manager Dam & Spillway	North Dam, South Dam, North Spur, Spillway, Spillway Gates, Diversion, Approach Channel, Discharge Channel, Cofferdams
Area Manager Overland Transmission	MF-SP dc OH Tx, MF-CF ac OH Tx, Electrode Line MF-SOBI, Electrode Line SP-DP, Transmission Infrastructure
Area Manager HVdc Specialties and Swithyards	MF ac Switchyard(SWYD), CF ac SWYD, SP ac SWYD, MF dc Converter Station, SP dc Converter Station, SOBI Transition Compounds, SOBI Electrode, SP Electrode
Area Manager Reservoir & HADD	Reservoir Infrasture, Clearing, Reservoir HADD, SOBI HADD
Marine Crossing Manager	Supply, installation and protection of the subsea cable across the Strait of Belle Isle. (Potential to be expanded to include the Cabot Strait for the Maritime Link)

8.0 Integrated Project Control Process Cycle

With consideration of the Stewardship Process and the above Guiding Principles, an Integrated Project Control Process Cycle, depicted in Figure 4, has been adopted for the Project. This Project control cycle is a quality driven, continuous improvement model rooted in the following four (4) basic elements:

- **Plan** – establish a plan and budget for a given work scope
- **Do** – carry out the planned work and measure performance
- **Check** – compare the measured performance against the plan
- **Assess/Act** – take corrective, mitigating or improvement action as required

Figure 4: Integrated Project Control Process Cycle



Through these four (4) basic elements, the Project Controls function facilitates:

- The provision of accurate and relevant information to the NE-LCP PMT so that effective and efficient decision making can occur, thereby allowing the Project to be delivered in accordance to the stated objectives.
- Provide critical cost and schedule performance data so that the Project can be proactively managed to achieve the stated business objectives.

8.1 Stewardship Process: Steps 1 through 9

This Integrated Project Control Process Cycle (see Figure 4) comprises the following nine (9) primary steps, with Steps 1 through 4, the Project Controls Planning phase, required to establish the scope, cost and schedule baseline from which progress will be monitored. As a cycle, Steps 5 to 9 are repeated on a regular basis until the Project is complete. Step 4 may be repeated if it is necessary to adjust the plan or budget (i.e. re-baseline). These nine (9) steps are described below.

Step 1 – Confirm the Scope / Project Definition (the "WHAT")

The quality of Project information often depends upon the extent of the definition of the scope of work – the "WHAT" has to be done (i.e., the features and functions that characterize a physical equipment or service to be delivered by the Project). If the scope of work is loosely defined, every piece of information derived from it (i.e., cost estimates and schedules) is likely to be suspect. This merely serves as a warning that all subsequent information needs to be verified and, of course, the more that this has to happen, the more inefficient the whole execution process will be.

The document LCP-PT-ED-0000-EN-RP-0001-01 Lower Churchill Project – Basis of Design provides the physical scope and definition of the Project, while supporting Key Deliverables from the Gateway Process provide context of the non-physical deliverables required in support of the Project (e.g., release from Environmental Assessment).

Step 2 – Develop an Execution Plan (the "HOW")

The second key scope component is the "HOW," of how the "WHAT" will be achieved (i.e., the strategy that will be used by the Project to deliver the WHAT).

In consideration of the Scope / Definition of the Project or the respective deliverables for either Gateway Phase 3 or 4, an execution plan will be prepared to detail how the scope of work will be executed / delivered. Included within this Execution Plan will be the strategy for management, design, procurement, construction and completion of the work, as well as organization roles, responsibilities and interfaces. During this process the WBS, OBS and COA are determined, as contained in LCP-PT-MD-0000-PC-LS-0001-01 Project Work Breakdown Structure and Code of Accounts.

At the start of Project Execution an outline of the full PEP should be in place covering all of the above elements. Detail for each section of the PEP should be developed as a rolling process as each stage of the Project is approached. This provides clarity for all of the stakeholders regarding their scope of work as well as their roles and responsibilities in achieving their Project objectives. It also describes how change will be evaluated, managed and, only where absolutely necessary, incorporated into the Project.

Document LCP-PT-MD-0000-PM-PL0003-01 Work Planning Management Plan provides guidance of how execution / work plans shall be prepared for the Project.

Step 3 – Develop Cost and Schedule Estimates

Cost estimates and schedules for the respective Project component or Gateway Phase will be developed that ensure alignment of the scope and execution approach defined in the previous two (2) steps. These cost estimates and schedules will be developed considering the input of the appropriate detail scope steward, / Budget Holder, EPCM Consultant, Contractors, Subcontractors and Suppliers, as applicable for the relevant Project component and structured (reflecting the WBS, OBS and CCA) and sufficiently detailed to facilitate the timely establishment of control baselines.

Step 4 – Establish the Baseline

The next step of the process is to establish a baseline budget and schedule for each of Gateway Phases 3 and 4 of the Project. Cost and Schedule Stewards will monitor the cost and schedule performance of each component of the Project against the baselines established.

The Original Control Budget (OCB) is the baseline budget and the Project Control Schedule (PCS) the schedule baseline, either of which can only be modified by approved scope changes as described in the document LCP-PT-MD-0000-PM-PL-0002-01 Project Change Management Plan.

Step 5 – Monitor Baseline

This step involves development of timely reports providing actual performance data including progress, productivity and expenditure data; all compared to the control baselines. It involves collection of data from a variety of sources, including the EPCM consultant, contractors, subcontractors and suppliers cost reports, finance reports, communication with the PMT. Its primary purpose is to detect early deviations from the Baseline.

The Current Control Budget will be developed based on the Original Control Budget and the all scope changes to the OCB under the LCP-PT-MD-0000-PM-PL-0002-01 Project Change Management Plan.

Step 6 – Trending / Analysis

This step entails the analysis of cost and schedule performance to-date based on the information collected in Step 5. This task involves:

- Reconciliation of actual data with the baselines;
- Identification of significant Trends;
- Review identified Deviation Alert Notices;
- Review all pending Project Change Notices; and
- Investigation and understanding of Trends.

Step 7 – Forecasting

This step is to develop a forecast of remaining work. A forecast predicting the Project's final cost and schedule shall be developed based on demonstrated performance to-date and assessments incorporated for future work.

Forecasted overruns could often initiate corrective actions, while forecast under-runs should be tested for their validity. This task involves working with the PMT to explore corrective actions, if necessary.
Monthly Reports will be prepared to keep the PMT informed of Project cost and schedule performance (analyses) and forecasts.

Step 8 – Corrective Actions

If an adverse Trend is identified during analysis and forecasting, corrective actions shall be identified and implemented with the goal of bringing performance in line with expectations.

The Project Controls Lead shall bring any significant deviations in Trends to the attention of PMT. To the extent possible, the Project Controls Lead shall identify and explore corrective actions for management's consideration.

Management shall review those Trends that need immediate correction, develop action plans and assign responsibilities. Once consensus on the corrective action plan is reached, the plan will be implemented.

Step 9 – Verifying

The results of corrective actions implemented shall be checked to verify rectification of the Trend and improvement to the Project's cost and schedule performance. If a corrective action is put in place, the same performance data will be monitored further to assure that adverse Trends do not reoccur.

The verification step completes the control cycle by tying back to Step 5 of the cycle – "Monitor Baseline".

Steps 3 through 9 will be discussed within the context of each of the respective areas of cost and schedule management.

8.2 Elements of the Stewardship Process

The process's major work elements include:

- Setting reasonable cost and schedule targets based on competitive benchmarking data and Project and sub-Project optimization opportunities;
- Enforcing management control through weekly status and issues management processes;
- A formal monthly Cost, Schedule and Change Management Stewardship Meeting;
- Senior Project Management interacting directly with Cost and Schedule stewards; and
- Keeping multi-functional teams focused on effective planning and risk mitigation.

The Cost and Schedule Stewardship Process culminates into a monthly meeting that communicates cost and schedule activity to the Project Team. These meetings will be chaired by the Project Services Manager and facilitated by the Projects Controls Lead.

The cost portion of the meeting will address:

- Cost Forecast Reconciliation;
- Cost Forecast Summary;
- Cost Reduction Opportunities Table; and
- Cost Vulnerabilities Table.

Standard data that is planned for review during this portion of the meeting include:

- Summary charts at the Project and Sub-Project levels that show the cumulative effect of monthly changes;
- Trends such as contingency rundown versus change activity and forecast growth;
- The effect of cost reduction on achieving cost targets and the Estimate-to-Complete;
- Commitments, work-in-place, expenditures and current forecast compared to Control Budget; and
- Other pertinent data that may warrant review as the Project progresses.

The objective of the cost portion is to:

- Obtain management approval for monthly Forecast Change Notices;
- Discuss related cost activities (such as changes, commitments, work-in-place, expenditures);
- Table new cost reduction opportunities and update existing opportunities; and
- Expose potential cost vulnerabilities and update and report status of existing vulnerabilities.

The schedule portion of the meeting contains similarities to the cost portion of the meeting. The cost review section addresses schedule impacts that drive cost, but there are inherent differences that relate directly to schedule. These differences include management of

interfaces, critical path management and overall Project progress as well as schedule recovery, if required.

Part of the schedule review process is to take place before the monthly meeting. The Planner/Scheduler responsible for the PCMP interfaces with the respective Scope Managers as well as other Planner/Schedulers to generate a draft updated schedule prior to the meeting. Where possible the draft schedule will include alternatives for dealing with delayed activities, including workarounds and corrective actions.

Any changes proposed by the Scope Managers will be evaluated during the monthly meeting for Opportunity and Risk and viable options will be submitted to the Change Control Board for further consideration in compliance with LCP-PT-MD-0000-PM-PL-0002-01 Change Management Plan. The Change Control Board, established by the Project Director, will determine the validity and impacts of potential/pending Project Changes Notices (PCN). Assessments will be made by the CCB to determine whether each outstanding PCN is to be further progressed beyond its current state, implemented, or rejected. For PCN's that merit ongoing consideration, an assessment of the impacts will also be completed by the CCB.

9.0 Division of Project Control Responsibilities

Due to the complexity and scope of the NE-LCP, a variety of management execution strategies will be utilized. At this time, two strategies are contemplated as follows:

EPCM – MF Generation, Island Link OL Transmission

EPC – Island Link Marine Crossing

Table 1 has been developed to show adjustments in the Division of Responsibility between the Nalcor Project Controls organization and EPCM/EPC contractor.

Table 1: Division of Responsibilities for Project Control

Activity / Task	NE-LCP PMT	EPCM / EPC
Establish and Maintain Cost Basis		
Develop Project WBS/OBS and document the process for maintenance, including approval authorities	**A/L/T**	**I**
Develop Project COA and document the process for maintenance, including approval authorities	**A/L/T**	**I**
Develop and document the Project Estimating System, including Estimate Classifications, Estimate Basis and Estimate formats. Document the use of Allowances, Factors, Bids, Escalation, FOREX, Time dependencies and Quantities.	**A/L/T**	**C**
Develop Project Estimates in accordance with the approved processes	**A/L**	**T**
Develop and document the estimating Contingency setting process, incorporating the Risk Management process, for each class of estimate.	**A/L/T**	**C**
Develop and document the Project estimating review and approval process, including external benchmarking, use of analogues and other data to validate estimates.	**A/L**	**T**
Develop the Estimating Feedback process to update and maintain the Estimating Basis.	**A/L**	**T**
Maintain the Project WBS/OBS/COA in accordance with the approved processes	**A/L/T**	**C**
Establish and Maintain Budgets		
Develop and document the Project Budget system including the process of incorporating estimates, allocations, transfers and changes as well as bridging between budget changes.	**A/L/T**	**I**
Develop and document the Project Contingency Management system including contingency rundown reporting.	**A/L/T**	**C**
Maintain the Project Budget in accordance with the approved processes.	**A/L/T**	**I**
Convert EPCM Consultant's Services Budget and Capital Cost Estimate into a Project Budget.	**A/L**	**T**

Activity / Task	NE-LCP PMT	EPCM Consultant
Establish and Maintain Schedule Basis		
Develop and document the Project Schedule system including the process of incorporating EPCM Consultant, Contractors, Subcontractors and Suppliers schedules. Schedule Levels of Detail, Logic Conventions, Software Requirements, Timing of Updates, as well as the process for consolidating the Integrated Project Schedule will be detailed also.	**A/L/T**	**C**
Develop and document the contract attachment for Schedule Data Submission Requirements for all Contractors, Subcontractors and Suppliers involved in the Project	**A/L**	**T**
Prepare concise monthly updating, of Project schedule and forecasts to NE-LCP PMT.	**A/L**	**T**
Prepare detailed schedule of Engineering Activities by work Package	**A**	**L/T**
Prepare detailed schedule of equipment procurement by Package	**A**	**L/T**
Prepare detailed Construction Schedules and updates	**A**	**L/T**
Prepare work hour histograms, quantity curves and "S" curves	**A**	**L/T**
Establish and Maintain Actual Costs		
Develop and document the collection of Nalcor initiated costs, including commitments, actual payments and change orders/contract amendments.	**A/L/T**	
Develop and document the collection and validation of EPCM Consultant initiated costs, including commitments, actual payments and change orders/contract amendments.	**A**	**L/T**
Develop and document the contract attachment for Cost Data Submission Requirements for all Contractors, Subcontractors and Suppliers involved in the Project	**A/L**	**T**
Develop and document the reconciliation process between JD Edwards and PRISM including the application of accrual information and the correction of coding errors.	**A/L**	**T**
Collect and verify commitments and Actual Costs in accordance with the approved processes. Reconcile with JD Edwards monthly and ensure accurate cost reporting.	**A/L**	**T**
Establish and Maintain Progress Reporting		
Develop and document the collection and verification processes associated with Nalcor initiated costs, including quantities and forecasts.	**A/L/T**	
Develop and document the contract attachment for Progress Data Submission Requirements for Contractors, Subcontractors and Suppliers involved in the Project	**A**	**L/T**
Develop and document the collection, verification and reporting on EPCM Consultant initiated costs, including quantities and forecasts.	**I**	**A/L/T**
Collect and verify actual progress, quantities and forecasts in accordance with the approved processes.	**I**	**A/L/T**

Activity / Task	NE-LCP PMT	EPCM Consultant
Analyze, Forecast and Report Cost and Progress		
Develop and document the analysis of Actual Cost, quantities and progress to develop reasonable forecasts of final outcomes. Document the interface with the Project Schedule.	**A/L**	**T**
Develop and document a Project Trend process to identify beneficial or adverse Trends on the Project. Document the incorporation of identified Trends within the Budget, Mgmt. of Change and Schedule Mgmt. processes	**A/L**	**T**
Develop a process, including Schedule Management, to maintain current reporting of deviations in Trends or Forecasts to Project Management, along with recommended corrective actions.	**A/L**	**T**
Review Trends that need immediate corrective action, develop action plans and assign responsibilities.	**A/L**	**T**
Implement corrective action plans to manage deviations. Report progress as required, completion and lessons learned.	**A/L**	**T**
Support monthly reporting of Actual Cost, quantities progress, schedule and forecasts to NE-LCP PMT.	**A/L**	**T**

Legend

L = Leads the effort

A = Approves the plan or results

C = Consulted (must be responded to!)

T = Tasked to perform the activity

I = Informed

Attachment B.1 contains Business Process Maps which map out the interface process between Nalcor Project Controls and EPCM Project Controls team as defined in Coordination Procedures Section 7 – Cost Management and Section 18 – Schedule Management of the EPCM Services Contract.

10.0 Breakdown Structures

There are many ways in which the Project can be categorized - organizational, package or procurement, facility or system or asset based. The Project will use the Work Breakdown Structure or WBS as the primary structure for controlling cost. This allows the full application of cost, time and scope alignment to the Project.

This is the primary structure required to execute the Project efficiently.

10.1 Work Breakdown Structure

The Work Breakdown Structure (WBS) is a hierarchical coding structure established for the Project that categorizes it into logical components that require normal Project execution activities to be performed by various disciplines such as engineering, procurement and construction. The summary levels of the WBS could, in essence be considered sub-projects and Project execution strategies could be formulated for each sub-project. On any large project activities, such as Project Management, are undertaken that cover multiple components and sub-projects. A general WBS allocation is created for each level of the WBS. It is organized at an appropriate level to formulate basis of design, estimate, track cost and progress and manage change. The WBS is one of the fundamental linkages between cost and schedule information on the Project.

The WBS is also a code which is associated with every cost control account. It facilitates the analysis and reporting of cost and progress information by sorting and grouping parameters within PRISM.

The WBS is one method used to control the execution of the Project and to provide Project related cost and schedule information. The WBS is used as a roll up structure for:

- Project Control Estimate and Budget
- Project Schedules and updates
- Contract plans, compensation and invoicing
- Progress measurement and reporting

Updates to the WBS may be required after issuance of the approved WBS due to changes in the Project work scope, the EPCM Consultant work scope, changes in Project organization and/or development of the contract control schedule. All WBS changes will be approved through the Management of Change process.

Details of the WBS for the Project are contained in LCP-PT-MD-0000-PC-LS-0001-01 Project Work Breakdown Structure and Code of Accounts.

The first level of the WBS designates the Project. The NE-LCP in its entirety is very large and involves a number of significant sub-projects. The Project level of the WBS is defined as follows:

1 – NE-LCP General
2 – Gull Island Generation
3 – Muskrat Falls Generation
4 – Island Link Transmission
5 – Maritime Link Transmission
7 – Export Link to Quebec

Level 1 – NE-LCP General comprises costs associated with various aspects of each of the remaining sub-projects. Costs associated with 1 – NE-LCP General will be appropriately allocated to sub-projects 2 to 7, in accordance with the Project's allocation methodology, to arrive at the final cost of each of sub-projects 2 – 7 inclusive.

The first 3 levels of the WBS are outlined in Figure 3 for the sub-projects undertaken in Phase 1 of the Project and include 1 - NE-LCP General, 3 - Muskrat Falls Generation, 4 - Island Link Transmission and 5 - Maritime Link Transmission.

Figure 5 translates this overall WBS into the Stewardship Process that will be used for Phase I of the Lower Churchill Project, including Muskrat Falls, Labrador – Island Transmission Link, and the Maritime Link. The WBS is outlined in Figure 6.

Figure 5: Lower Churchill Project Phase I Project Control Stewardship Roll-up

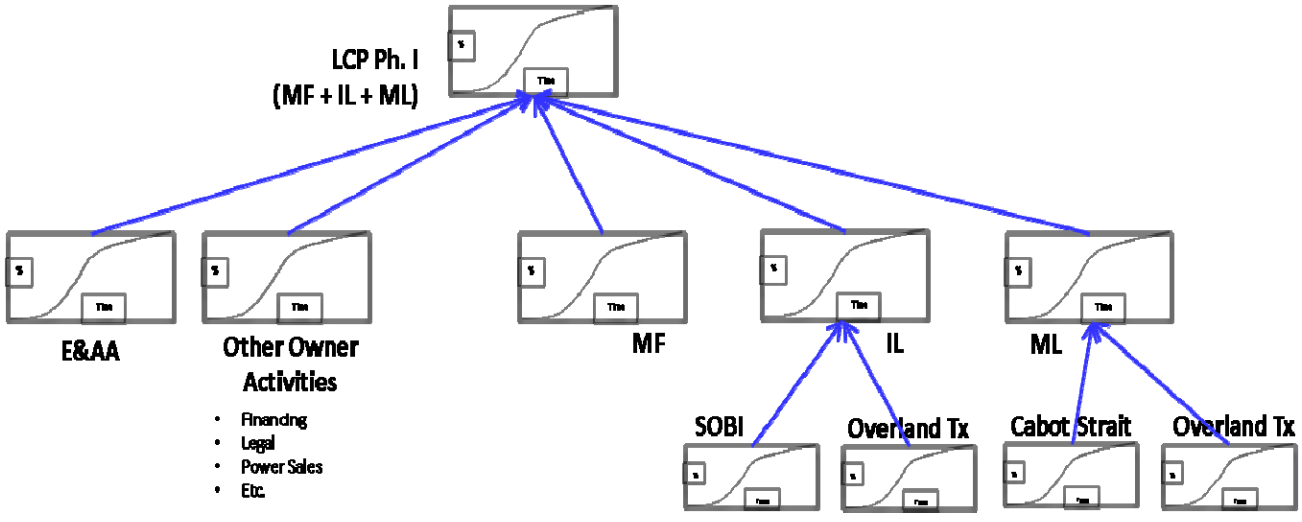


Figure 6: Work Breakdown Structure (WBS)

1 LCP General	3 Muskrat Falls	4 Island Link	5 Maritime Link
1.0 LCP General	3.0 Muskrat Falls General	4.0 Island Link General	5.0 Maritime Link General
1.0.00 General Administration	3.0.00 Muskrat Falls General	4.0.00 Island Link General	5.0.00 Maritime Link General
1.1 Project Management	3.1 Infrastructure and Support	4.1 Infrastructure and Support	5.1 Infrastructure and Support
1.1.00 Project Management General	3.1.00 Infrastructure and Support General	4.1.00 Infrastructure and Support General	5.1.00 Infrastructure and Support General
	3.1.10 Offices	4.1.10 Offices	5.1.10 Offices
	3.1.11 Access	4.1.11 Access	5.1.11 Access
1.2 Engineering	3.1.13 Construction Power	4.1.13 Construction Power	5.1.13 Construction Power
1.2.00 Engineering General	3.1.14 Construction Telecommunications	4.1.14 Construction Telecommunications	5.1.14 Construction Telecommunications
	3.1.15 Accomodation Complex		
1.3 Environmental Affairs	3.1.16 Site Services	4.1.16 Site Services	5.1.16 Site Services
1.3.00 Envronmental Affairs General	3.1.17 Housing Facilities HVGB	4.1.17 Housing Facilities	5.1.17 Housing Facilities
	3.1.18 Offsite Logistics Infrastructure and Support	4.1.18 Offsite Logistics Infrastructure and Support	5.1.18 Offsite Logistics Infrastructure and Support
1.4 Aboriginal Affairs	3.2 Generation Facility		
	3.2.00 Generation Facilty General		
1.4.00 Aboriginal Affairs	3.2.21 Reservoir		
	3.2.23 Dams and Cofferdams		
1.5 Construction Management	3.2.24 Spillway		
1.5.00 Construction Management General	3.2.25 Approach Channel		
	3.2.28 North Spur		
1.8 Power Sales and Marketing	3.2.31 Tailrace		
1.8.00 Power Sales and Marketing General	3.2.32 Intake		
	3.2.33 Powerhouse and Related Facilities		
1.9 Project Financing	3.2.34 Turbines and Generators		
1.9.00 Project Financing General	3.2.35 Balance of Plant		
	3.2.92 Operations Telecommunications		
	3.4 Switchyards	4.4 Switchyards	5.4 Switchyards
	3.4.00 Switchyards General	4.4.00 Switchyards General	5.4.00 Switchyards General
	3.4.10 Churchill Falls Switchyard Extension	4.4.50 Soldiers Pond Switchyard	5.4.60 Maritime Switchyard
	3.4.30 Muskrat Falls Switchyard		5.4.70 Bottom Brook Switchyard
			5.4.80 Granite Canal Switchyard
	3.6 OL Transmission	4.6 OL Transmission	5.6 OL Transmission
	3.6.00 OL Transmission General	4.6.00 OL Transmission General	5.6.00 OL Transmission General
	3.6.14 AC Tx Muskrat Falls to Churchill Falls	4.6.13 AC Tx Muskrat Falls Switchyard to Converter Station	5.6.17 AC Tx Bottom Brook to Granite Canal
	3.6.16 AC Collector Lines to Switchyards	4.6.22 DC TX SOBI to Soldiers Pond	5.6.26 DC Tx Cape Ray to Bottom Brook
		4.6.27 DC Tx Muskrat Falls to SOBI	5.6.33 Electrode Line - Maritimes
		4.6.31 Electrode Line - Labrador	5.6.34 Electrode Line - Newfoundland West
		4.3.32 Electrode Line - Newfoundland East	
		4.7 System Upgrades	5.7 System Upgrades
		4.7.00 System Upgrades General	5.7.00 System Upgrades General
		4.7.10 Island Upgrades - East	5.7.20 Island Upgrades - West
			5.7.30 Maritime Upgrades
		4.8 DC Specialties	5.8 DC Specialties
		4.8.00 DC Specialties General	5.8.00 DC Specialties General
		4.8.11 Marine Crossing - SOBI	5.8.12 Marine Crossing - Maritimes
		4.8.21 Labrador Converter Station	5.8.23 Maritime Converter Station
		4.8.22 Soldiers Pond Converter Station	5.8.24 Newfoundland West Converter Station
		4.8.51 Transition Compound Labrador	5.8.53 Transition Compound Newfoundland West
		4.8.52 Transition Compound Northern Peninsula	5.8.54 Transition Compound Maritimes
		4.8.61 Electrode Labrador	5.8.63 Electrode Maritime
		4.8.62 Electrode Newfoundland East	5.8.64 Electrode Newfoundland West
	3.9 Habitat Compensation	4.9 Habitat Compensation	5.9 Habitat Compensation
	3.9.00 Habitat Compensation General	4.9.00 Habitat Compensation General	5.9.00 Habitat Compensation General
	3.9.11 Muskrat Falls Fish Habitat Compensation	4.9.11 Island Link Fish Habitat Compensation	5.9.11 Maritime Link Fish Habitat Compensation
	3.9.12 Muskrat Falls Terestrial Habitat Compensation		

10.2 Organizational Breakdown Structure

The Organizational Breakdown Structure (OBS) is used to identify the organizational groups that will perform various tasks in executing the Project. The OBS is closely linked to the functional group outlined in the Code of Accounts structure. The OBS is also a code that will be applied to each cost code in the code of accounts to facilitate the analysis and reporting of cost and progress information by sorting and grouping parameters within the project controls software.

Updates to the OBS may be required after issue of the approved OBS due to changes in the Project work scope, the EPCM Consultant work scope, changes in Project organization and/or development of the contract control schedule. All OBS changes will be approved through the Management of Change process.

Details of the OBS for the Project are contained in LCP-PT-MD-0000-PC-LS-0001-01 Project Work Breakdown Structure and Code of Accounts. The OBS is outlined in Figure 7.

Figure 7: Organizational Breakdown Structure (OBS)

- 0 General Administration
  - 0.0 General Administration
- 1 Project Management
  - 1.1 Project Manament - External Support
  - 1.2 Project Management
  - 1.3 QHSE
  - 1.4 Information Management
  - 1.5 Project Controls
  - 1.6 Controller and Accounting
  - 1.7 Supply Chain
  - 1.8 Stake Holder Management
- 2 Engineering
  - 2.1 Engineering Management
  - 2.2 Civil Power Generation
  - 2.3 Civil Transmission
  - 2.4 Mechanical
  - 2.5 Electrical
  - 2.6 Operations/Energy Analysis
  - 2.7 Loss Control
  - 2.8 Environmental
  - 2.9 Package/Project Engineering
- 3 Environmental Affairs
  - 3.1 Environmental Affairs Management
  - 3.2 EIS Generation
  - 3.3 EIS Transmission (Island Link)
  - 3.4 EIS Transmission (Maritime Link)
  - 3.5 Permits, Licence & Authorizations
  - 3.6 Regulatory Affairs
- 4 Aboriginal Affairs
  - 4.1 Aboriginal Affairs Management
  - 4.2 Innu Nation & Benefits Agreement
  - 4.3 Other Aboriginal Groups
- 5 Construction
  - 5.1 Construction Management
  - 5.2 Discipline Construction
  - 5.9 Facility Operations
- 6 Completions
  - 6.0 EPCM Services General
  - 6.1 EPCM Project Management Services
  - 6.2 EPCM Engineering Services
  - 6.3 EPCM Construction Management Services
- 7 Completions & Operations
  - 7.1 Operations Management
  - 7.2 Discipline Operations
  - 7.6 Completions Management
  - 7.7 Discipline Completions
- 8 Power Sales and Market Access
  - 8.0 Power Sales and Market Access Management
  - 8.1 Power Sales
  - 8.2 Regulatory
- 9 Finance
  - 9.0 Finance Management

10.3 Cost Breakdown Structure

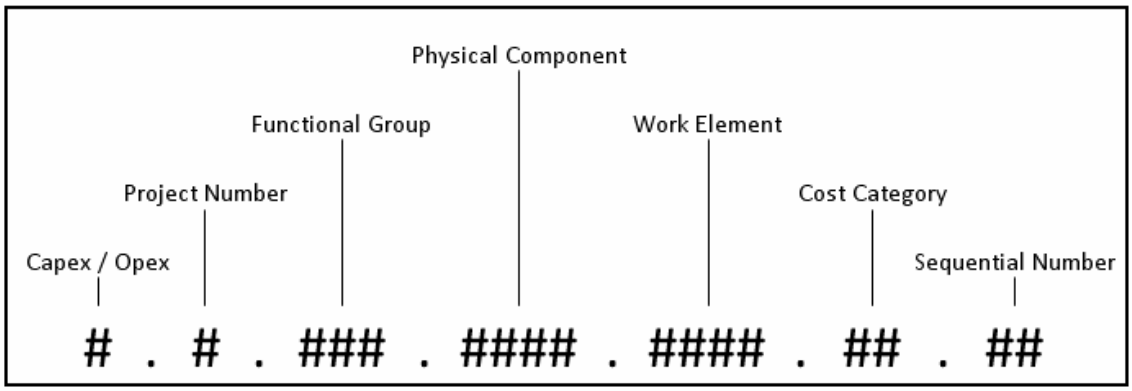
The cost breakdown structure is used to control the execution of the Project and to provide Project related information to various Project stakeholders to suit their needs.

The Cost Control Account (CCA) is a code which is established for each scope of work or cost associated with the execution of the Project and is deemed to require a single account for effective stewardship. The goal of Project Controls is to establish control accounts at an appropriate level to effectively manage the Project.

The control accounts should not be at such a low level that an inordinate amount of effort is required to effectively manage the Management of Change process for each control account. A control account must have a single steward, a clear description of what is included in the account, an established baseline budget and a baseline timeline for execution.

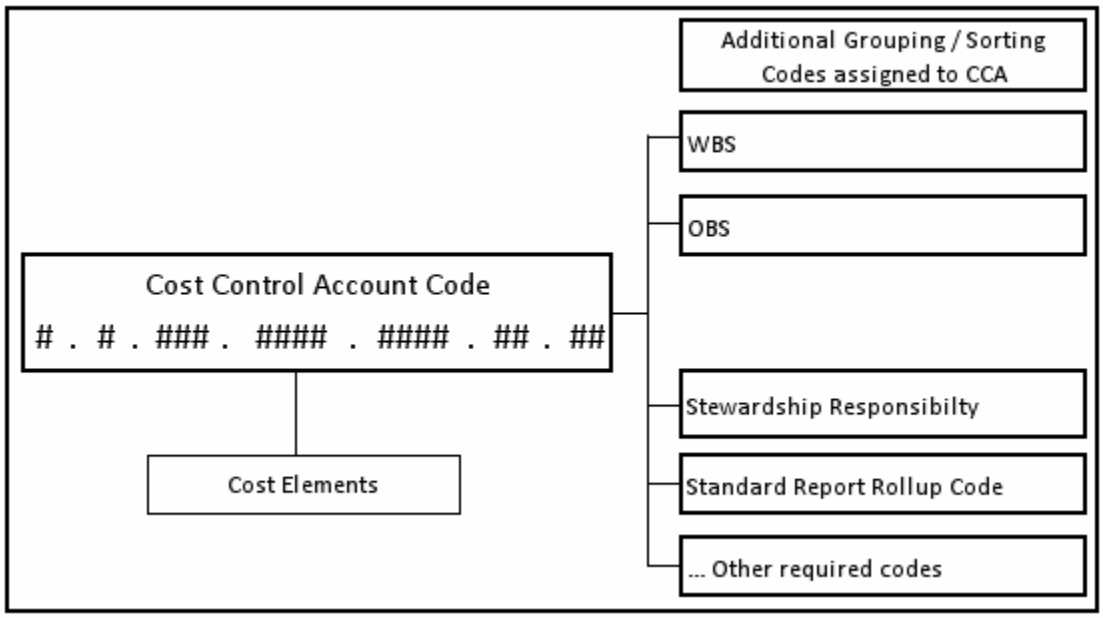
The CCA structure is shown in Figure 8.

Figure 8: Cost Control Account Structure



Each control account will have additional codes assigned to them within PRISM. These codes will include the WBS, OBS, stewardship responsibility, reporting roll up codes and any others that may be required to effectively manage cost. These additional codes will be used to facilitate the reporting of the Project in a variety of ways to provide as much clarity of the Project's status to management, as is possible and practical. Additionally, within each control account a cost element code is available to break a control account's cost into lower level elements of the cost associated with the control account such as labour, materials, or equipment. This breakdown is illustrated in Figure 9.

Figure 9: CCA, WBS and OBS Relationship



Cost control accounts are created from the lists of codes established for the Project. Details of the Cost control account coding and cost categories for the Project are contained in LCP-PT-MD-0000-PC-LS-0001-01 Project Work Breakdown Structure and Code of Accounts.

Updates to the CCA's and / or its structure may be required after issue of the approved CCA listing due to changes in the EPCM Consultant work scope, changes in Project organization and/or development of the contract control schedule. All CCA changes will be approved through the Management of Change process.

11.0 Organization & Staffing

On any large project the recruitment and retention of human resources to manage the execution of the project is a significant undertaking. The salaries and other associated cost of management and staff can easily see significant growth if not well planned and controlled. To aid in the estimating and control of the cost and facilitate management's knowledge of staffing requirements, a Position Register Database has been established for the Project.

In the Position Register Database every position that is planned to be mobilized has been allocated a position ID and position description. For each position, information is recorded with respect to cost, mobilization and demobilization, as well as information for benefits reporting. The following is a partial list of data fields that will be used:

- Position ID
- Position Description
- Organization Chart
- Supervisor
- OBS
- Cost Control Account
- Compensation Rate
- Work week hours
- Overtime allowance
- Work Location
- Mobilization Date
- Demobilization Date
- NOC (National Occupation Classification) Code
- Special software requirements
- Other pertinent data

In determining the cost associated with a position, several factors have been taken into account. Salaries are estimated based on a base compensation rate. Where applicable, the base compensation rate is modified to include other factors such as a change in standard work week and / or work location. The position is assigned a control account for salary costs and this provides a linkage to upload budgets and cost information to PRISM.

General Project costs associated with staff are also calculated in the Position Register Database and coded with the appropriate cost control account. One time expenses such as a computer, standard software, office set up and special software (position specific) are also recorded. Reoccurring expenses such as standard office overhead, office supplies, telephone expenses or living expenses and turnaround travel are calculated.

From the Position Register Database organizational charts, resource Gantt charts, resource histograms and cost curves can be generated.

To begin the recruitment process for staff positions a personnel Requisition must be completed. This Requisition is then checked against the Position Register Database to ensure alignment with staff mobilization plans. If discrepancies are observed then the MOC process will be followed.

A baseline copy of the Position Register Database will be established. A current working copy of the Position Register Database will be maintained with the latest information to ensure accurate forecasting and facilitate the MOC process. Historical information will also be captured via the timesheet database, where all staff timesheets will be recorded. This information will be used to accurately record incurred salary cost and hours worked.

12.0 Estimating and the Cost Baseline

12.1 Scope

This section of the PCMP sets forth the approach that will be used to develop control level cost estimates for the sub-projects, various components and Gateway Phases of the Project (e.g. Island Link, Muskrat Falls). These estimates will be used to establish the control baseline. Securing estimate approval is the responsibility of the Project Services Manager. Estimates shall be handled as a secure document as described in LCP-MD-PT-0000-IM-PL-0001-01 – Information Management Plan.

12.2 Division of Estimating Responsibilities

The Control Budget for Gateway Phase 3 has been prepared as a Key Deliverable for Decision Gate 2. Upon mobilization, the EPCM Consultant will work to verify the Estimate for its services, including the completion of engineering, procurement and construction management. This process may result in the need to make changes to the Original Control Budget agreed at Decision Gate 2.

Gateway Phase 3 will focus on the development of a Class 3 cost estimate for each EPC portion of Muskrat Falls and Island Link component which will form the Original Control Budget for Gateway Phase 4. The EPCM Consultant will be responsible for development of a significant amount of this estimate in accordance to the parameters agreed with the NE-LCP Project Controls estimating team. For the SOBI Crossing, the PMT will take the lead on development of the detailed estimate, leveraging the support of specialist consultants as required. Table 2 provides Division of Responsibilities between NE-LCP PMT and EPCM Consultant for preparation of the Class 3 Estimate.

Table 2: Division of Responsibilities between NE-LCP PMT and EPCM

Activity / Task	NE-LCP PMT	EPCM Consultant
Develop estimating work plan & procedures	**A/L**	**T**
Compile Overall Project estimate	**A/L**	**T**
Prepare cost estimates of Project components	**A**	**L/T**
Assign coding system to Overall Project Estimate	**A**	**L/T**
Produce equipment and material list for estimate development	**A**	**L/T**
Develop Overall Basis of Estimate Document for NE-LCP	**A/L**	**T**
Develop Basis of Estimate Document for Project components	**A**	**L/T**
Develop material quantities (bulks and consumables)	**A**	**L/T**
Develop equipment and material supply cost (rates)	**A**	**L/T**
Develop labor rates for use in estimating	**A/L/T**	**T**
Develop production norms / rates to be used in the estimate	**A**	**L/T**
Prepare capital Estimate of direct costs and matrix summaries	**A**	**L/T**
Develop construction hours including productivity factor	**A**	**L/T**
Prepare estimates for Project Changes Notices	**A**	**L/T**
Check bid estimates for construction contracts	**A**	**L/T**
Operating cost estimate	**A/L/T**	**C**

Legend

L = Leads the effort

A = Approves the plan and results

C = Consulted (must be responded to!)

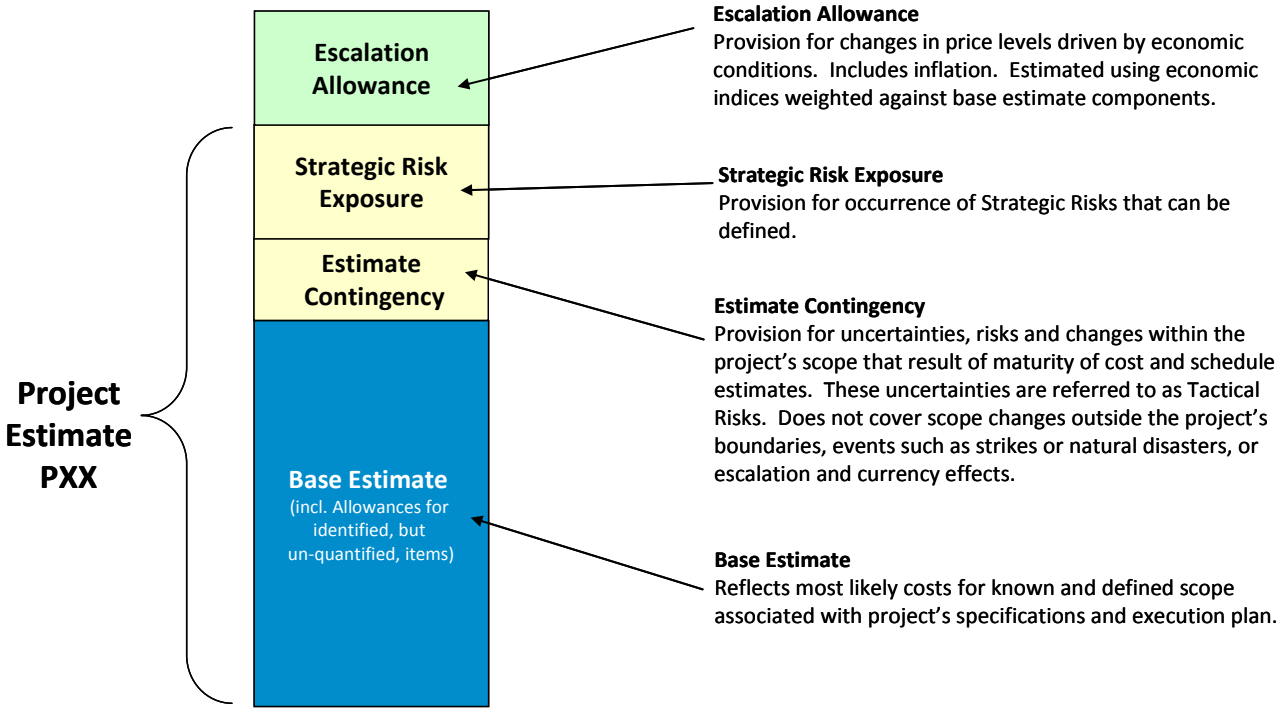
T = Tasked to perform the activity

I = Informed

12.3 Estimate Components

Figure 10 presents the nomenclature used by the PMT when describing the components of all cost estimates and defining the responsibilities for the production of cost estimates. The Project Estimate is shown on a probabilistic (Pxx) basis determined as a factor of investment risk tolerance and class of estimate (reference: LCP-PT-MD-0000-RI-PL-0001-01 Risk Management Plan).

Figure 10: Project Cost Estimate Components



12.4 Estimate Class, Accuracy and Contingency Setting

A cost estimate is a forecast of costs for a given set of conditions, which include scope of work, schedule and execution plans. The accuracy of an estimate is subject to the details known at the time and provided as input to the estimate. Different classes or types of estimates are required to evaluate capital and other work programs, at various stages of the Project. Estimates are classified in terms of quality, or known accuracy, which improves as the Project or work program proceeds as illustrated in Figure 11.

Table 3 illustrates a typical probabilistic scheme for estimating and setting the budget baseline. For the NE-LCP a probabilistic estimating basis will be used in line with the Association for the Advancement of Cost Engineering Recommended Practice 42R-08 using P10 for low side and P90 for high side basis. Estimate Contingency provision will be adjusted based on engineering maturity and consistent with principles found in AACE document entitled: Risk .03, John K. Hollmann, 2007. Probabilistic estimating may be carried out under the Owner's supervision with assistance from EPCM Consultant, Contractors, Subcontractors and Suppliers using commercial tools such as "At Risk" software and databases such as Aspen Kbase and Richardson and Means.

Figure 11: Cost Estimate Maturity Model

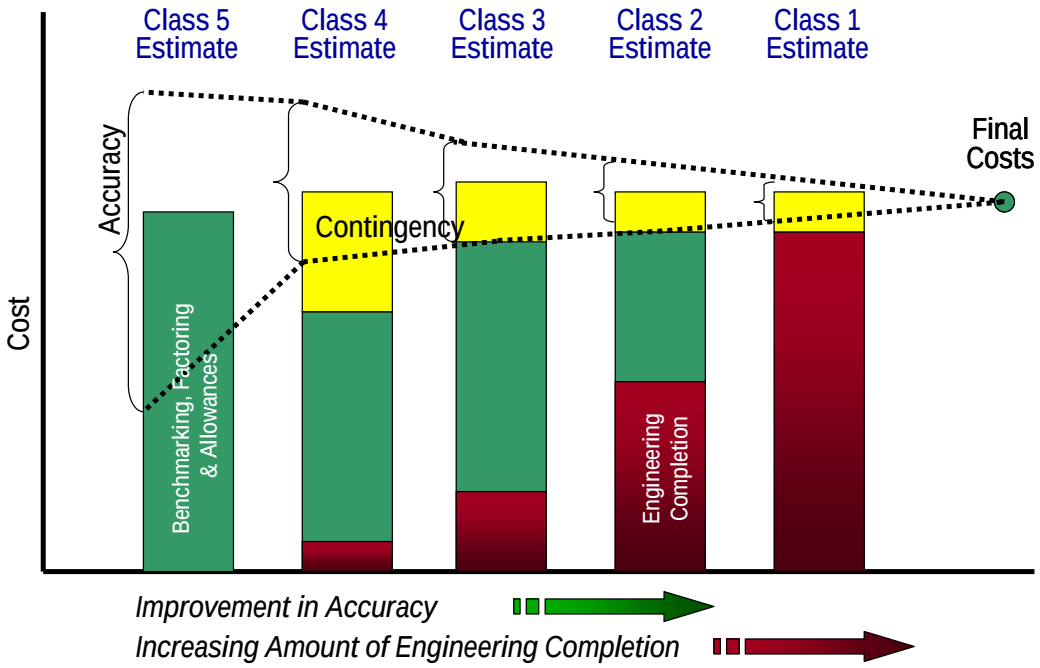


Table 3: Estimate Class and Accuracy

Estimate Class	Engineering Complete	Typical Estimate Contingency	Typical Estimate Accuracy	Purpose of Estimate	Required For Decision Gate
5	Minimal	*	± 50%	• Evaluation • Screening	1
4	1 – 10 %	15 – 25 %	- 15% + 30%	• Concept Selection • Business Case Determination	2
3	10 – 25 %	10 – 15 %	- 10% + 15%	• AFE • Sanction Decision • Control Estimate	3
2	30 – 80 %	5 – 10 %	- 5% + 10%	• Re-forecast of Class 3	**
1	80 – 100 %	5 – 10 %	- 3% + 7%	• Final Control Estimate • Re-forecast of Class 2	**

Note: * Class 5 estimates are typically prepared based on benchmark data and factors that include contingency.
** Class 2 and Class 1 estimates are not required to proceed through Decision Gates of Gateway Model. These classes of estimates are prepared during the execution stage of a project.

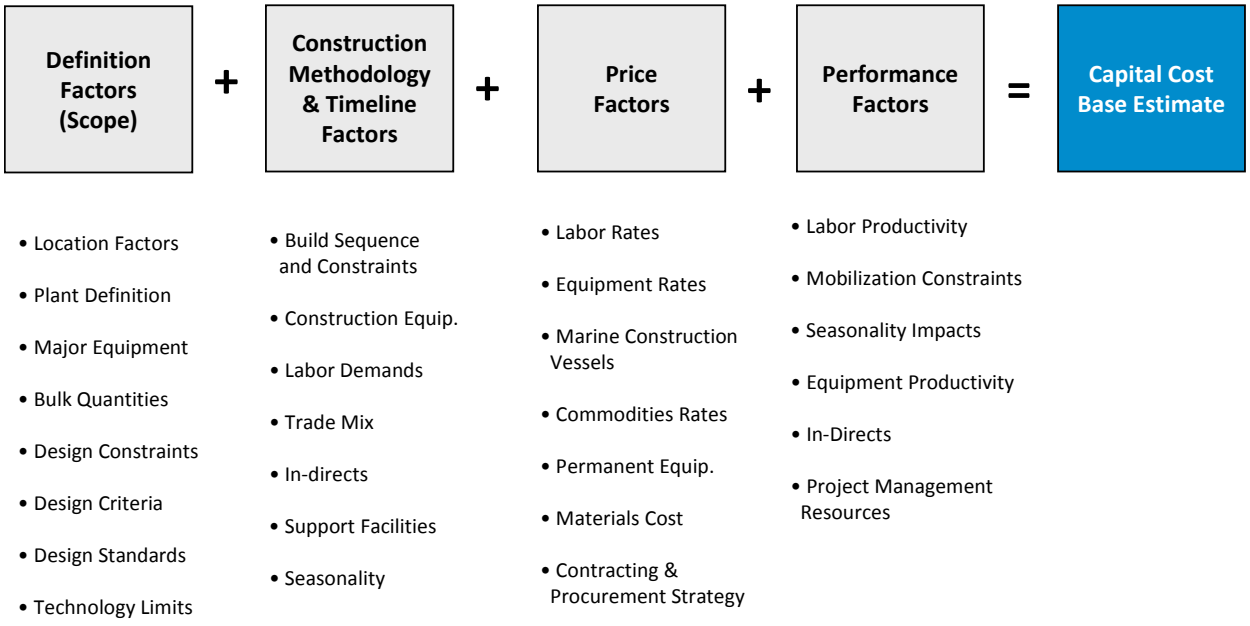
12.5 Estimating Methodology

Cost estimates for all Gateway Phases of the Project will be prepared consistent with the Work Breakdown Structure and translated into the respective CCA's to facilitate development of an accurate Original Control Budget.

The Class 3 estimate required for the Project at a Decision Gate will be prepared from a bottom up estimate using the four (4) elements detailed in Figure 12.

In the case of the Island Link (excluding SOBI) and Muskrat Falls, the EPCM Consultant will be responsible for conducting the required engineering, construction planning and procurement market intelligence in order to produce a Base Estimate that meets the criteria of a Class 3 estimate. Probabilistic variances of the base estimate elements detailed in Figure 9, together with any specific Project elements that are determined as having a high cost risk and high potential for occurrence will be run as outlined in Section 12.4 above. P10 and P90 estimate accuracies will be used for reporting and controlling purposes together with probabilistic estimate contingency allowances.

Figure 12: Base Estimate Elements



12.6 Estimate Structure

The Class 3 estimate will be developed in a structured manner to allow analysis of quantities and costs for all Project components. Guiding principles and practices for the structure of the estimate include:

- Cost estimates will be prepared consistent with the Work Breakdown Structure and translated into the respective CCA to facilitate establishment of an accurate Original Control Budget.
- The estimate will show direct costs and indirect costs separately, with both costs developed in detail. The estimate will be broken out into standard cost elements consisting of labor, equipment usage, materials, process equipment, Subcontracts, freight, expenses and funding.
- The estimate will have a hierarchical structure, with cost details developed at the lowest levels of the WBS, with the ability to roll up or summarize the estimate at higher levels.
- The estimate coding will allow summarization by any coding structure, (e.g. Project, physical component, functional group, work element)
- The estimate will be integrated with the Project schedule (e.g. by physical component or major package of work) to allow cost flows to be developed.
- The estimate will follow the Project coding structure to eliminate external mapping of codes between the EPCM Consultant's coding structure and the Project coding structure.

The Class 3 estimate will be developed in sufficient detail to allow the following deliverables to be produced and monitored:

- Estimate summary report with detailed Basis of Estimate including allowance (probabilistic) consistent with Association for the Advancement of Cost Engineering Recommended Practice No. 34R-05 Basis of Estimate.
- Estimate summary by Project, sub-project and physical component in constant dollars
- Expenditure summary by currency
- Commitment profile
- Cost and cash flow of estimate by currency
- Cost and cash flow of estimate by commodity
- Labor histograms by NOC code
- Probabilistic estimate contingency and estimate contingency rundown curve
- Escalation allowance
- Other pertinent information

12.7 Dealing with Foreign Currencies within the Cost Estimate

Many elements of the estimate will be quoted in foreign currencies (e.g. USD, Euro, NOK) which will be translated to a Canadian dollar equivalent value using a (fixed) set of exchange rates provided by Nalcor Investment Evaluation, with Nalcor Treasury, for the purposes of calculating the Project cost estimate. During the development of the base estimate all price quotes in foreign currency will be captured in PRISM in the base currency in order to facilitate foreign currencies requirements and as well as foreign currency exposure to the Project.

12.8 Benchmarking

Resource stewardship would mandate relative benchmarking against industry. Hydro electric projects are well documented in industry databases. Major cost elements (such as concrete in place, transmission line, subsea cable installation, generators) will be referenced against industry norms to validate estimating and categorization of funds.

12.9 Escalation Estimating

As indicated in Figure 10, escalation allowance is a key element of the overall Project cost estimate. Escalation represents changes in price levels driven by economic conditions. It includes economic conditions that prevail in a micro-economy or micro-industry (e.g., Newfoundland, hydro) such as:

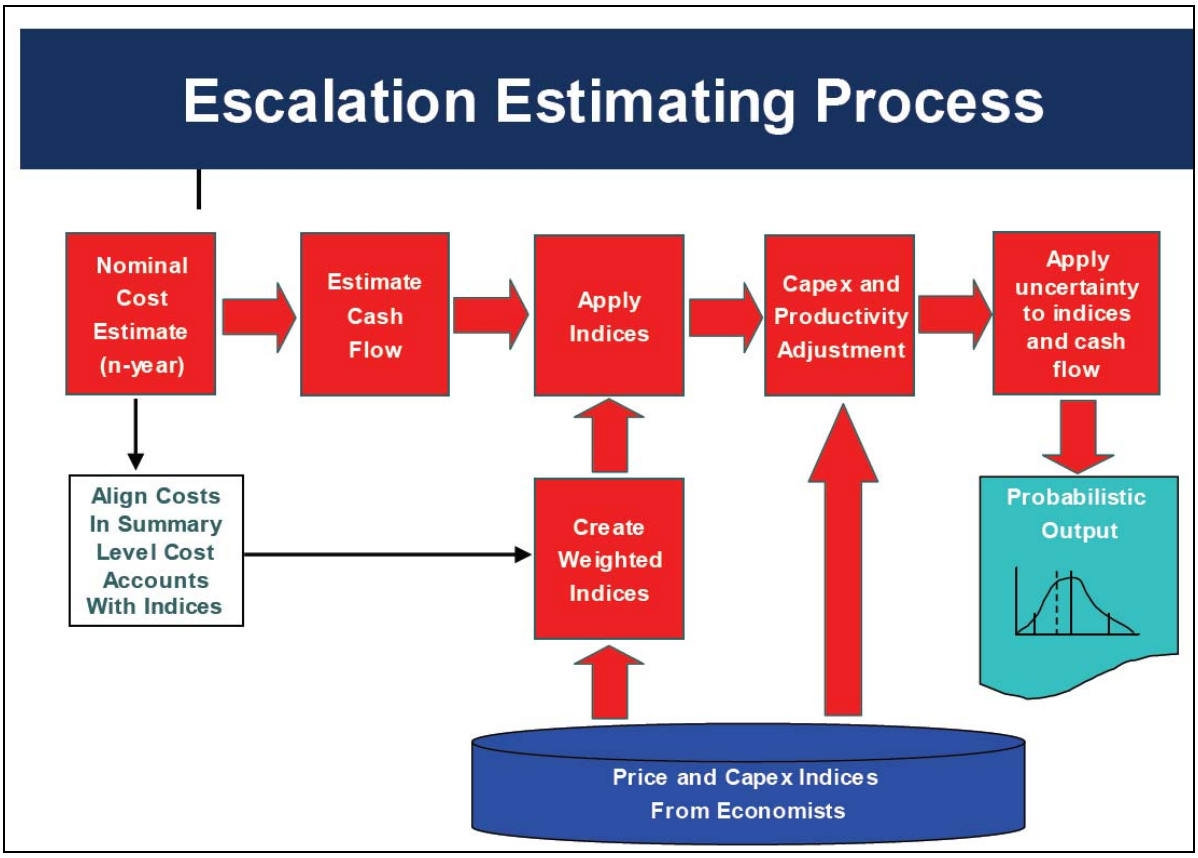
- Industry productivity and technology
- Industry and regional market conditions (such as demand, labor shortages, margins)

Escalation includes, but differs from inflation, which is caused by debasement of a currency. It varies for different cost items, regions and procurement strategy.

For reliable escalation estimating and control, the cash flow of the base estimate must reflect prices and conditions for a single reference point in time (i.e. Jan 2010) will be used for determination of an appropriate escalation allowance. Where possible standard base escalation indices will be used for determination of escalation of various components of the estimate, while for specialty items (e.g. turbines, generators, labor, subsea cable) external market intelligence will be gathered (including input from the EPCM Consultant) to support the development of custom escalation indices to forecast future price levels.

The Project Controls Team will develop an overall estimate of the escalation provision that should be provided on the base cost in order to reflect the changes in price conditions using industry best-practice as depicted in Figure 13.

Figure 13: Escalation Estimating Process

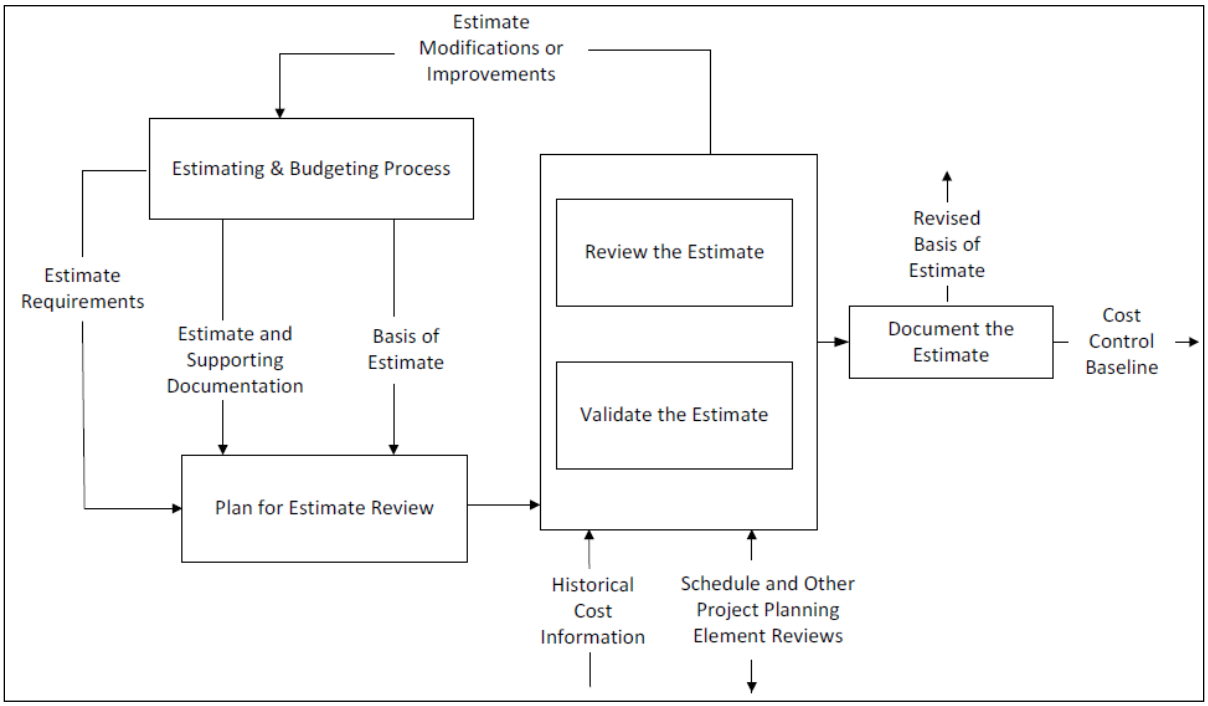


12.10 Estimate Review Process

Estimate review is an important step in the cost estimating and budgeting process. A review process is required to ensure that the estimate meets Project requirements, in terms of estimate quality, accuracy and documentation.

The estimate review process as shown in Figure 13 may be iterative in practice, with modification or improvements made to the estimate as a result of the review.

Figure 13: Estimate Review Process



As outlined in Association for the Advancement of Cost Engineering Recommended Practice 31R-03 Reviewing, Validating and Documenting the Estimate, the estimate review process has three main steps:

1. **Review** – typically qualitative in nature and focused on ensuring that the estimate technically meets requirements. This quality review determines if the estimate covers the entire Project scope, was developed using required practices, is structured and presented in the required format and is free from errors and omissions.

2. **Validation** – typically quantitative in nature and focused on ensuring that the estimate meets the Project requirements in regard to its accuracy, appropriateness and competitiveness. The estimate is typically benchmarked against various cost metrics, including third party published data, similar completed projects or past detailed estimates. A validation process should be completed even if the review team also prepared the estimate, Preference should be given to having an independent third party complete the validation process.

3. **Documentation** – the end result of the estimate review process should be a set of clear, consistent and reliable documentation that follows industry standards or best practices and has Project Team concurrence. Any recommended changes to the estimate should be documented and the Basis of Estimate should be updated to reflect these changes.

The estimate review process can be applied to the overall estimate, but may be applied to portions of the estimate separately, with specialized scope review by specialist experts. The estimate review typically involves four phases:

Phase 1 – Technical / Scope Review

The first estimate review should be held with the Technical Team (i.e., those who developed the technical documents). This team evaluates whether the estimate accurately represents the Project scope. The core members of the technical team are key participants in this review, along with the Lead Estimator and Estimating Team. One of the critical items to review is the listing of all drawings, specifications and other technical deliverables used in preparing the estimate to ensure that it is complete and up-to-date.

Phase 2 – Estimating Team Review

The next review is typically conducted by the Estimating Team that prepared the cost estimate. An initial screening will assess whether the scope was quantified completely, ensuring that the estimate is documented correctly and is consistent with the Basis of Estimate. This is generally followed by mathematical validation of the Basis of Estimate. Another consideration would be to establish a "peer review" team, comprising other experienced estimators.

Phase 3 – Project Manager/Project Team Review

Once the estimate has been reviewed by the Technical and Estimating Teams, it is ready for review by the PMT. The objective is to gain the approval of the PMT for the estimate. This is the first point where the estimate should be able to pass overall validation tests, in addition to a quality review. The first part of this review involves examination by the Project Team and Project Manager of the estimate documentation, including the Basis of Estimate, the estimate summary and estimate detail pages. The purpose is to ensure that the estimate is presented in a clear manner and that it is complete and consistent.

Phase 4 – Management Review

The final review is usually completed by Corporate Management (i.e. Gatekeeper). This review is typically presented at a summary level and usually does not involve the details of the estimate. As with the Project Manager review, estimate validation is a key element of the Corporate Management review. It is important to be able to explain and demonstrate that metrics for the current estimate are in line with data from other similar projects. It is also important to clearly and concisely explain the probabilistic nature of the estimate and how recommended contingency and escalation amounts were developed. When reviewing the risk analysis, it is important to discuss significant risk drivers and what has been done to mitigate those risks.

13.0 Cost Control

13.1 Scope

Cost control is an essential Project activity that employs tools and processes that facilitate measuring, analyzing, controlling and making available financial capital to fund the progression of work for accomplishing an intended functionality in an efficient manner. The Project Controls Lead has accountability for the development and maintenance of Project budgets and control of monetary commitment for the Project. All Project Team members have responsibility for content and adherence.

This section of the Project Control Management Plan describes cost control objectives and strategies for the Project Team and lays out plans for their achievement. It should be noted that full implementation of the objectives and strategies contained in this section will not be accomplished until post Gate 3; following award of most major contracts. Budgeting and Cost Control objectives for the Project can be summarized as follows:

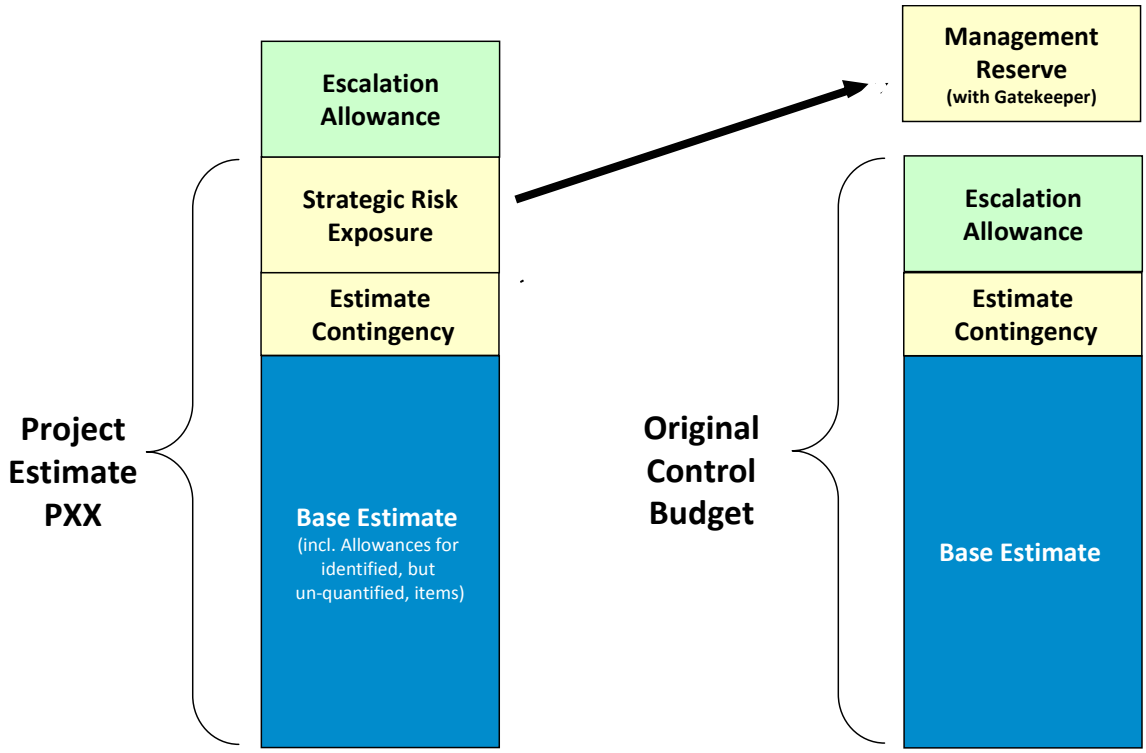
- Divide the Project into manageable sub-projects with their own budget Code of Accounts, funding authority and funding release mechanism.
- Identify key date and milestone events which will be universally accepted as significant Project funding commitment events and link them into the Integrated Project Schedule (IPS).
- Establish and maintain a baseline for estimating and budget consistent with accepted practice for probabilistic funding scenarios and standardize across the Project.
- Establish a benchmark for gauging cost efficiency of delivery.
- Establish an analysis and reporting mechanism of actual performance against the base-line that serves to align the PMT and is forward looking enough to permit timely intervention to avoid or correct undesirable events.
- Forecast and ensure funding levels are sufficient to meet Project commitments without incurring cost of capital penalties.

13.2 General Strategies

The general strategies to achieve the cost control objectives are:

- The Original Control Budget (OCB) is the Project's Decision Gate 2 and 3 estimate as defined by the Project Design Basis and Project Control Schedule. It covers all known Project costs and contains estimate contingency for developmental changes and estimate errors and omissions. It is the baseline tool that Project cost is measured against and will be divided appropriately among all contracts for the work and their respective sub-projects. It also corresponds to Project funding. Figure 14 illustrates the process by which the OCB is developed from the Project's cost estimate.

Figure 14: Establishing the Original Control Budget



- The structure of the OCB will be aligned with the cost breakdown structure (Code of Accounts) in accordance with LCP-PT-MD-0000-PC-LS-0001-01 – Project Work Breakdown Structure and Code of Accounts.
- The OCB will be fixed with provisions for updating in accordance with LCP-PT-MD-0000-PM-PL-0002-01 - Change Management Plan.
- Initially, the OCB and Current Control Budget (CCB) are identical, however as the Project progresses, scope changes will be processed, developmental change will occur and perhaps errors and / or omissions will be discovered within the OCB. These adjustments will be documented and reflected in the CCB. Contingency rundown and budget transfers will also affect the CCB. Therefore, CCB = OCB – Contingency Rundown + Approved Scope Changes + Budget Transfers. Figure 14 illustrates OCB, CCB and Forecast build-ups.
- EPCM Consultant, Contractors, Subcontractors and Suppliers to the Project will align their Project cost reporting with the Cost Breakdown Structure which will be governed by the Coordination Procedures (Ref: RFP LC-G-02 - Request for Proposal, Exhibit 5, Section 7)
- The Owner's Project Control Team will utilize a standard cost analysis tool (PRISM) across the Project, however will heavily rely upon the EPCM consultant and its systems for the overall management and reporting of cost for the contractors and suppliers it is managing for Nalcor.

- The Project Controls Team will focus on active trend monitoring and maintain a Trend Register which will be the primary information source in assessing and recommending changes to the Final Forecast Cost.
- The Owner will standardize (where feasible) on cost estimating norms, factors and allocations prior to contract onset for both comparative benchmarking and change management control.
- The Owner will control against a 30-60-90 day Trend analysis which will feed into cash forecasting, hedging facilities, contingency draw down, accruals, escalation and Commitment forecasting.

13.3 Appropriation of Capital

Capital for funding of the Project and sub-projects will be secured by approval of an Authorization for Expenditure (AFE), with authority delegated to a Budget Holder in accordance with the Project Approval Authority Limits as outlined in LCP-PT-MD-0000-FI-PR-0001-01Capital Expenditure Authorization Procedure.

Projects and sub-projects will be planned against an execution plan which will include a plan for funding requirements. Work plans will be developed for groups of work (controlled by Work Breakdown Structures) that have logical synergies. Funds will be released (or amended) for each work plan by the Budget Holder once approved. Additional details of this process may be found in document LCP-PT-MD-000-PM-PL-0003-01 Work Planning Management Plan. This information was also used in the development of Exhibit 5, Sections 5 and 18 of the EPCM Coordination Procedure.

13.4 Commitment Control

A Financial Commitment is a legal agreement (agreement, WTO or PO) between NE-LCP and a third party which authorizes NE-LCP to proceed with the award/instruction to the third party to provide goods and/or services for an agreed price or in accordance with an agreed pricing structure. Committed cost is captured when a Financial Commitment is made and its value is based upon the original estimate for that Financial Commitment. Scope Managers have responsibility for control of all Project commitments with support from the Project Controls Team. Additional details of the process for initiation and approval of Financial Commitments may be found in document LCP-PT-MD-0000-FI-PR-0001-01 Capital Expenditure Authorization Procedure.

13.5 Incurring Cost

Costs will be incurred on a monthly basis in accordance with the cost reporting schedule. The primary source of incurred cost data will be the EPCM consultant as presented to Nalcor through the EPCM's regular cost reports, however will include a number of other sources including, but not limited to contractor time and material reports, invoice cost, transfer costs from Nalcor Energy and personnel costs from the timesheet database. Once all incurred costs have been entered into PRISM the reporting period is closed and the monthly report is produced.

The Project Controls Team will work with the EPCM Consultant to determine the how to efficiently extract the optimal level of cost information from its Project Management Tool into PRISM. Reference Section 17.0 for further details on the tools used by the Project Controls team.

13.6 Changes to the Original Control Budget

As the Project matures, scope changes may occur to the facilities, execution and estimating bases used to prepare the Gate 3 estimate. As shown in Figure 13, the Original Control Budget will include Estimate Contingency that will be used to fund approve Project Scope Changes as well as cost variance due to performance trends and underestimating of final cost.

The Project's Management of Change (MOC) process (ref: LCP-PT-MD-0000-PM-PL-0002-1 Project Change Management Plan) provides a means to ensure Project Scope Changes are reviewed by the appropriate parties prior to implementation, and hence provide the means to facilitate the allocation of funds from Estimate Contingency to Control Accounts for executing an approved Project Scope Change. The EPCM consultant's and EPC contractor's change management process will provide interface with Nalcor's process, feeding the Deviation Alert Process.

The Project Change Coordinator shall maintain a log of all Deviation Alert Notices and pending Project Changes, which such indicate whether these are Scope or Non-Scope related changes, status, potential cost and schedule impacts, and other information as required. On a weekly basis (or as deemed necessary by Project MOC activity), the Change Coordinator will issue a report to the PMT containing the following information:

- **Potential Changes** – Changes that have been identified (initiated) but not rigorously estimated or reviewed by all affected Scope / Area Managers.
- **Pending Changes** – Changes that have been initiated and subject to further investigation (through the stewardship process), but not yet approved for implementation. Typically the cost impacts of these changes have been estimated.

- **Approved Changes** – Changes that have been approved by the appropriate level of management. These changes will be included in the CCB and current forecast.
- **Cancelled Changes** – Changes that have been rejected. When this occurs, the reason for not approving the change should be noted on the change form and it should be communicated to the originator and any others who reviewed the change.

The ECPM Consultant's cost control system will provide additional reporting which documents potential, pending and approved changes out of its change management process. These reports may also be used to steward the forecast relative to cost growth and contingency usage.

For all Non-Scope Changes, the Project's MOC process will include provision for adjustment of the final estimated Project cost or completion dates using a Forecast Change Notice (FCN). These FCN's will be the principal mechanism for adjusting the Project's Final Forecast Cost (FFC). Additional details on the development of the FFC are contained in Section 13.6.

13.7 Final Forecast Cost Reporting

The Sr. Cost Engineer will update the Project Final Forecast Cost on a regular reoccurring basis, using the collective input from the Project Controls Team, and substantive input from the EPCM consultant.

The FFC will be driven by both Project Changes and Trends which will trigger Forecast Change Notices, a mechanism used to formally adjust the FFC. The Project Controls Team, with the EPCM consultant, will place significant effort towards identifying and analyzing scope, cost and schedule Trends that may influence the FFC or forecasted completion date. The process of establishing Trends for forecasting purposes involves timely examination of various reports that provide progress, productivity and expenditure data consistent with the Project's control baselines. The sources of data include the following:

- Purchase orders
- Contracts
- Actionable bids
- Project change and contract change registers
- Engineering and construction progress and productivity reports
- Staffing plans
- Material take-offs
- Material status reports
- Verification results of previous corrective actions taken
- Expenditure reports
- Etc.

The monthly progress, productivity and expenditure data produced by the EPCM consultant, contractors, subcontractors and suppliers will be analyzed by the Project Controls Team to identify any deviations from the planned baselines in order to establish Trends, which may affect the FFC. It is expected that the EPCM consultant and contractors will utilize appropriate forecasting methods that align with those developed by the Project. In the event that they do not, the Owner's Project Controls personnel will coach their personnel regarding industry best practices and Project expectations until they have implemented acceptable forecasting methods.

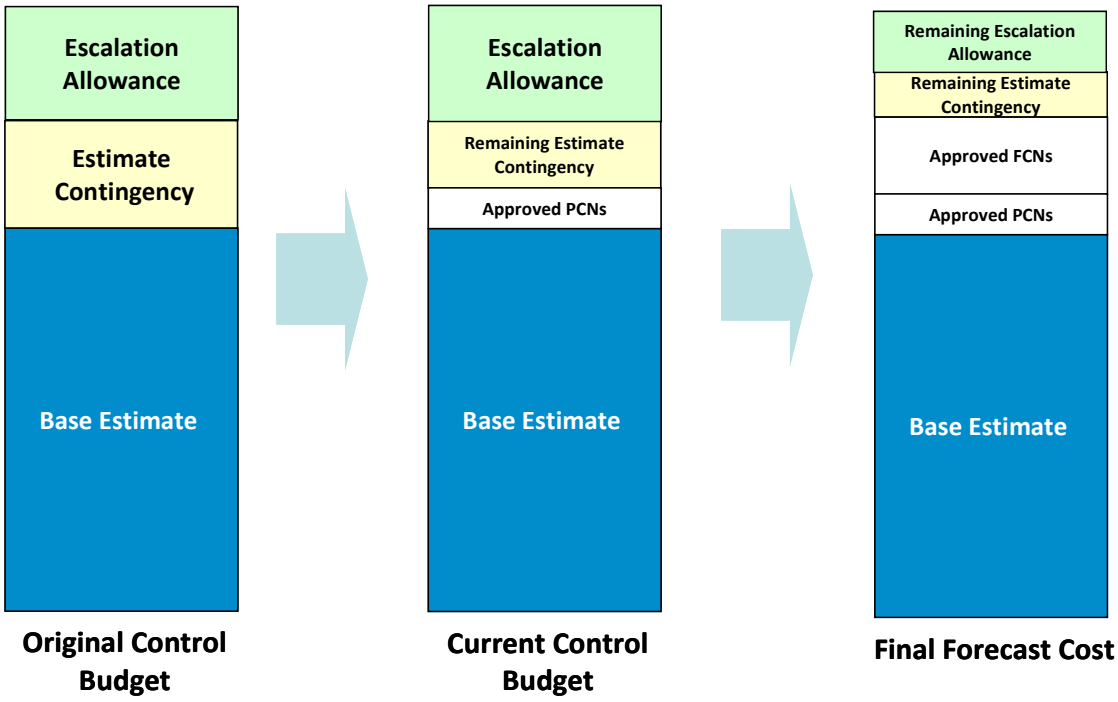
The Project Controls Team will maintain a Trend Register that shall capture all Trends and include the following information for each:

- Trend unique identifier
- Cost control account(s) cross reference
- Description
- Source and Basis
- Estimated cost and / or schedule impact
- Status

Upon receipt of the monthly performance data, the Project Controls Team will produce a preliminary monthly forecast based on the Actual Cost of work performed to-date plus an estimate of the work remaining. The latter shall include approved, potential and pending changes plus a cost assessment of Trends following analysis of reported performance on the factors listed above. The associated FCN's will be prepared by the Sr. Cost Engineer and be presented to the respective Scope / Area Manager and Project Controls Lead for their assessment. All FCN's will require endorsement by the Scope/ Area Managers and the Project Controls Lead before they are incorporated into the forecast. Additionally, the forecast cost of any agreed or proposed corrective actions will also be included.

Figure 15 illustrates the concepts upon which the OCB becomes the CCB and from which the FFC is generated.

Figure 15: OCB, CCB and FFC Concepts



13.8 Cash Flow Management

Monthly cash flow forecasting is required to ensure that sufficient financial resources are available to meet upcoming financial obligations. This information will be derived using the time phased cost information from PRISM, detailed by month with the addition of one (1) month to allow for invoice processing and payment. Quality input and assurance is required from each Budget Holder to ensure that the recorded information is the most accurate available.

Monthly Project cash flow forecasting will be the responsibility of the Project Controls Lead. The cash flow forecast will be used to support the Project's monthly cash requirements. The Sr. Cost Engineer, leveraging the EPCM Consultant (as applicable for the relevant sub-project), will work with the Project Accountant in order to produce a rolling forecast of cash requirements by currency, in order to ensure effective cash management.

From time-to-time financial constraints may be imposed on the Project by the Gatekeeper, in particular during the period prior to Decision Gate 3. Funding limits may be established by quarter, fiscal year or calendar year. The PMT is responsible for operating within these limits. Cash flow information will be compared to any funding constraints to identify when additional funds will be required and appropriate approvals obtained or if adjustments to the work plan are required to stay within approved funding limits.

13.9 Reconciliation

The Cost Engineer / Controllers(s) will produce a monthly reconciliation of changes to Actual Costs (expenditures + accruals), CCB and FFC. The latter shall include approved, potential and pending changes plus a cost assessment of Trends following analysis of reported monthly performance factors. The monthly reconciliation will be presented to the respective Project Scope / Area Manager for their assessment and agreement.

Reconciling monthly changes between committed actual costs / work-in-progress / CCB serves the following:

- Highlight the data from approved / pending changes
- Highlight results of cost analysis and trending
- Explain any differences in real Project terms
- Help focus management attention on potential problem areas

In addition, the reconciliation data can assist in evaluating the future estimate accuracy and contingency levels.

13.10 Estimate Contingency Rundown

“Estimate Contingency Rundown" curves will be developed to forecast the usage of estimate Contingency over the Project life. The shape of the curve will not be driven by the base estimate cost flow profile, rather by the view on the materialization of key estimate uncertainties or tactical risks; as such the contingency rundown curve may have quite a different profile than the base estimate cost flow profile.

An “Estimate Contingency Rundown” curve will be prepared for each sub-project and a “Total Estimate Contingency Rundown Curve” will be prepared from the aggregate of the sub-projects. Once curves are established, they should remain fixed until close-out unless schedule duration forecasts change by a month or more - at which time the x-axis should be altered.

13.11 Escalation

Similar to estimate Contingency, the escalation allowance estimated for the Project will be managed as risk fund within a separate cost control account of the Original Control Budget for the Project using the Project’s management of change process, as described in LCP-PT-MD-0000-PM-PL-0002-01 Change Management Plan.

Forecast Change Notices will be used as the mechanism to draw down funds from the escalation control account.

13.12 Foreign Exchange Losses and Gains

As discussed in Section 12.7, foreign exchange rates will be established (and fixed) for use in project budgeting of all non-Canadian dollar expenditures. The Cost Controllers will document both the non-Canadian dollar commitments made by the Project, while the Project Controller will monitor the actual foreign exchange rates experienced in paying invoices for these commitments, and provide the exchange rate gain/loss to the Cost Controllers. Overall exchanges gains and losses will be tracked by the Project Controller and provided to the Sr. Cost Engineer for the production of the Project's Monthly Cost Report.

The Sr. Cost Engineer will be responsible for forecasting the impact of any projected deviations from these fixed Project exchange rates (upward or downward) in the regular production of the Project's FFC as part of the on-going trending. The EPCM consultant's accounting and cost control resources will be actively engaged in this process.

Further details on this process are contained in LCP-PT-MD-0000-FI-PL-0001-01 Project Finance and Accounting Management Plan.

13.13 Cost Reporting

Cost reporting is required for two main purposes:

- Expenditure monitoring – to provide information to the PMT regarding the pace of Project expenditure relative to the plan.

- Budgetary control – to provide information and recommend corrective action to ensure the total Project expenditure remains within approved levels.

Figure 16 highlights the approach that is planned to be used to roll-up the various sources of cost information, in particular that provided by the EPCM consultant, to support overall project cost reporting.

Individual Project Team members should review the results of costs analysis and propose remedial cost control steps to management as necessary. Management will review the results of the update cycle at monthly Cost and Schedule Stewardship meetings. At this venue, they can review the interactive effect of all AFE's on the Project total cost and assess any corrective control actions required.

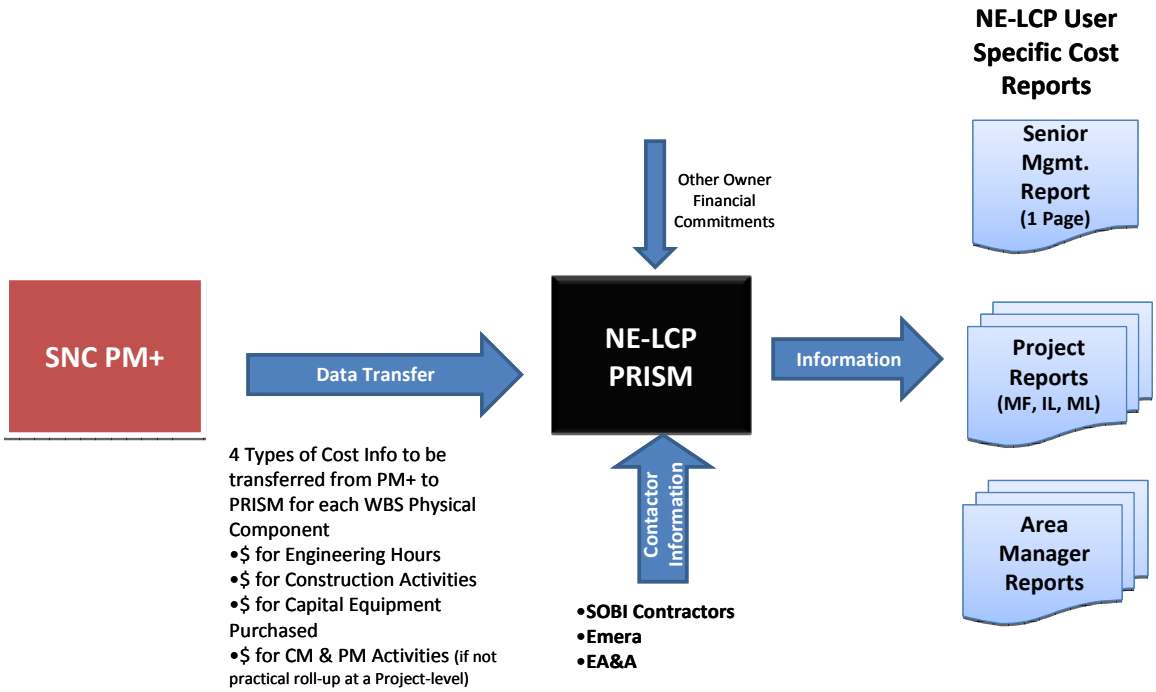
The monthly report serves as the primary tool for the Scope / Area Manager to steward costs against AFE's and Project goals and objectives. Shown below are examples of the Project's monthly cost reporting. Cost reports will be produced as required to meet the PMT's requirements; however will include the following reports:

- Overall LCP Phase I Cost Report – Level 1 Detail (Gatekeeper's Report) – reference Figure 17
- Overall LCP Phase I Cost Report – Level 2 Detail (Project Director's Report)
- Sub-project Cost Report – Muskrat Falls, Island Link, Maritime Link
- Area Based Cost Report (Area / Scope Manager's Report)

In addition to these reports there are a number of other reports that are produced on a monthly basis. These include the Period Incurred by Contract, Open Commitments and Staff Mobilization. Monthly reports are also produced for the cost & schedule stewards covering their scope of responsibility. These reports are generated using the data complied in PRISM and reported using a Microsoft Access database front end.

Note: Shared or common costs will be allocated to each of the three (3) sub-projects by either the EPCM consultant or Nalcor using an agreed allocation methodology.

Figure 16: Overall Project Cost Reporting – Roll-up from EPCM Consultant and EPC Contractors



13.14 Invoicing

Reference Finance and Accounting Management Plan LCP-PT-MD-0000-FI-PL-0001-01 for details on invoicing as well as the process for monthly calculation of accruals.

Figure 17: Overall LCP Phase I Cost Report (Representative Only)

Lower Churchill Project Phase I Component	Funding	A Original Control Budget	B Scope Changes	C = A + B Current Control Budget	D Commited To Date	E Incurred Pre-Gate 2 [3]	F Incurred Post Gate 2 [3]	G Final Forecast Cost	H Variance from Previous Forecast	H = (G - C) Variance from Current Control Budget
Muskrat Falls										
Base Capex										
Contingency										
Escalation										
Total Project Capital										
Labrador - Island Transmission Link										
Base Capex										
Contingency										
Escalation										
Total Project Capital										
Maritime Link										
Base Capex										
Contingency										
Escalation										
Total Project Capital										
Total Project Capital		6,200								
Transactional FOREX Adjustment										
IDC Charges										
Total Project Capital Including FOREX										

Notes:
[1] Includes Cost Recovery of $7,536,900 and Project Close-out Cost $9,606,221
[2] Includes Insurance, Power Sales and Market Access
[3] Decision Gate 2 for Muskrat Falls and Labrador - Island Transmission Link occurred on November 18, 2010.

14.0 Planning and Scheduling

14.1 Scope

A plan and schedule are tools that facilitate measuring, analyzing and controlling the sequence and progression of work to accomplish an intended functionality with the most efficient use of resources. Development and maintenance of Project schedules for the NE-LCP will be the accountability of the Project Controls Lead with all Project Team members having responsibility for content and adherence. This section of the Project Controls Management Plan describes planning objectives and strategies for the NE-LCP PMT and lays out plans for their achievement. It should be noted that full implementation of this section will be accomplished post Decision Gate 3, following award of most major contracts.

Planning and scheduling objectives for the Project can be summarized as follows:

- Divide the Project into manageable sub-projects with their own execution plans that efficiently represent the work and minimize interface conflicts. Figure 18 indicates the breakdown of the Project into phases, sub-projects and sections, as understood at Decision Gate 2.
- Identify Project Key Dates and Project Milestones which will be universally accepted as significant Project functionality, commitment, legal or social delivery points.
- Establish a baseline for gauging delivery of Project Key Dates and Project Milestones that is consistent across the Project.
- Establish a benchmark for gauging efficiency of delivery.
- Establish an analysis and reporting mechanism of actual performance against the baseline that serves to align the PMT and is forward looking enough to permit timely intervention to avoid or correct undesirable events.

14.2 General Strategies

The central strategy for achieving the planning and scheduling objectives noted above is for the PMT to utilize develop project schedules that support the achievement of key planning dates established for the Project and endorsed by Executive Management. The Target Milestone Schedule LCP-PT-ED-0000-EP-SH-0001-01 has been developed to define and establish these key planning dates for the Project upon which the Project Execution Plan and detailed work programs endeavor to facilitate. All project schedules must work to structured to facilitate the achievement of these Project Milestones. Rev. B1 of the Target Milestone Schedule provides planning basis as understood at Decision Gate 2 and as used in support of the key target dates contained within the EPCM Services Agreement.

The PMT will use a high level plan for reporting and alignment needs and a more detailed schedule for control purposes. The Lower Churchill Project Management Summary Schedule LCP-PT-ED-0000-EP-SH-0003-01 (LCP-MSS) will be used for management alignment and

Figure 18: Project Division for Planning and Scheduling

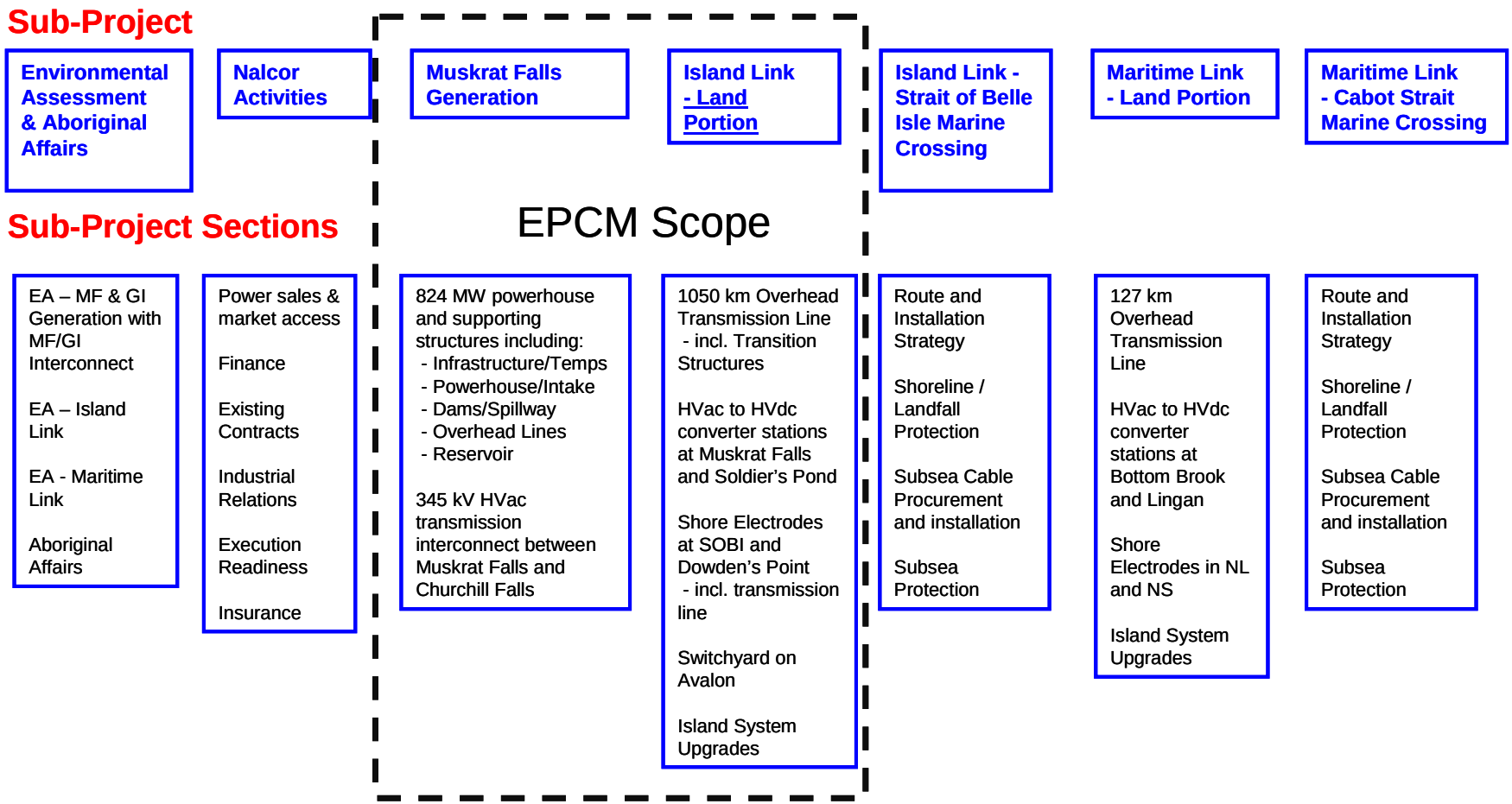
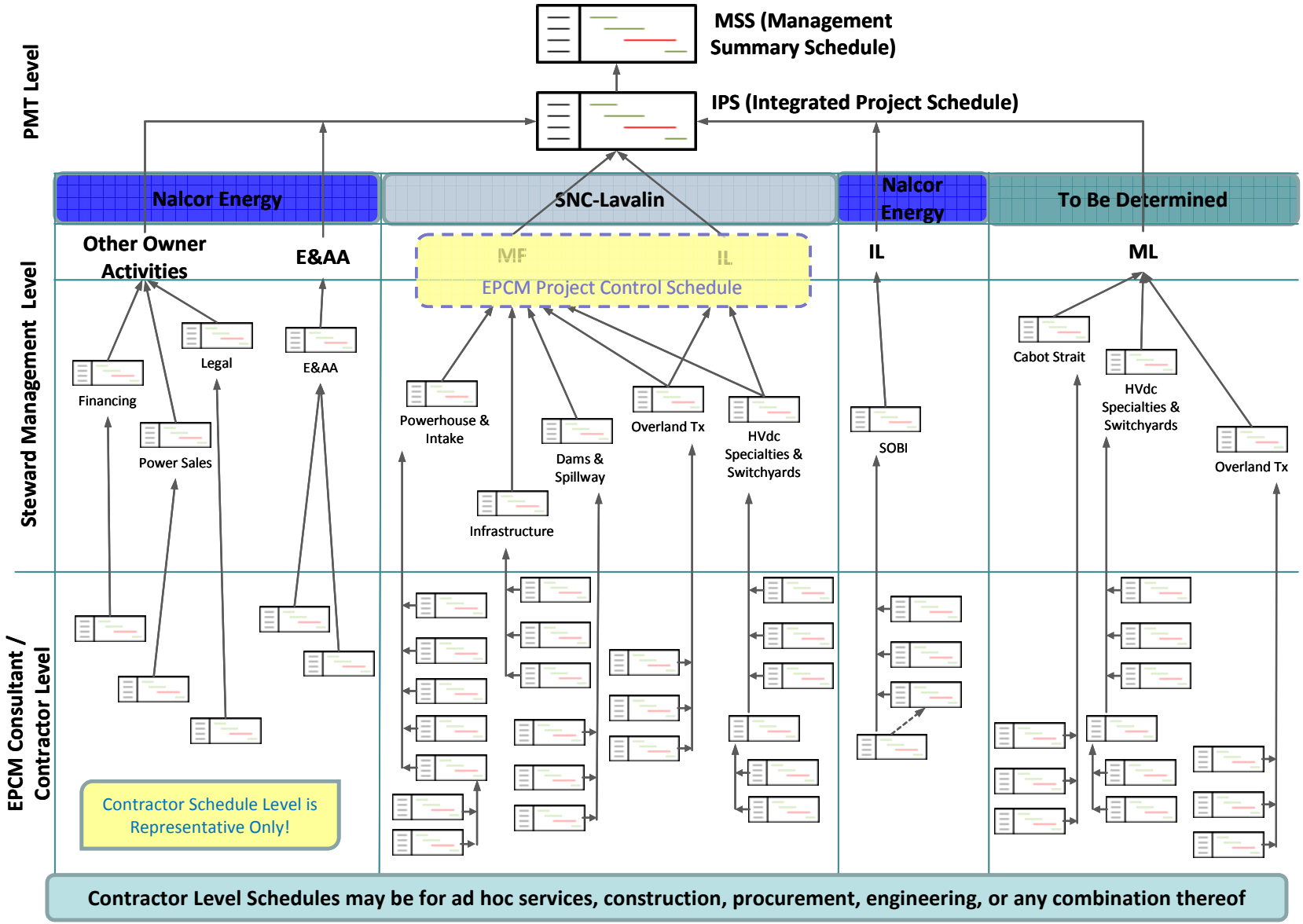


Figure 19: Project Schedule Breakdown and Roll-up highlighting Nalcor PMT / EPCM / EPC Interface



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reporting purposes, while the Project Control Schedule LCP-PT-ED-000-EP-SH-0002-01 Rev B1 (Oct 29/10) will be replaced with the Integrated Project Schedule (LCP-IPS) for control purposes.

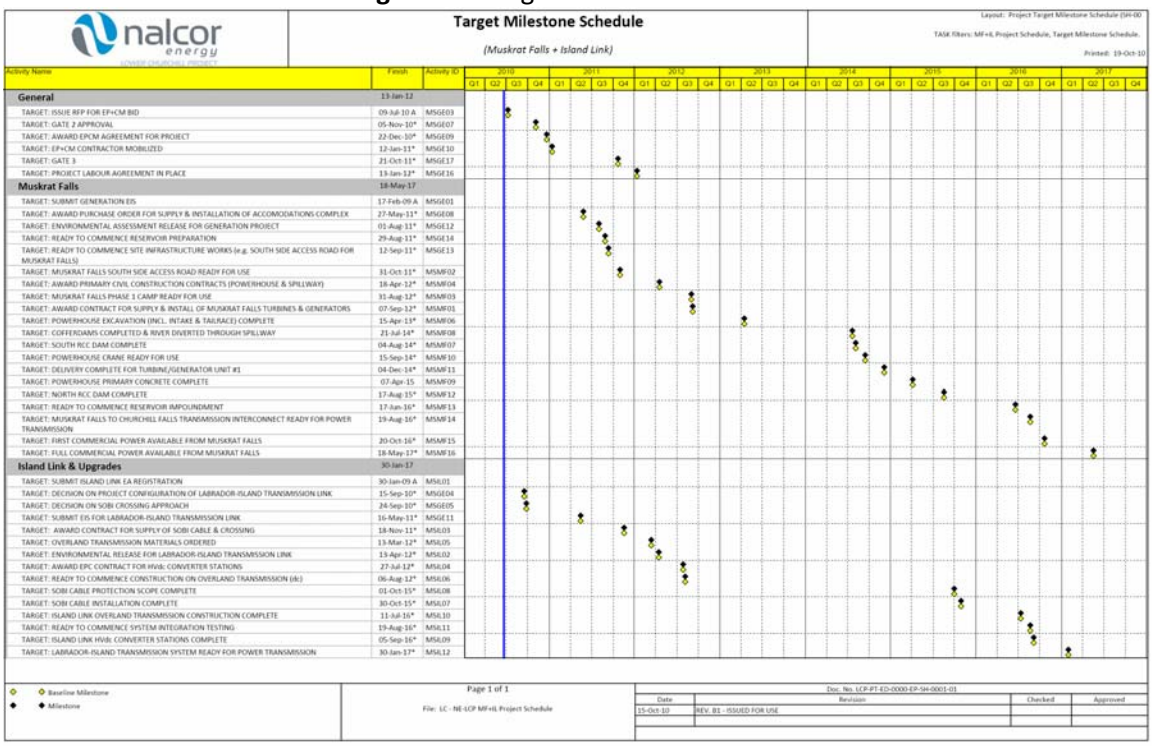
With reference to Figure 19, NE PMT will develop detailed schedules for work that they directly execute. Similarly the EPCM consultant will be responsible to develop a detailed engineering, procurement and construction schedules for its scope, which will integrate the various contractor and supplier detailed schedules, with the lowest level of detail being developed and held by the contractors and suppliers. The EPCM consultant's detailed working schedules will roll-up into the EPCM Project Control Schedule which will be baselined and form the basis for overall progress reporting and the establishment of key interface point with the LCP-IPS.

14.3 Target Milestone Schedule

The Target Milestone Schedule defines all Project Milestones that have been agreed at Decision Gate 2. The Target Milestone Schedule will form the execution planning basis of the EPCM consultant, and will be linked to the LCP-IPS. Along with other planning documents, this Target Milestone Schedule will be updated on a periodic basis in order to forecast timelines based upon project activity. This may include a re-baseline of the project, should it be necessary.

Figure 20 illustrates the Target Milestone Schedule format.

Figure 20: Target Milestone Schedule



14.4 Management Summary Schedule

The Management Summary Schedule will include major Project Milestones (defined in Target Milestone Schedule LCP-PT-ED-0000-EP-SH-0001-01) and major Project key dates. This schedule will contain the major Project components section which depicts:

- Entire scope of the Project
- Project Milestones
- Project Key Dates (dates to be monitored that are not Project Milestones)
- Significant delivery dates
- Summarized durations for key activities
- Critical path(s)

The LCP-MSS will provide:

- Overall Project status visibility
- Schedule summary for monthly reports and meetings
- Schedule summary for internal/external presentations

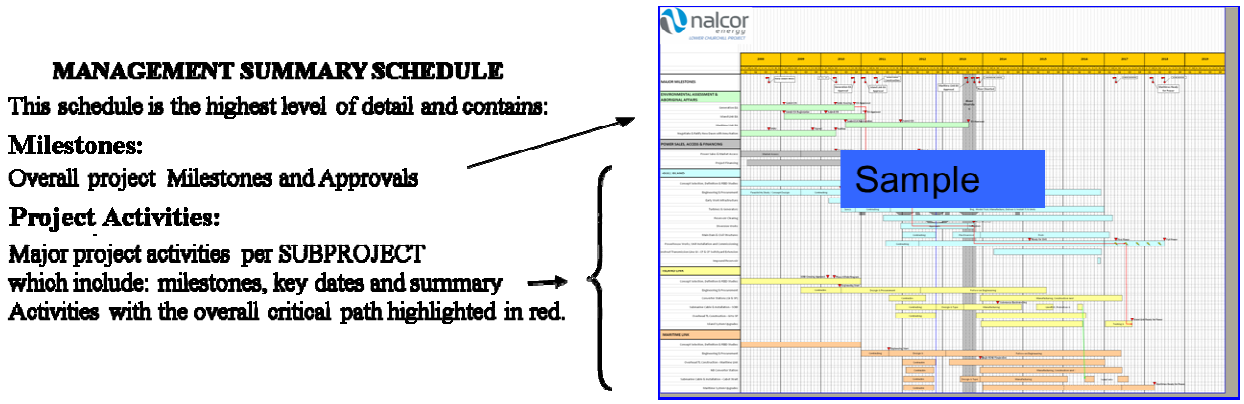
The LCP-MSS will not provide:

- Forecasts (only frontline status on the baseline based on information from the progress measurement system)
- Resource curves/progress curves (these curves will be provided from the progress measurement system).

The LCP-MSS will primarily represent elements that appear at the project number and functional group number position in the Work Breakdown Structure.

A sample Management Summary Schedule is shown below as Figure 21.

Figure 21: Management Summary Schedule



14.5 Integrated Project Schedule

The Integrated Project Schedule will include overall Project Milestones, durations and Project Key Dates. The schedule will contain the following for each major Project component:

- Entire scope of the Project component
- Project Key Dates (dates to be monitored which are not milestones)
- Overall critical path
- Key delivery dates (tied to work)
- Significant durations (tied to work)
- Activities representing the major Project components
- Logic, both internal and between Project components

The LCP-IPS will:

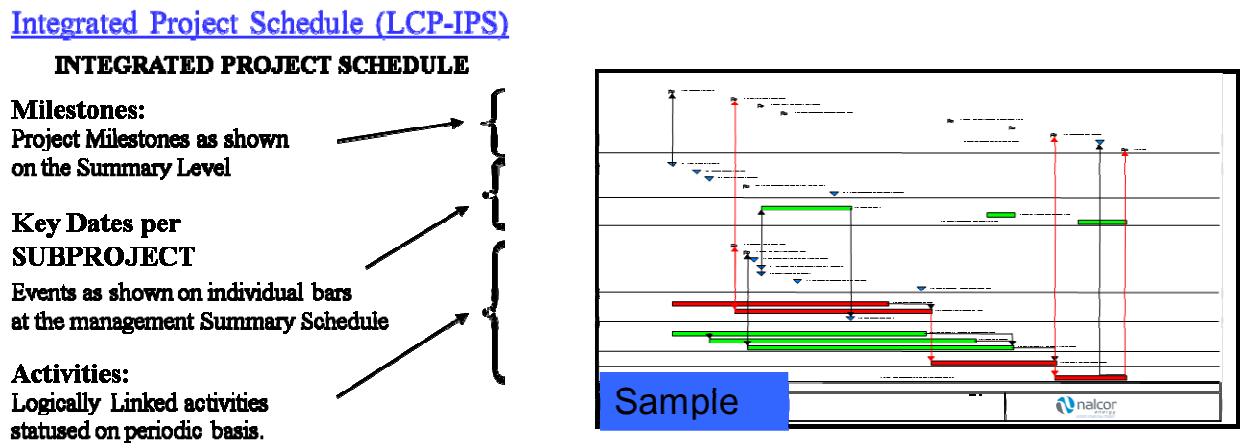
- Roll up to mirror the LCP-MSS
- Be the PMT main schedule tool
- Be structured to reflect major Project interactions
- Provide float analysis for internal and between Project components
- Be a basis for running scenarios
- Be a forecasting tool

The LCP-IPS will not provide:

- Resource curves / progress curves (provided by reporting system)
- Progress on activity bars (current versus baseline comparison will be utilized)
- % complete on activity bars (current versus baseline comparison will be utilized)

This schedule will primarily represent elements which appear at the physical component number position in the Work Breakdown Structure. A sample Integrated Project Schedule is shown below as Figure 22.

Figure 22: Integrated Project Schedule



14.6 Working Level Schedules

Working Level Schedules are built around items which appear primarily as the work element number position in the Work Breakdown Structure. Schedules developed at this level will primarily serve as the communication tool between the NE-LCP PMT and the EPCM Consultant, Contractors, Subcontractors and Suppliers that provide services to the Project. In instances where the Owner acts as a general contractor (i.e. Strait of Belle Isle), schedules will be developed at the working level by the Owner's team.

14.7 Baseline Development

Initial development of the planning and scheduling baseline will be performed by the EPCM Consultant, Contractors, Subcontractors and Suppliers performing the work. Due diligence will be carried out on proposed baseline by the Owners Project Controls Team which may include either third party resources or industrial data bases (e.g. Means, Dun and Bradstreet, IPA). As the Project matures, baseline revisions will be carried out by the Owner's Project Controls Team (or its delegate - EPCM Consultant) using intelligence gathered from lessons learned, expediter reports, quantity surveyor reports, industrial data bases or "expert" sources.

14.8 Stewardship

Schedule reports and forecasts generated by the Project Controls Team will be analyzed in support of the stewardship process described in above Section 8.0.

15.0 Progress and Performance Management

15.1 Scope

A key ingredient to reporting Project status is accurate progress and performance data. Progress and performance reporting is required to provide Project Management with information to judge whether:

- The schedule milestones are likely to be met
- Additional actions are necessary to document the value of work performed
- Potential problem areas or delays need to be highlighted

Progress and productivity curves represent quantified and time-scaled summaries of the schedule which provide a means to identify areas of the Project that may require corrective action or re-planning. Full implementation of this section will occur post Gate 3 when major contracts are in place.

15.2 General Strategies

Progress and performance management for the NE-LCP will be conducted in accordance with MSD-PJ-005 Lower Churchill Project – Progress and Performance Measurement Guidelines.

All schedules in support of the NE-LCP shall have an objective based, systematic method for collecting progress on planned activities. The EPCM Consultant, contractors, suppliers, other consultants, and major vendors will be tasked with planning, measuring and reporting physical progress and performance of the Project, including engineering, procurement and construction activities, to the Project Control Lead consistent with the WBS.

Progress is represented by the physical completion of work, whether that work is physical construction work, engineering design, component fabrication, field studies or any other work associated with a project. Progress is not the amount of time, money or hours spent, but an objective measure of the work completed. It is important, however, to measure these various elements (time, money and hours) as they provide critical pieces of data to support performance analysis.

Progress measurement will be based upon physical progress with a weighting system factor. Elements of the Project are determined to contribute towards the overall Project (weight factor). Each element is then progressed based upon physical completion of work (progress). The arithmetic sum of the weight factor and progress of the element is the weighted progress of that element.

Actual progress is calculated based on achievements related to physical completion of work. Work hours and costs are used only for weighting purposes. Indirect work hours associated with home office, support functions (such as Project Management, Procurement, Project

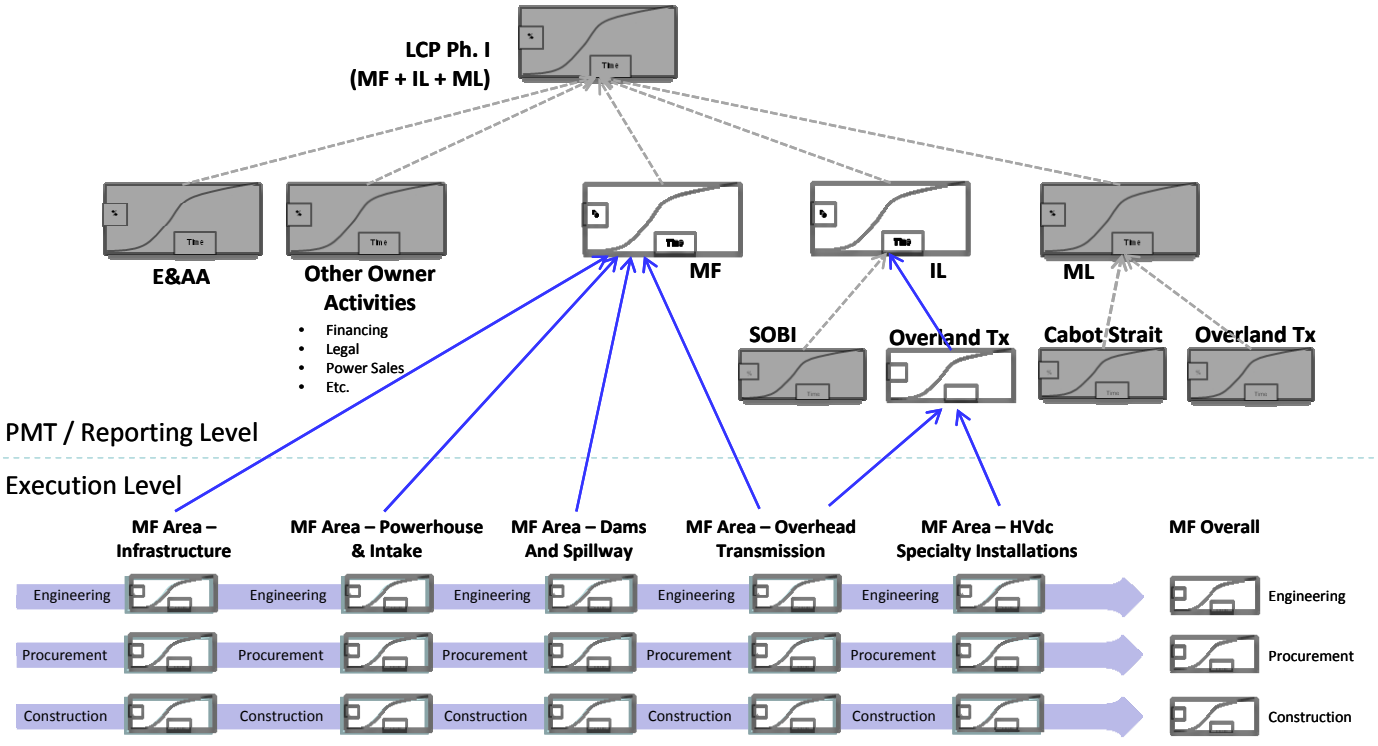
Controls, Engineering Management, HSE Management, Document Control, and indirect craft support functions) are to be excluded from the contractor's calculated progress.

Progress measurements will be made in such a manner that the physical progress can be related easily to the IPS. Progress shall be evaluated on discrete, identifiable deliverables for each major Project activity and weighted by budgeted work-hours or other measurable quantity to determine a total percent for each activity. Each deliverable will roll up to only one (1) activity in the IPS.

Physical progress is planned and weighted according to budget work-hours, or other measurable quantity, and aggregated to a defined total.

The EPCM Consultant will utilize its own system for progress measurement. This system must be reviewed in detail by the Project Controls Lead and agreed with the EPCM Consultant – preferably prior to contract award. EPCM Consultant will measure progress at a greater level of detail than reported to the PMT. However, an overall progress curve will be developed for each of the contracts with weightings determined after contract award, commensurate with the approved schedule and control plans. Once these weightings are determined, they shall not be changed during the course of the Project without a compelling reason to do so (i.e., change in work scope). Figure 23 provides an illustration of the planned Project Stewardship Progress Reporting on an Area Basis.

Figure 23: Project Stewardship Progress Reporting – Area Management Emphasis at Detail Level



ALL PROGRESS BASED UPON PHYSICAL ACHIEVEMENT OF WORK!
Deliverables, quantities, etc.

15.3 Resource Loading

A key ingredient for successful execution of a project within the planned timelines and approved budget is the mobilization of personnel. Accordingly, staffing mobilization charts will provide important leading information to the PMT. Mobilization charts will be required for the PMT and for the various sub-projects.

Similar to mobilization, effective resource utilization provides for the ability to execute work, influence workforce costs and potentially influence productivity and work scope conflict issues. When resource utilizations are higher than reasonable, there is an increased risk of schedule delay, increased costs (due to overtime) and an increased risk for error (which may result in health and safety issues), as well as an increased risk of workforce turnover. When resource utilizations are lower than reasonable, there is generally a productivity risk which translates into costs being higher than estimated.

Resource utilization charts, also known as resource histograms, will be prepared as necessary for each sub-project.

15.4 Overall Project Progress Calculation

Progress Measurement will be performed at three levels of detail, with lower levels rolling up to higher levels:

a. Overall summary level
b. Sub-project level
c. Sub-project section level

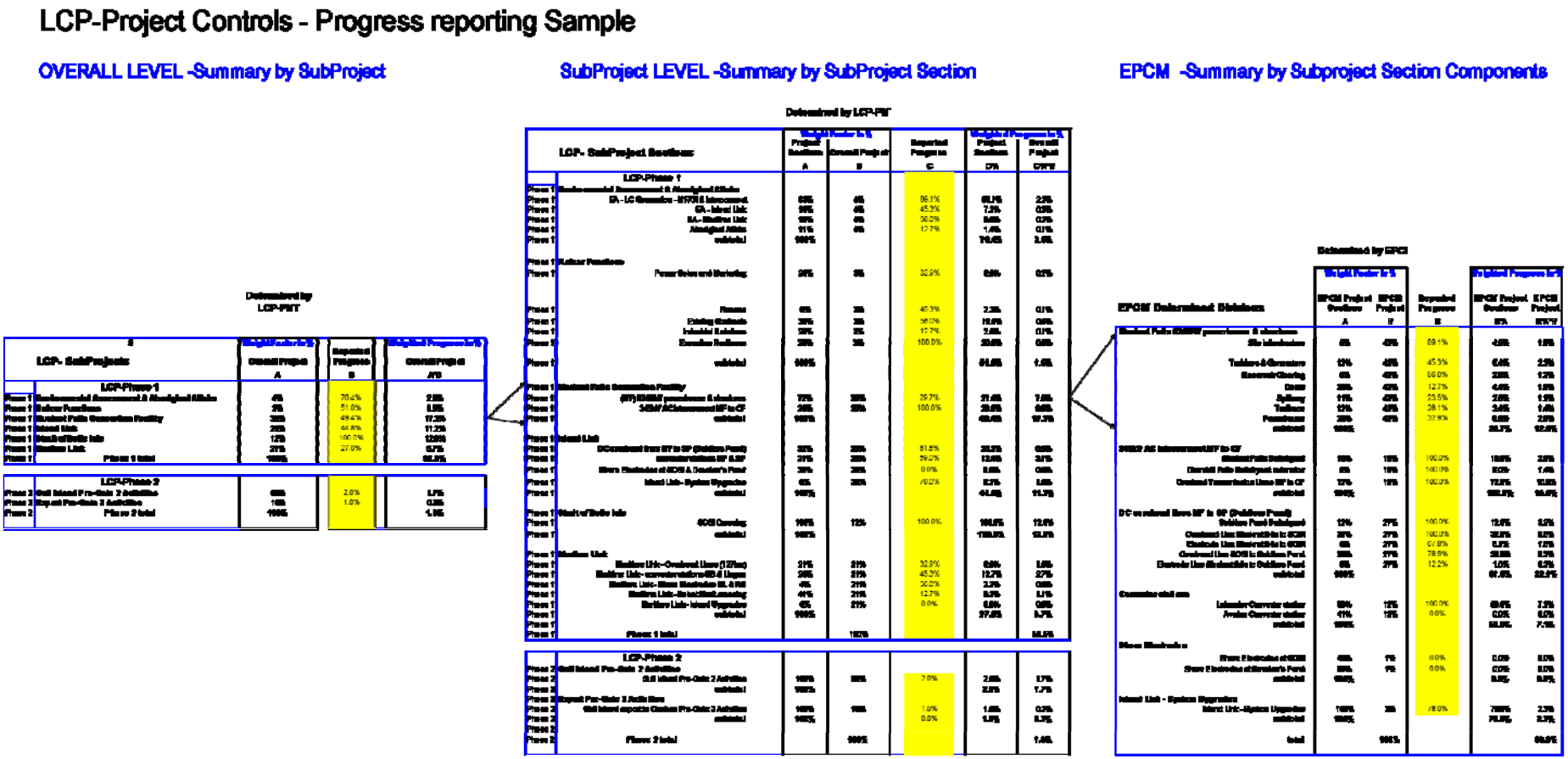
The overall summary level progress will be for the Project in its entirety, spanning both Project phases and all sub-projects.

Sub-project level progress will be based upon weighting and progress reporting at the section or major Project element level and totaled for the sub-project level.

Sub-project section level progress will be based upon weighting factors determined by the entity performing the work, as they are the closest to that level of work and best able to appropriately determine and apportion the relevant weighting.

A sample of the weighted progress roll-up method is shown in Figure 24.

Figure 24: Overall Progress Measurement (Sample)



16.0 Communications Plan and Reporting

16.1 Overall Monthly Progress Report

The Monthly Progress Report is a key vehicle for information transfer to all Project stakeholders and facilitates timely and consistent communication of data and forecasts. The purpose of this report is to document and communicate key aspects of Project status and outlook throughout the Project life. Charts, graphs and photos will be included, as appropriate. The Monthly Progress Report will be compiled by the Project Controls Lead, verified by the Project Services Manager and approved by the Project Director.

A typical table of contents for a Monthly Progress Report follows:

- Executive summary (including overall cost, schedule and progress)
- Regulatory safety, health and environment
- Sub-project summary (including cost, schedule, progress, staffing)
- Project team reporting
- Risk management
- Project change management
- Benefits
- Attachments

16.2 Monthly Cost and Schedule Stewardship Meeting

A focal point of the Cost and Schedule Stewardship Process (reference Section 8.2) is a monthly meeting to communicate cost and schedule activity to the PMT. These meetings will be chaired by the Project Services Manager and facilitated by the Projects Controls Lead. This meeting is divided into two (2) sections, one for the Project Controls Lead to report on the overall Project and the other for the Cost and Schedule Stewards to report upon their respective sub-project component(s). Prior to the meeting, a package will be prepared and distributed that will contain cost, schedule and progress information (“one-page” summaries).

The objectives of the monthly cost and schedule stewardship meeting will be to:

- Identify cost and schedule drivers
- Identify opportunities and vulnerabilities
- List and assign action items
- Foster an environment to make the best general interest decisions
- Execute the Project in an active, cost conscious environment
- Eliminate cost and schedule surprises

Cost Review

The Project Controls Lead will discuss the Project's overall status, while the Cost and Schedule Steward will discuss sub-project component(s). These discussions will include the following:

- Summary charts at the Project and sub-project levels that show the cumulative effect of monthly changes.
- Trends, such as contingency rundown versus change activity and forecast growth.
- The effect of cost reduction on achieving cost targets and the estimate-to-complete.
- Commitments, work-in-place, expenditures and current forecast compared to AFE totals.
- Overall cost performance against budget
- Risks and opportunities
- Other pertinent issues that may arise

The focus for the Area / Scope Managers (i.e. Cost and Schedule Stewards) is to:

- Obtain management approval of monthly forecast changes.
- Discuss cost activities (such as changes, commitments, work-in-place, and expenditures).
- Bring forward new cost reduction opportunities and update existing opportunities.
- Expose potential cost vulnerabilities and update and report status of existing vulnerabilities.

The process entails communicating both what the cost drivers are and an awareness of early indicators for opportunities to capture and / or risk areas to mitigate.

The cost review section will address schedule impacts that drive cost. These differences include management of interfaces, critical path management and overall Project progress as well as schedule recovery if required.

Schedule/Progress Review

The Project Controls Lead will discuss the Project's overall status, while the Scope Manager (i.e. Cost and Schedule Steward) will discuss sub-project component(s). These discussions will include the following:

- Variations to milestones
- Progress
- Critical and sub-critical path(s)
- Front-lined schedules
- Schedule effects due to current changes
- Risks and opportunities

16.3 Monthly Meetings with Sub-project Management

Monthly meetings will be held with sub-project management teams to discuss all elements of Project Controls.

16.4 Change Management Stewardship Meeting

The Change Control Board, established by the Project Director, will serve to determine the validity and impacts of potential/pending (outstanding) PCN's. Assessments will be made by the Change Control Board to determine whether consideration of each outstanding PCN is to be further progressed beyond its current status, implemented or rejected. For PCN's considered to merit ongoing consideration, assessments of the impacts will also be made by the Change Control Board.

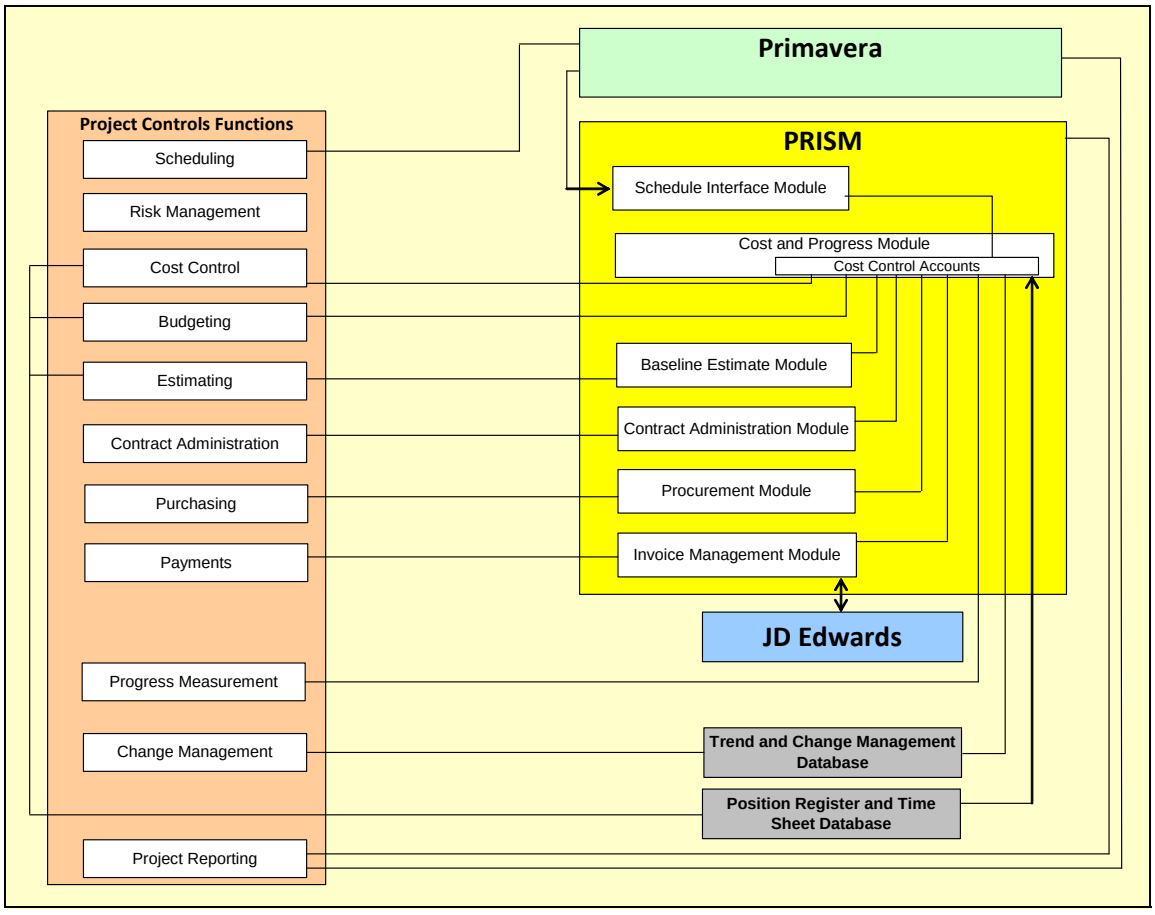
Reference document LCP-PT-MD-0000-PM-PL-0002-01 Project Change Management Plan for further details on this process.

17.0 Tools Used to Support the Delivery of Project Control Objectives

In order to perform its primary functions, as shown on the left of Figure 25 below, Project Controls utilizes a number of different tools including Oracle's Primavera, PRISM Project Manager from Ares Corporation, JD Edwards and a number of in-house developed MS-Access databases and reporting tools.

Note: The EPCM Consultant and Contractors will utilize their own processes and systems and where required, will interface with Project Controls systems. This interface will be either by hard or soft linkage. (Reference Figure 16 details on the interface of PRISM with SNC Lavalin's PM+

Figure 25: Interface of suite of Project Controls tools



Primavera is used to manage Project planning and scheduling as well as track work progress. For CCA's that have been designated to have a schedule interface, there is an interface in place between Primavera and PRISM that allows for the automated updating of cost forecasts and progress.

PRISM Project Manager is the main tool used by Project Controls to record, track and report on Project costs. It consists of a number of related modules including schedule interface, cost & progress, estimating, contract administration, procurement and invoice management. Within PRISM, Project progress can be tracked and reported in a number of different ways such as manual, schedule, cost, and quantity.

JD Edwards is the Nalcor corporate financial management system. In conjunction with PRISM it tracks Project costs and is the system through which payments are made on behalf of the Project by Nalcor. It is also the system that Nalcor employees enter their time so that time costs can be transferred back to PRISM. At this time the data transfer between JDE and PRISM involves a monthly download of JDE data which is and manually entered into PRISM by Project Controls. Similarly data that needs to be transferred from PRISM to JDE also involves a manual process.

In addition to these three (3) main tools, Project Controls has also developed a number of in-house databases and reporting tools using MS-Access. These include the ***"Position Register"*** which maintains organizational information including position numbers, staff assignments, rates and position history. This database is also used to produce the Project organizational charts. In addition to the "Position Register" is the ***"Timesheet Database"*** in which all contract employees enter their time on a weekly basis. These timesheets are used to calculate actual personnel costs as well as forecast future costs related to contract employees.

Project Controls has also developed the ***"Trend and Change Management Database"*** which is used to record Project Trends and change requests. This database is currently under review and will be updated / upgraded as required.

The final database currently in use is the ***"PRISM Cost Reporting System"***. Newly developed to give Project Controls more flexibility in developing and presenting cost reports from outside of the PRISM system utilizing the data tables maintained with PRISM.

18.0 Project Close-out

18.1 Contractor Close-Out Reports

No later than sixty (60) days after contract completion date, each contractor will prepare and submit a final contract report for their portion of the work. The detailed contents and format of this report shall be agreed between the contractor and NE-LCP PMT. To the extent practical, the final contract report will build on the standard report which the contractor might typically prepare for its internal documentation. One section of this report will be devoted to an analysis of overall job execution citing those actions by both contractor and NE-LCP PMT that: 1) enhanced performance or 2) interfered with or detracted from achieving desired results. It should contain photographs depicting significant activities and general progress at all work sites. Care should be taken to ensure that the preparation of the final contract report is an ongoing activity during the life of the Project.

18.2 Project Management Close-Out Report

In addition to the close-out reports developed by each of the contractors, the NE-LCP PMT will prepare a Project Management close-out report. This report will document the results of the efforts of the NE-LCP PMT and all contracted resources used in carrying out the Project. It will also describe the evolution (technical, execution, cost and schedule) of the Project from the Gate 2 estimate through to completion.

The purpose of this report is to: 1) capture actual results, 2) provide reconciliation against earlier estimates and 3) provide support for development of estimates for future projects. The report will summarize the entire Project including items such as lessons learned, cost, and progress. Each sub-project and functional area is responsible for capturing the information and data, archiving it as the Project progresses and submitting it to the Project Controls Lead in the form of a completed summary for the applicable portion of the Project. The Project Controls Lead is responsible for collecting input from the various areas and publishing the final report. The report will include the following:

- Summary – business purpose of the Project
- Project history – overview of Project evolution
- Lessons learned – by function or component
- Facilities – brief description of what was constructed
- Schedule – summary bar chart schedule of actual vs. planned
- Cost – budget history and actual information
- Organization / manpower – organizational charts during all Gateway Phases
- HSE performance
- Quality – quality program summary and results
- Engineering – brief description of engineering effort and drawings produced during each phase

- Procurement / materials management – scope of materials management program, procurement strategy
- Contracting – final WBS, contracts issued, change orders, performance results
- Construction – key methods employed, results, design changes, innovations
- Start-Up – overview of start-up planning, production rates
- Financial – update on the Project economics, changes and major drivers
- Controls / audit / accounting – project control systems used and results
- Regulatory – overview of regulatory and permitting activities
- Operations – operations philosophy
- Joint venture agreements – chronology of events
- Project reviews – dates and brief summary of findings

A.0 Activity Flowchart (Excel Format)

A.1 N/A

B.0 Attachments/Appendices

B.1 Nalcor Energy – EPCM Consultant Interface Business Process Maps

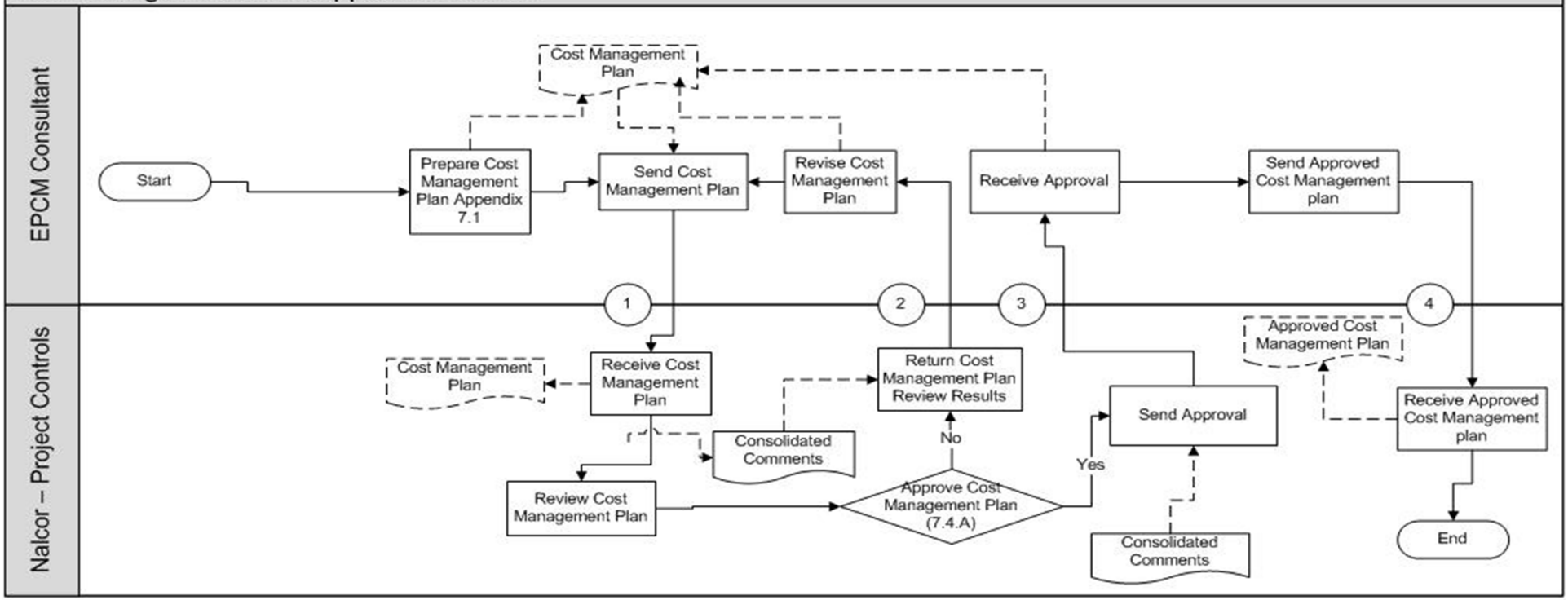
Attachment B.1

Nalcor Energy – EPCM Consultant Interface Business Process Maps

Nalcor Energy – Lower Churchill Project EPCM Services Contract – Contract Management Process Maps

Project Controls – Cost Management

Cost Management Plan Approval Process



Exchange Interface

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Possible Exchange Interfaces

Conversation
Electronic (Standard MS Office Tools)
Hard Copy
Native Format
PDF
Signed Approval
Signed Letter
Transmittal

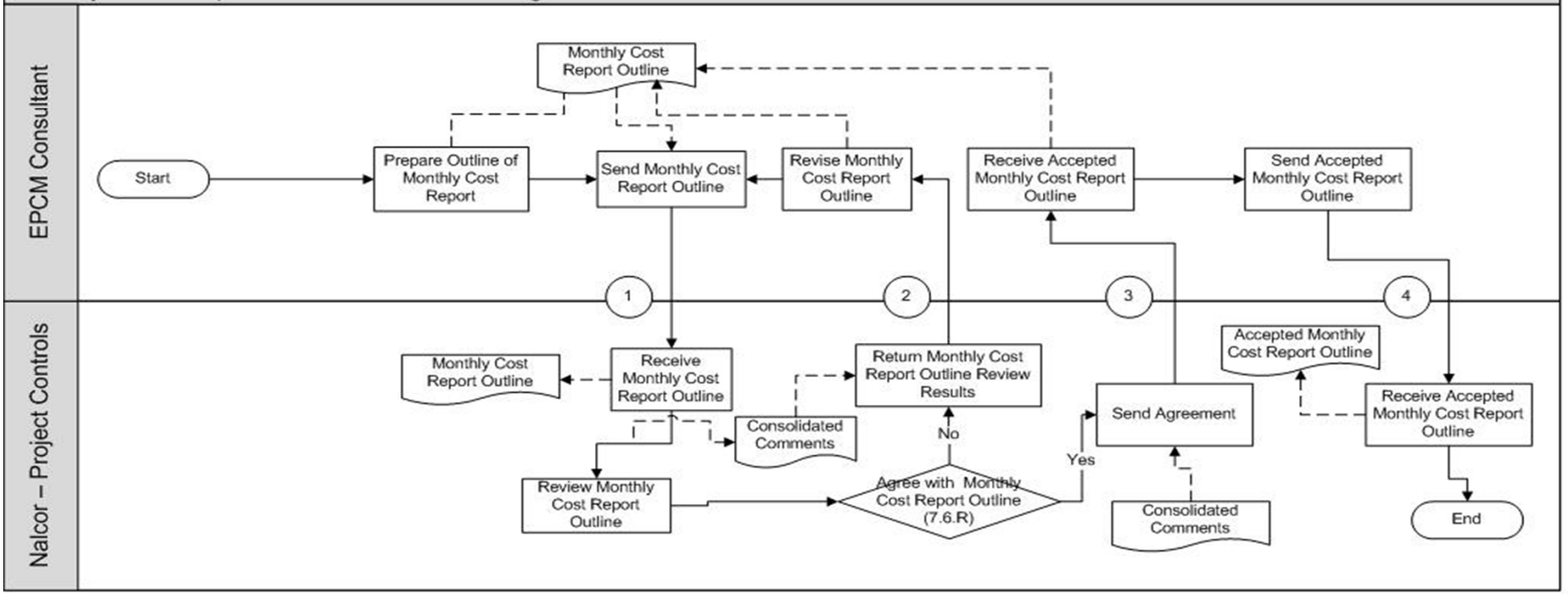
Legend

- A document
- A Revision Controlled Document
- Job to be performed
- Job(s) to be performed Collapsed
- Decision
- Sequence Flow
- Read Data
- Write Data
- Data

Nalcor Energy – Lower Churchill Project EPCM Services Contract – Contract Management Process Maps

Project Controls – Cost Management

Monthly Cost Report Format & Content Agreement Process



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Possible Exchange Interfaces

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Electronic (Standard MS Office Tools)
Hard Copy
Native Format
PDF
Signed Approval
Signed Letter
Transmittal

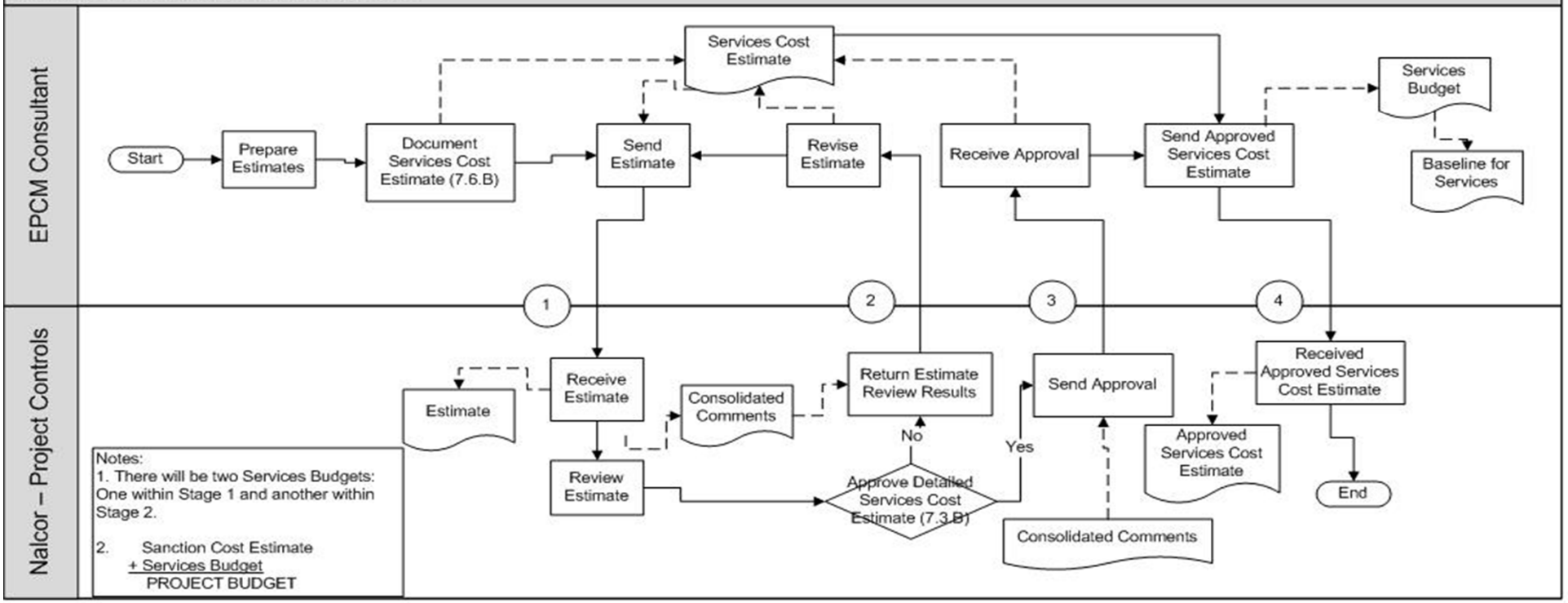
Legend

- A document
- A Revision Controlled Document
- Job to be performed
- Job(s) to be performed Collapsed
- Decision
- Sequence Flow
- Read Data
- Write Data
- Data

Nalcor Energy – Lower Churchill Project EPCM Services Contract – Contract Management Process Maps

Project Controls – Cost Management

Services Cost Estimate Process



Exchange Interface

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4. Electronic, PDF

Possible Exchange Interfaces

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Electronic (Standard MS Office Tools)
Hard Copy
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Signed Approval
Signed Letter
Transmittal

Legend

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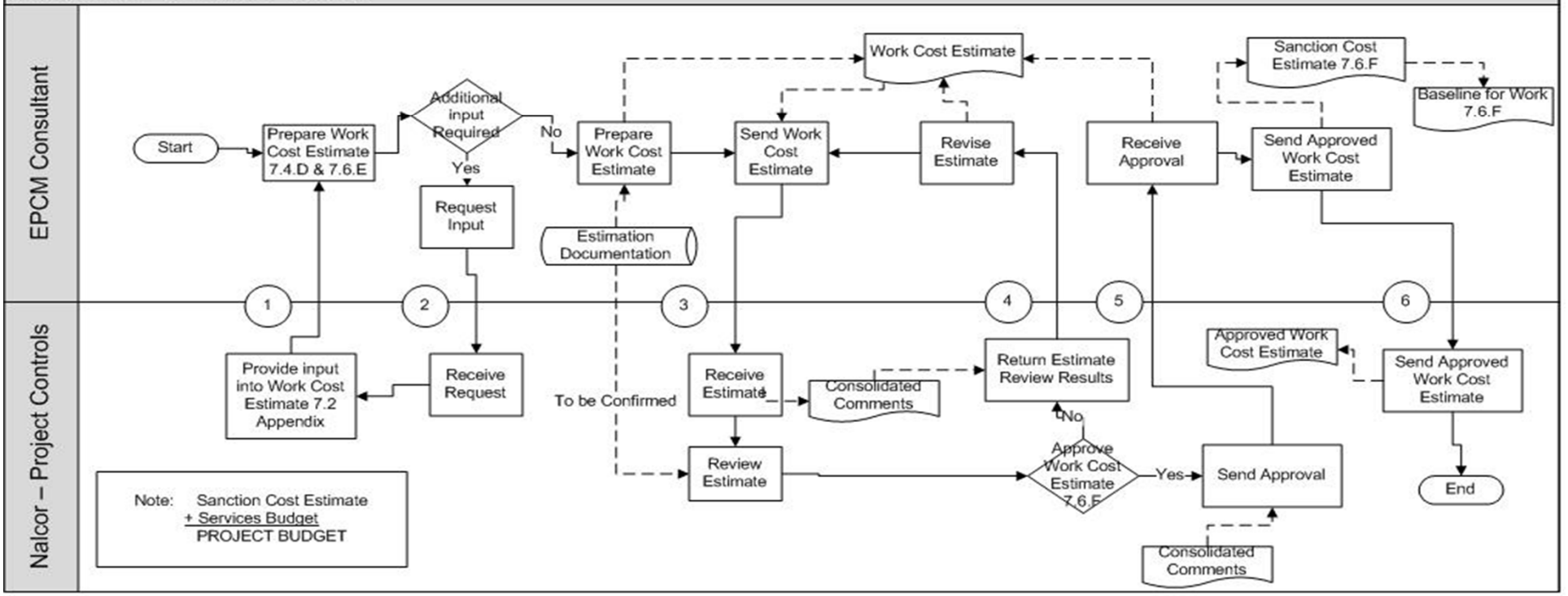
- A Revision Controlled Document
- Job to be performed
- Job(s) to be performed Collapsed
- Decision
- Sequence Flow
- Read Data
- Write Data
- Data

Nalcor Energy – Lower Churchill Project EPCM Services Contract – Contract Management Process Maps

Project Controls – Cost Management

Work Cost Estimate Process



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Possible Exchange Interfaces

Conversation
Electronic (Standard MS Office Tools)
Hard Copy
Native Format
PDF
Signed Approval
Signed Letter
Transmittal

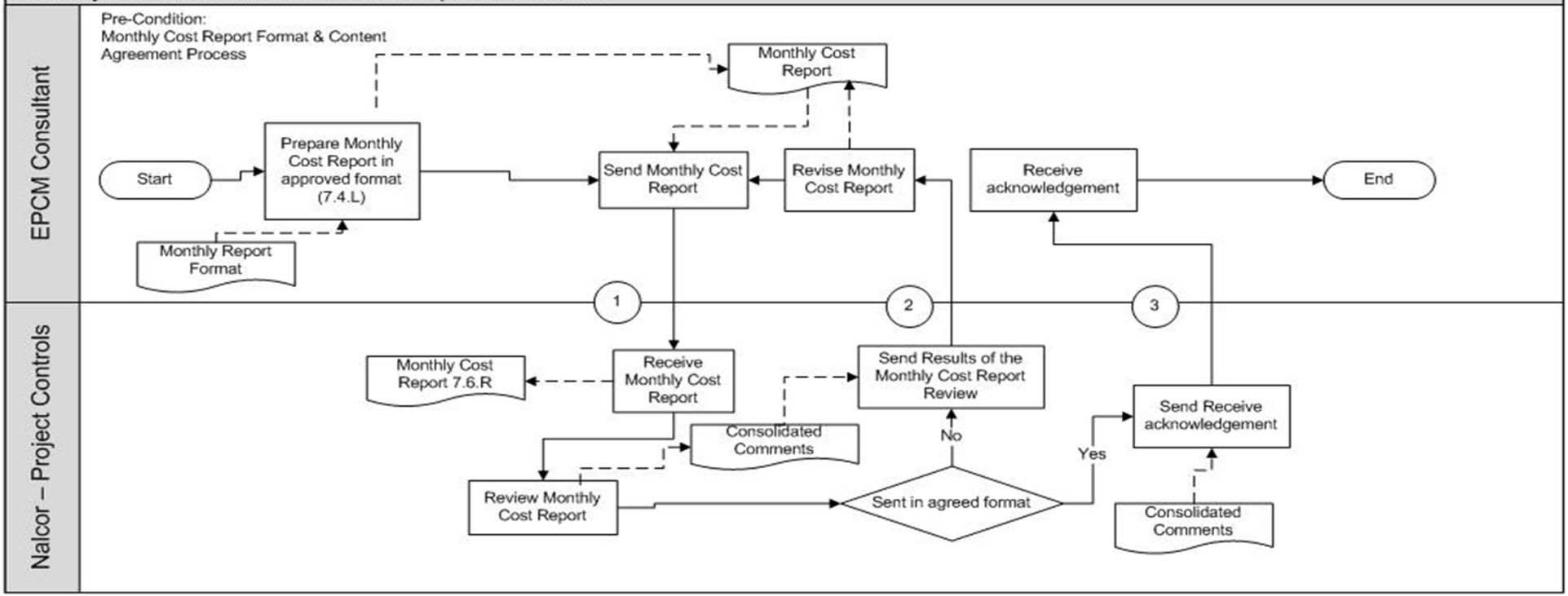
Legend

- A document
- A Revision Controlled Document
- Job to be performed
- Job(s) to be performed Collapsed
- Decision
- Sequence Flow
- Read Data
- Write Data
- Data

Nalcor Energy – Lower Churchill Project EPCM Services Contract – Contract Management Process Maps

Project Controls – Cost Management

Monthly Services & Work Cost Report Process



Exchange Interface

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2 Electronic

3 Transmittal

Possible Exchange Interfaces

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Electronic (Standard MS Office Tools)
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Native Format
PDF
Signed Approval
Signed Letter
Transmittal

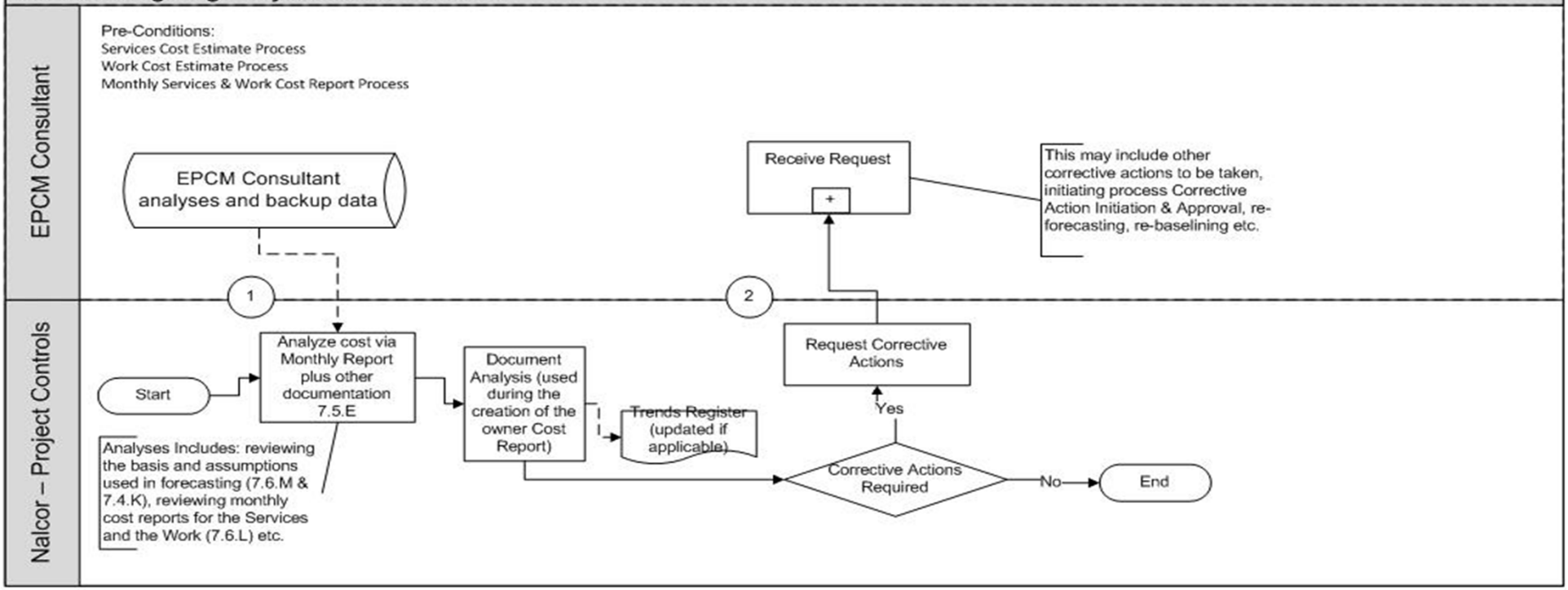
Legend

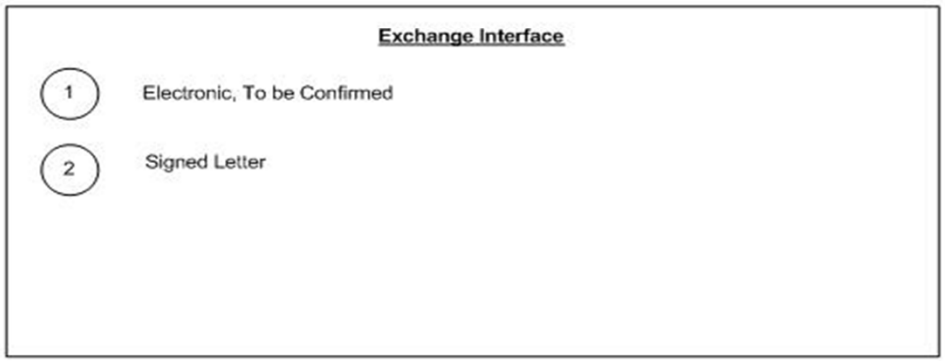
A document
A Revision Controlled Document
Job to be performed
Job(s) to be performed Collapsed
Decision
Sequence Flow
Read Data
Write Data
Data

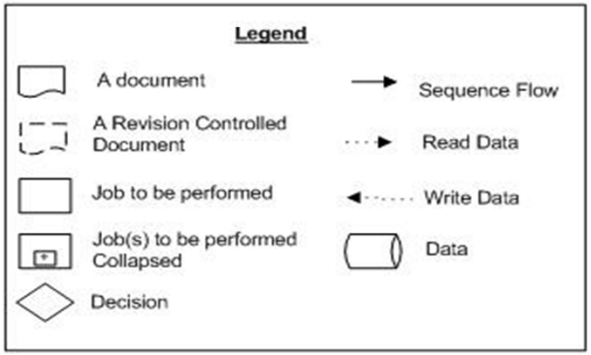
Nalcor Energy – Lower Churchill Project EPCM Services Contract – Contract Management Process Maps

Project Controls – Cost Management

Monitor on-going Project Cost Process



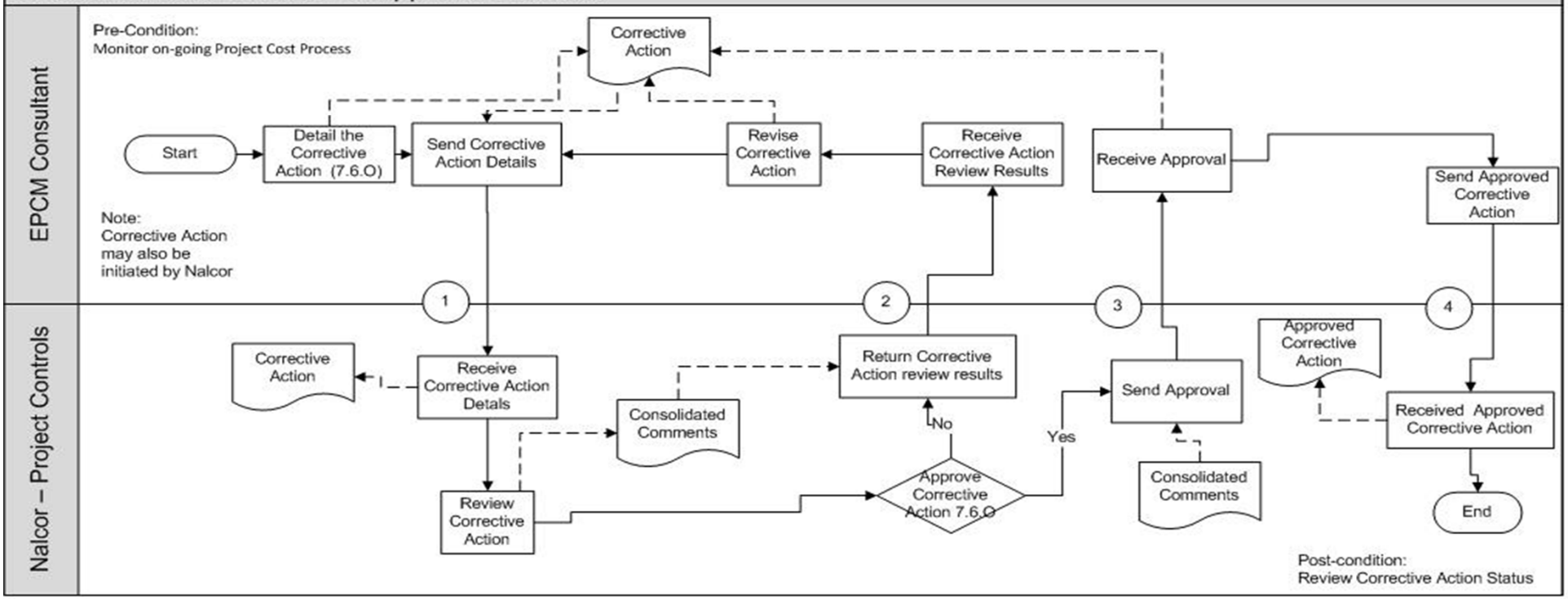




Nalcor Energy – Lower Churchill Project EPCM Services Contract – Contract Management Process Maps

Project Controls – Cost Management

Corrective Action Initiation & Approval Process



Exchange Interface

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Possible Exchange Interfaces

Conversation
Electronic (Standard MS Office Tools)
Hard Copy
Native Format
PDF
Signed Approval
Signed Letter
Transmittal

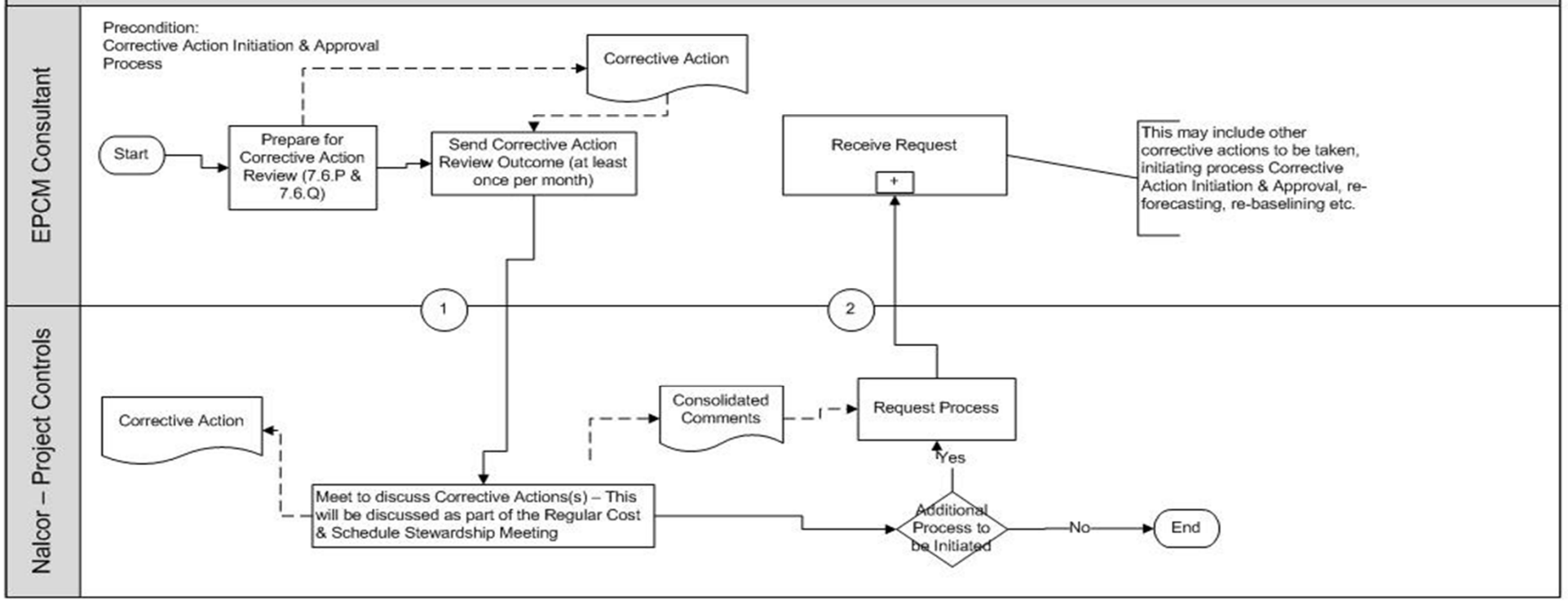
Legend

- A document
- A Revision Controlled Document
- Job to be performed
- Job(s) to be performed Collapsed
- Decision
- Sequence Flow
- Read Data
- Write Data
- Data

Nalcor Energy – Lower Churchill Project EPCM Services Contract – Contract Management Process Maps

Project Controls – Cost Management

Review Corrective Action Status



Exchange Interface

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Possible Exchange Interfaces

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Hard Copy
Native Format
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Signed Approval
Signed Letter
Transmittal

Legend

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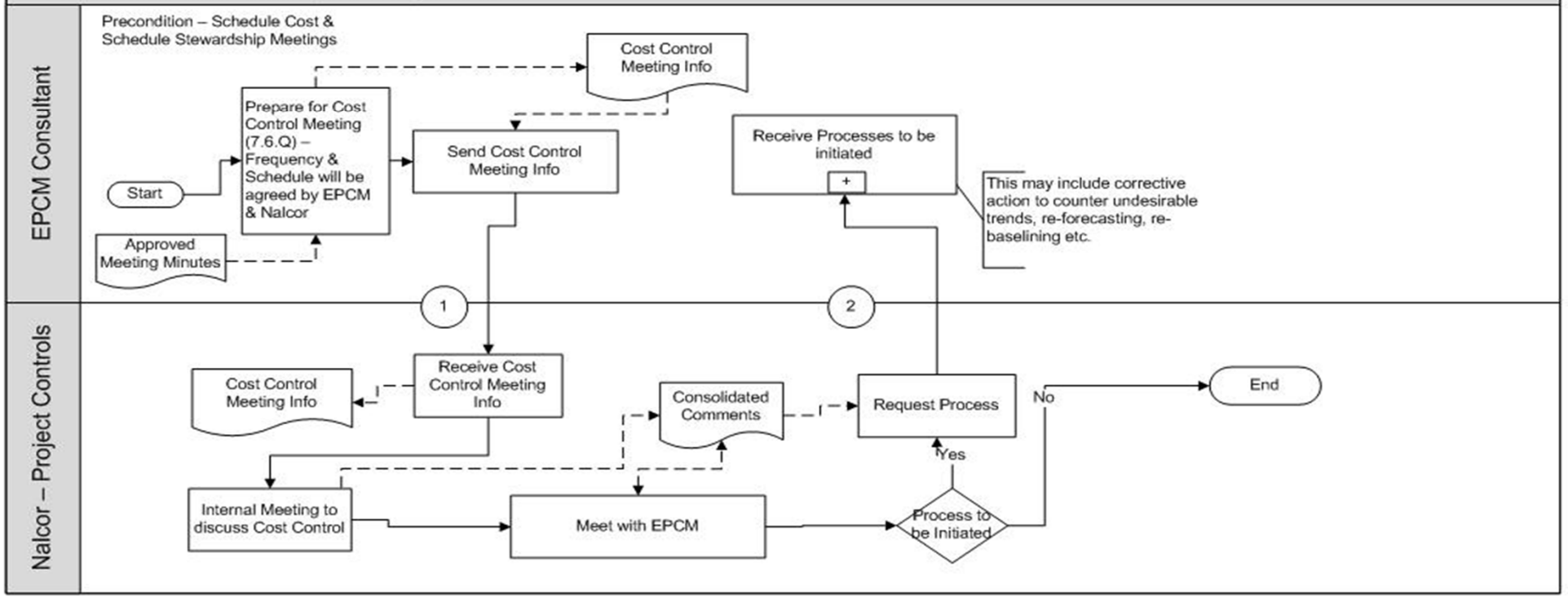
A Revision Controlled Document
Job to be performed
Job(s) to be performed Collapsed
Decision
Sequence Flow
Read Data
Write Data
Data

Nalcor Energy – Lower Churchill Project EPCM Services Contract – Contract Management Process Maps

Project Controls – Cost Management

Cost & Schedule Stewardship Meeting Process



Exchange Interface

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Possible Exchange Interfaces

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Hard Copy
Native Format
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Signed Letter
Transmittal

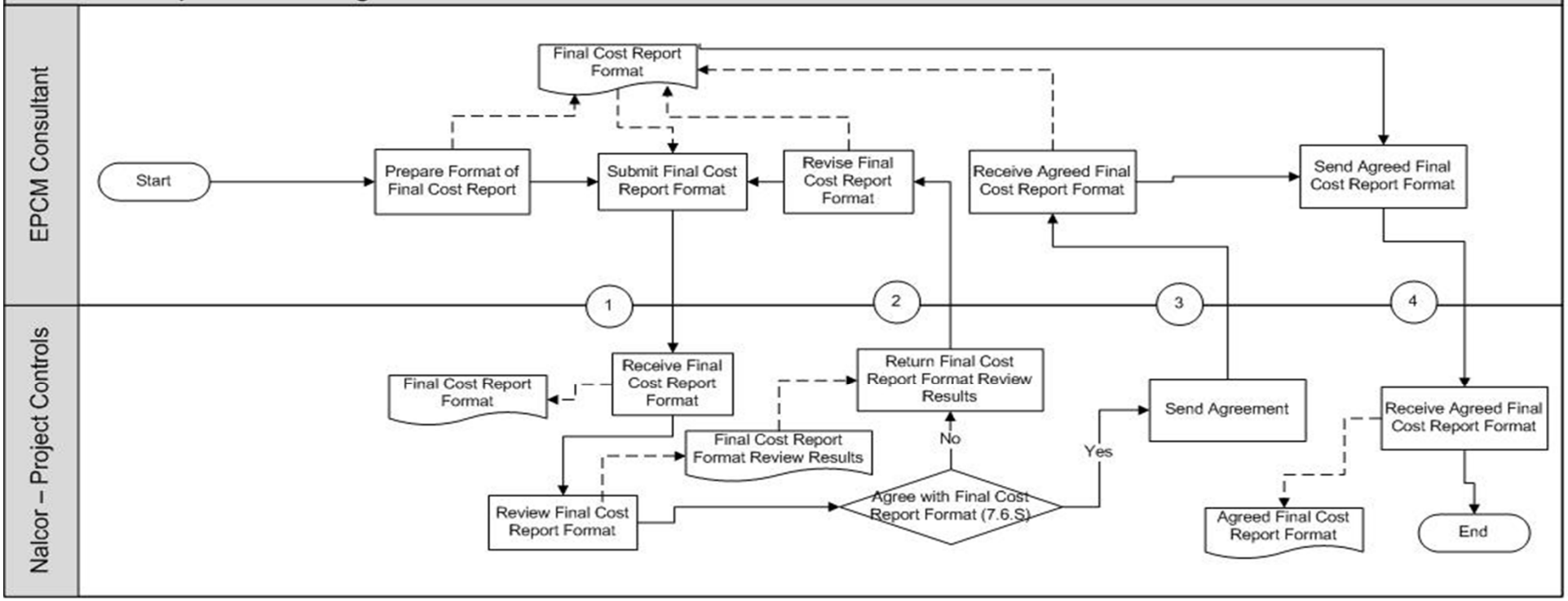
Legend

A document
A Revision Controlled Document
Job to be performed
Job(s) to be performed Collapsed
Decision
Sequence Flow
Read Data
Write Data
Data

Nalcor Energy – Lower Churchill Project EPCM Services Contract – Contract Management Process Maps

Project Controls – Cost Management

Final Cost Report Format Agreement Process



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Possible Exchange Interfaces

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Signed Approval
Signed Letter
Transmittal

Legend

- A document
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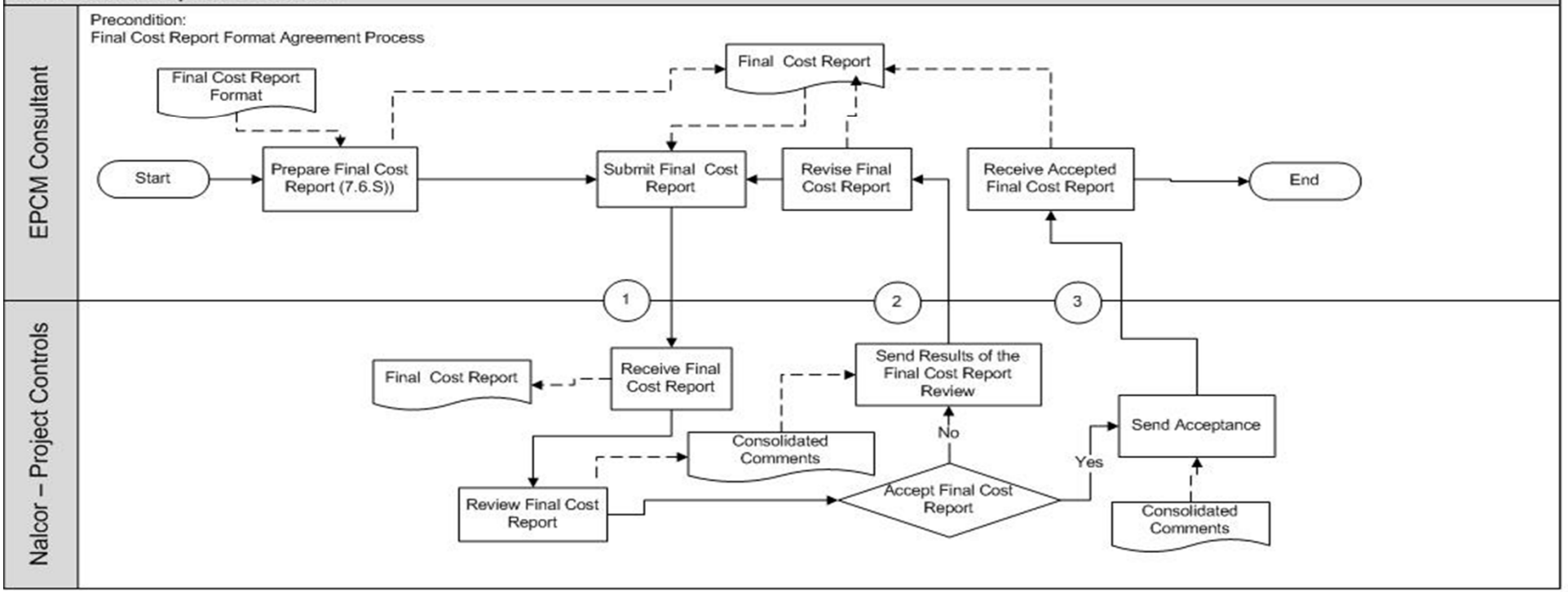
- Job to be performed
- Job(s) to be performed Collapsed
- Decision
- Sequence Flow
- Read Data
- Write Data
- Data

Nalcor Energy – Lower Churchill Project EPCM Services Contract – Contract Management Process Maps

Project Controls – Cost Management

Final Cost Report Process



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Signed Approval
Signed Letter
Transmittal

Legend

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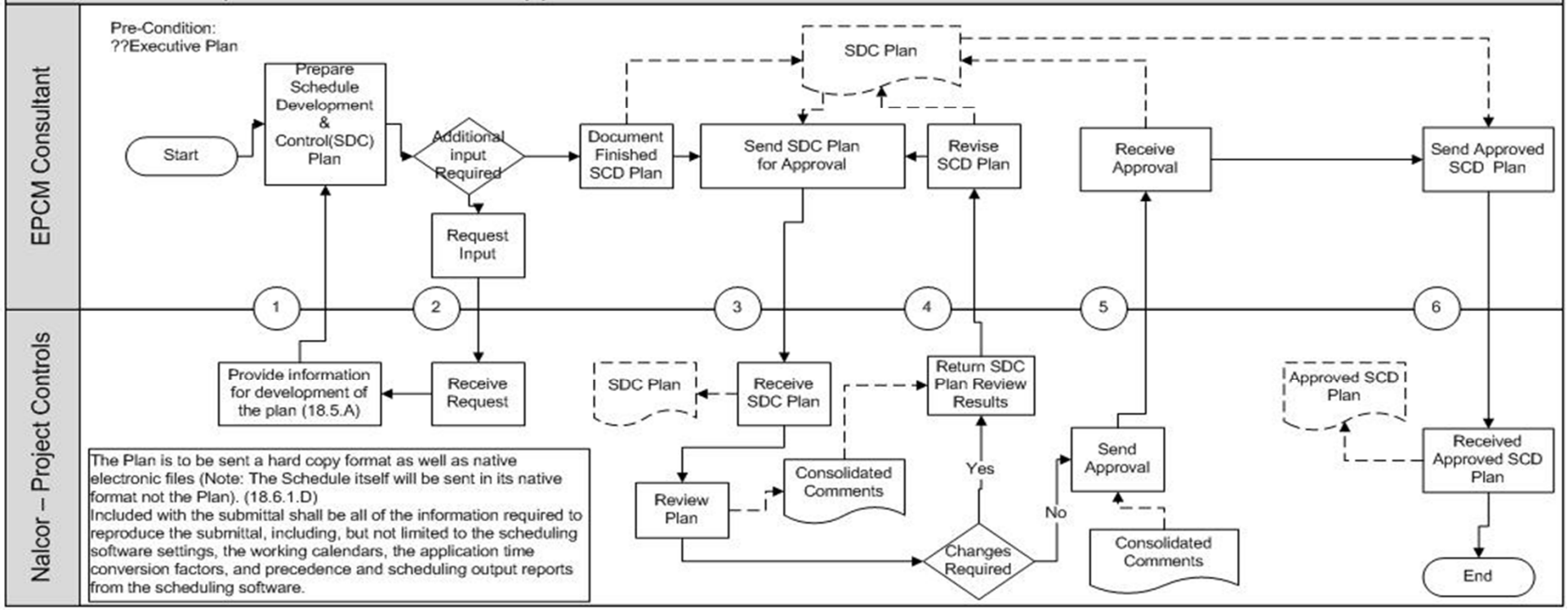
- Job to be performed
- Job(s) to be performed Collapsed
- Decision
- Sequence Flow
- Read Data
- Write Data
- Data

Nalcor Energy – Lower Churchill Project EPCM Services Contract – Contract Management Process Maps

Project Controls – Schedule Management

Schedule Development & Control Plan Approval Process



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Possible Exchange Interfaces

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Electronic (Standard MS Office Tools)
Hard Copy
Native Format
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Signed Approval
Signed Letter
Transmittal

Legend

- A document
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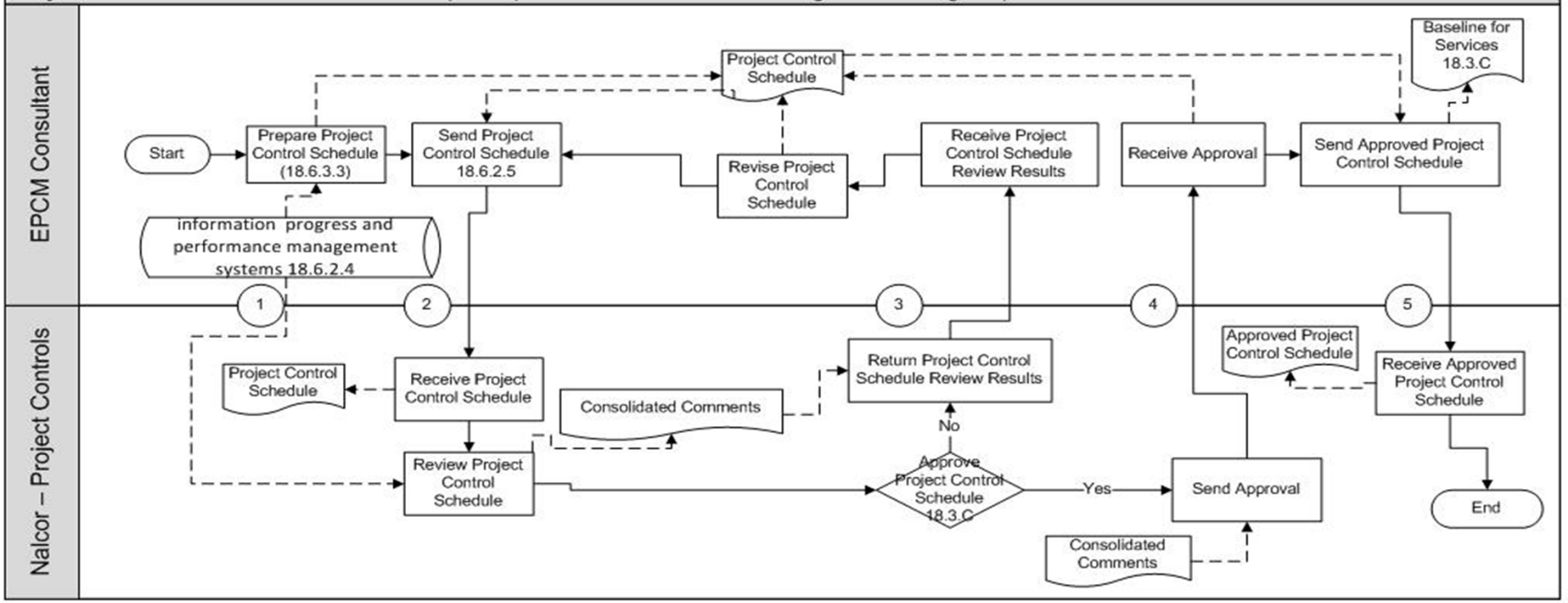
- Job to be performed
- Job(s) to be performed Collapsed
- Decision
- Sequence Flow
- Read Data
- Write Data
- Data

Nalcor Energy – Lower Churchill Project EPCM Services Contract – Contract Management Process Maps

Project Controls – Schedule Management

Project Control Schedule Process (Completed at the end of Stage 1 & Stage 2)



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Possible Exchange Interfaces

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Electronic (Standard MS Office Tools)
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Signed Letter
Transmittal

Legend

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- Job to be performed
- Job(s) to be performed Collapsed
- Decision
- Sequence Flow
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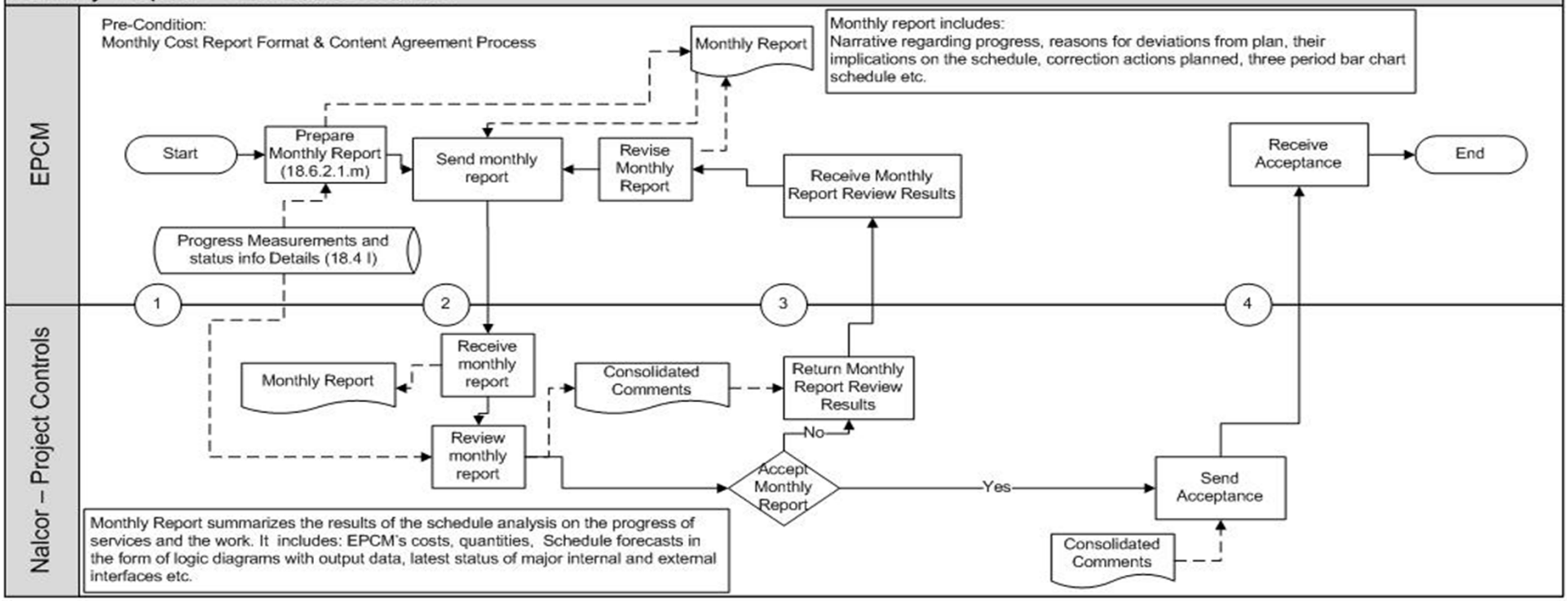
- Write Data
- Data

Nalcor Energy – Lower Churchill Project EPCM Services Contract – Contract Management Process Maps

Project Controls – Schedule Management

Monthly Report – Schedule Section



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Possible Exchange Interfaces

Conversation
Electronic (Standard MS Office Tools)
Hard Copy
Native Format
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Signed Approval
Signed Letter
Transmittal

Legend

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- A Revision Controlled Document
- Job to be performed
- Job(s) to be performed Collapsed
- Decision
- Sequence Flow
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- Write Data
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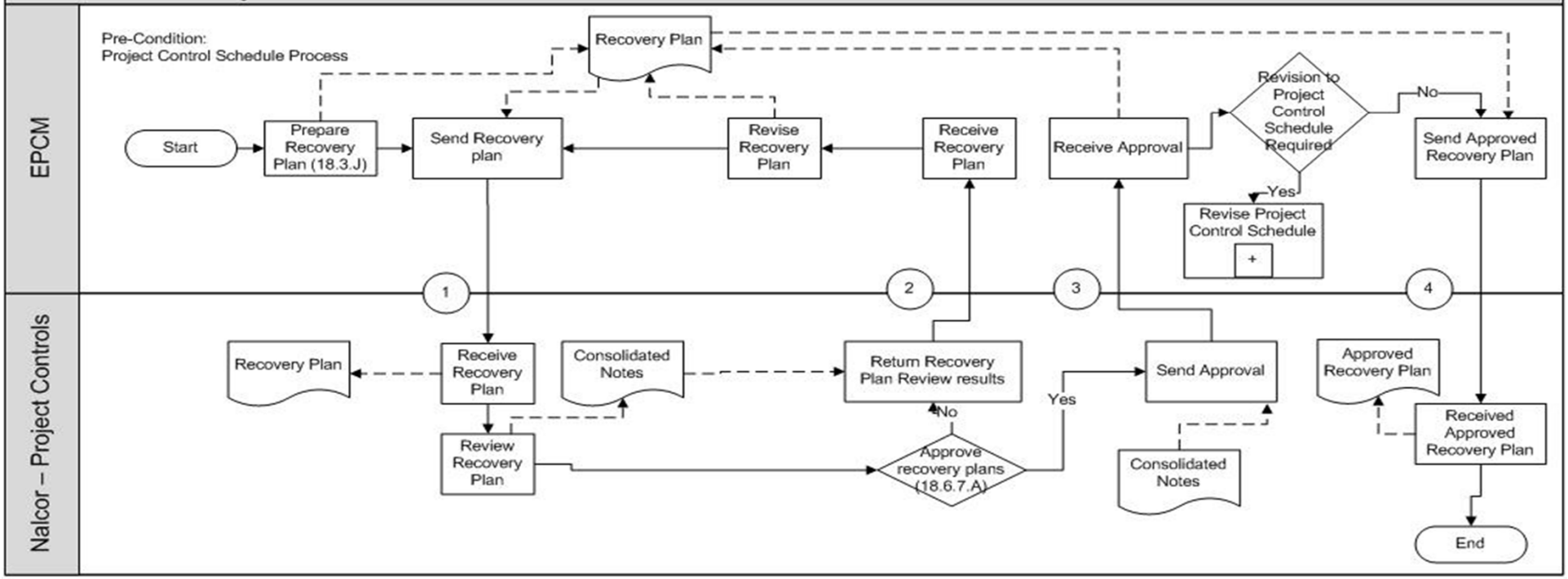
Nalcor Energy – Lower Churchill Project EPCM Services Contract – Contract Management Process Maps

Project Controls – Schedule Management

Schedule Recovery Plan Process



Exchange Interface

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Possible Exchange Interfaces

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Electronic (Standard MS Office Tools)
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Native Format
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Signed Letter
Transmittal

Legend

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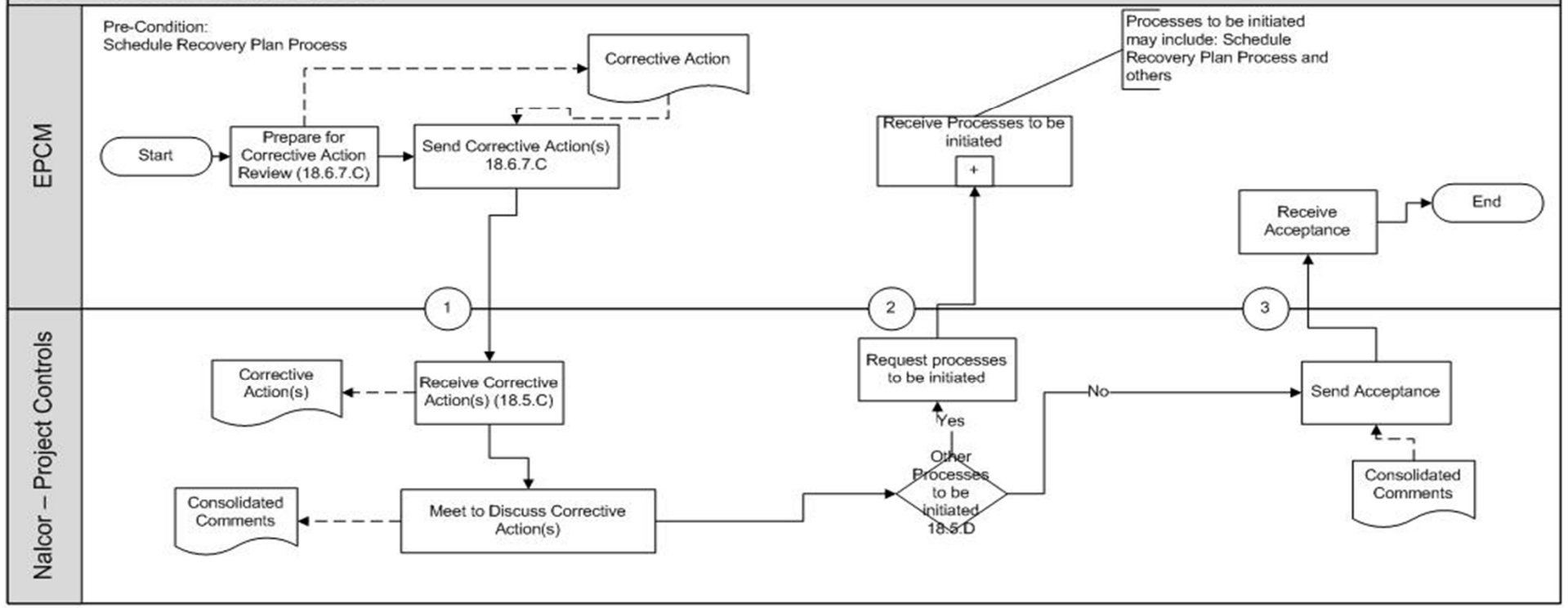
- Job to be performed
- Job(s) to be performed Collapsed
- Decision
- Sequence Flow
- Read Data
- Write Data
- Data

Nalcor Energy – Lower Churchill Project EPCM Services Contract – Contract Management Process Maps

Project Controls – Schedule Management

Review Corrective Action Process



Exchange Interface

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Possible Exchange Interfaces

Conversation
Electronic (Standard MS Office Tools)
Hard Copy
Native Format
PDF
Signed Approval
Signed Letter
Transmittal

Legend

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- A Revision Controlled Document
- Job to be performed
- Job(s) to be performed Collapsed
- Decision
- Sequence Flow
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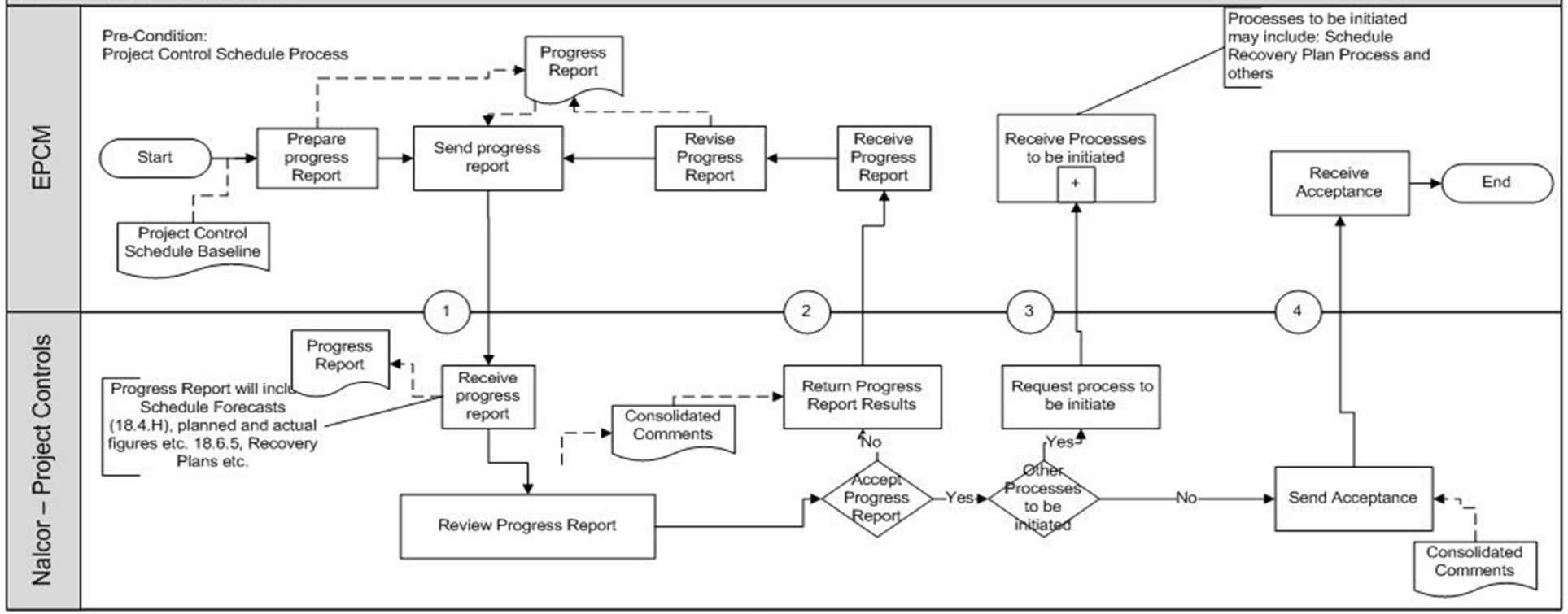
- Write Data
- Data

Nalcor Energy – Lower Churchill Project EPCM Services Contract – Contract Management Process Maps

Project Controls – Schedule Management

Periodic Updates Process



Exchange Interface

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Possible Exchange Interfaces

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Electronic (Standard MS Office Tools)
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Transmittal

Legend

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- Job(s) to be performed Collapsed
- Decision
- Sequence Flow
- Read Data
- Write Data
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Nalcor Energy – Lower Churchill Project

nalcor energy
LOWER CHURCHILL PROJECT

Project Risk Management Plan

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

Comments:	Total # of Pages (Including Cover):
This document supersedes MSD-RI-005 Strategic Risk Management Process	**33**

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
CONFIDENTIALITY NOTE:	This document contains intellectual property of the Nalcor Energy – Lower Churchill Project and shall not be copied, used or distributed in whole or in part without the prior written consent from the Nalcor Energy – Lower Churchill Project.						

Inter-Departmental / Discipline Approval (where required)

Department	Department Manager Approval	Date
Quality	D. Green	
Engineering	B. Barnes	
Supply Chain	P. Hussey	
Business Services	L. Clarke	
HSE	J. Kean	
Finance	M. Bradbury	June 22/11

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Jason Muise
nl
Jul 02, 2017 19:37

Table of Contents

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-0001-01for 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	Leads, Accountable, Consulted, Technical and Informed 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

- 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)

- 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

- 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

- 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

- 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	• 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	• 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	• 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

HYDRO
THE POWER OF COMMITMENT

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:

20 Dec 07	Date	18 Dec 07	Date	18 Dec 07	Date
Vice-President Lower Churchill Project		Project Manager Lower Churchill Project		Strategic Planning Lead Lower Churchill Project	

Figure 3: Risk-informed Decision Making Approach

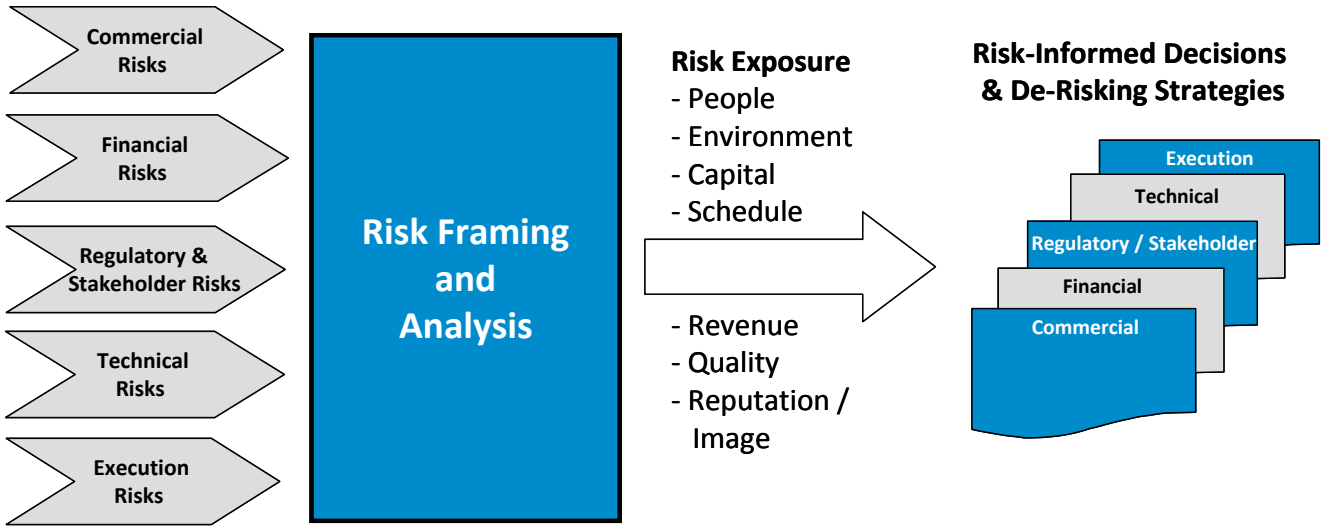
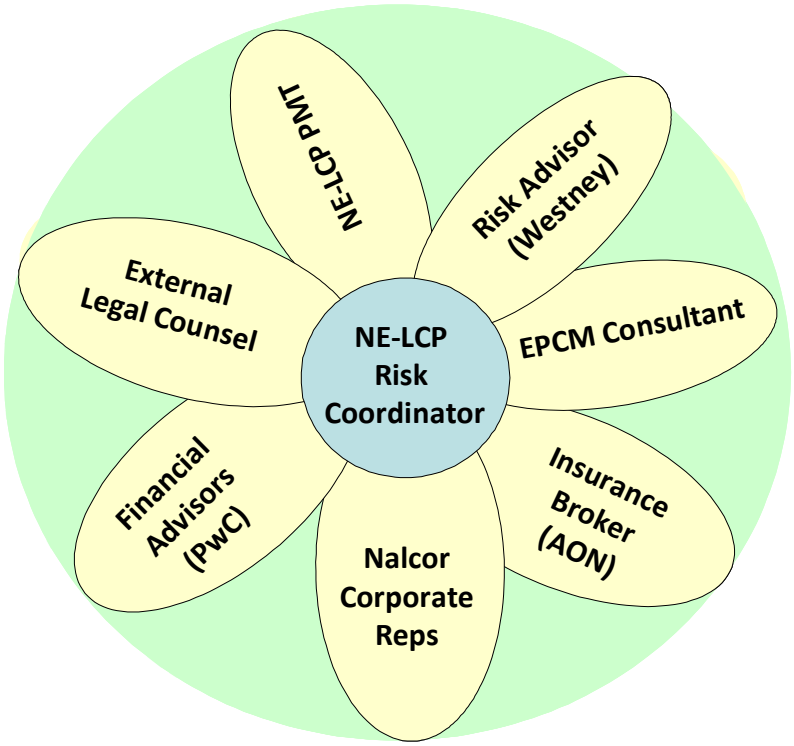


Figure 4: Risk Resolution Team Post Decision Gate 2

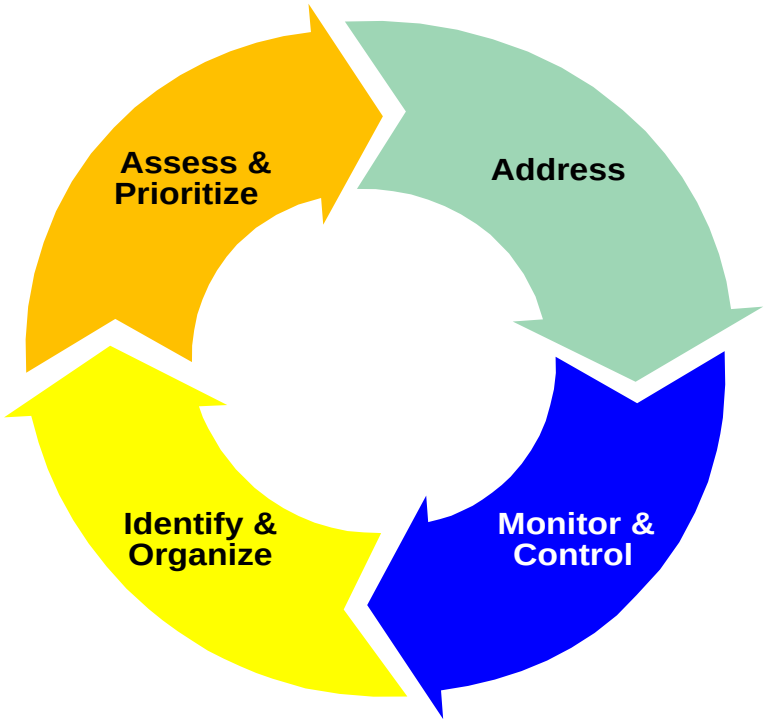


8.0 Overview of Risk Management Process

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.

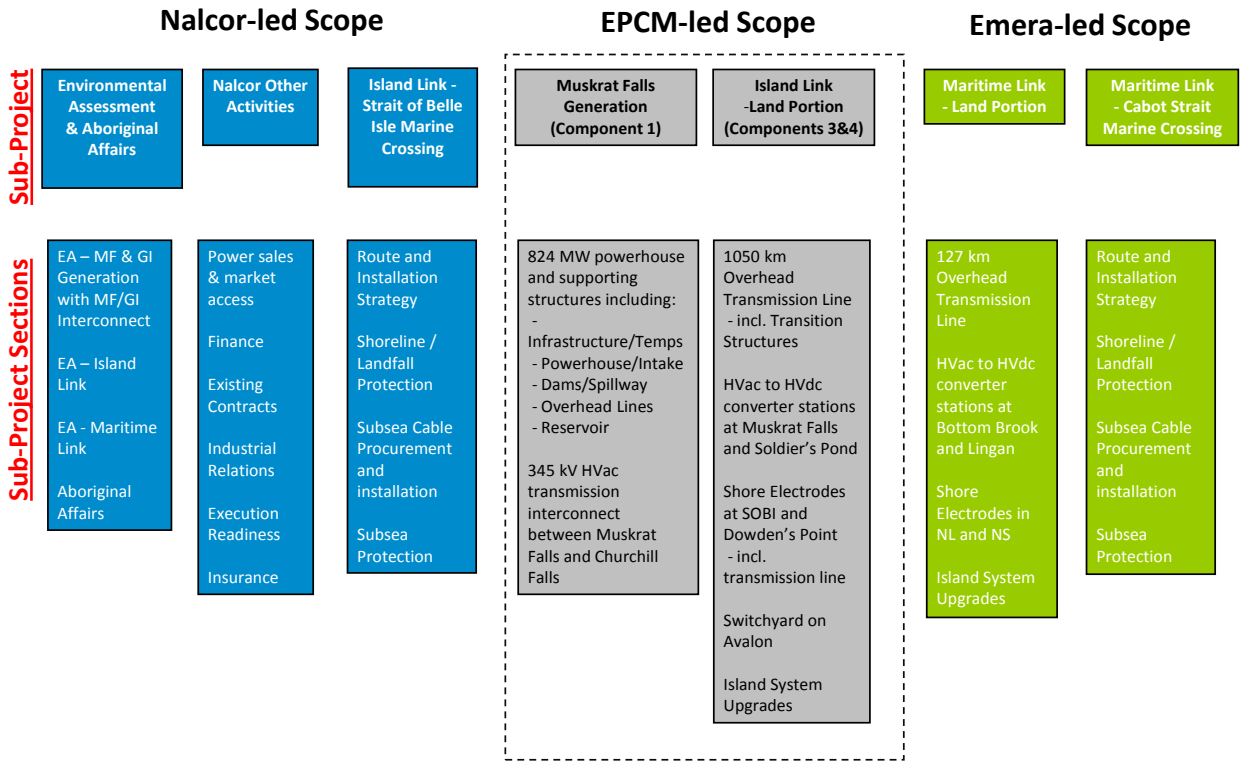
Step 4 – Monitor and Control Risks

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).

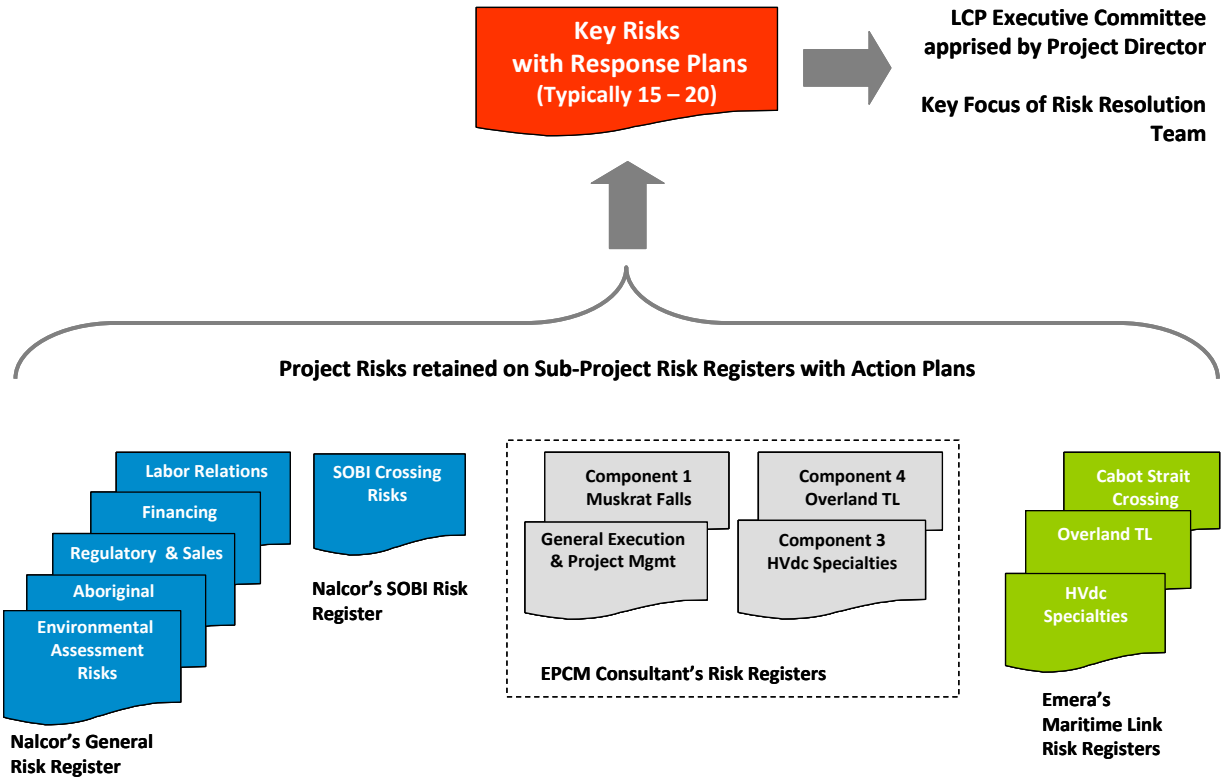
The EPCM Consultant will oversee sub-project risk registers pertaining to: Muskrat Falls Generation (Component 1), HVdc Specialties (Component 3), Overland Transmission (Component 4), and General Execution of Project Management within its area of responsibility.

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

Description of Activity	LCP Executive Committee	LCP Project Director	LCP Risk Resolution Team1	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.

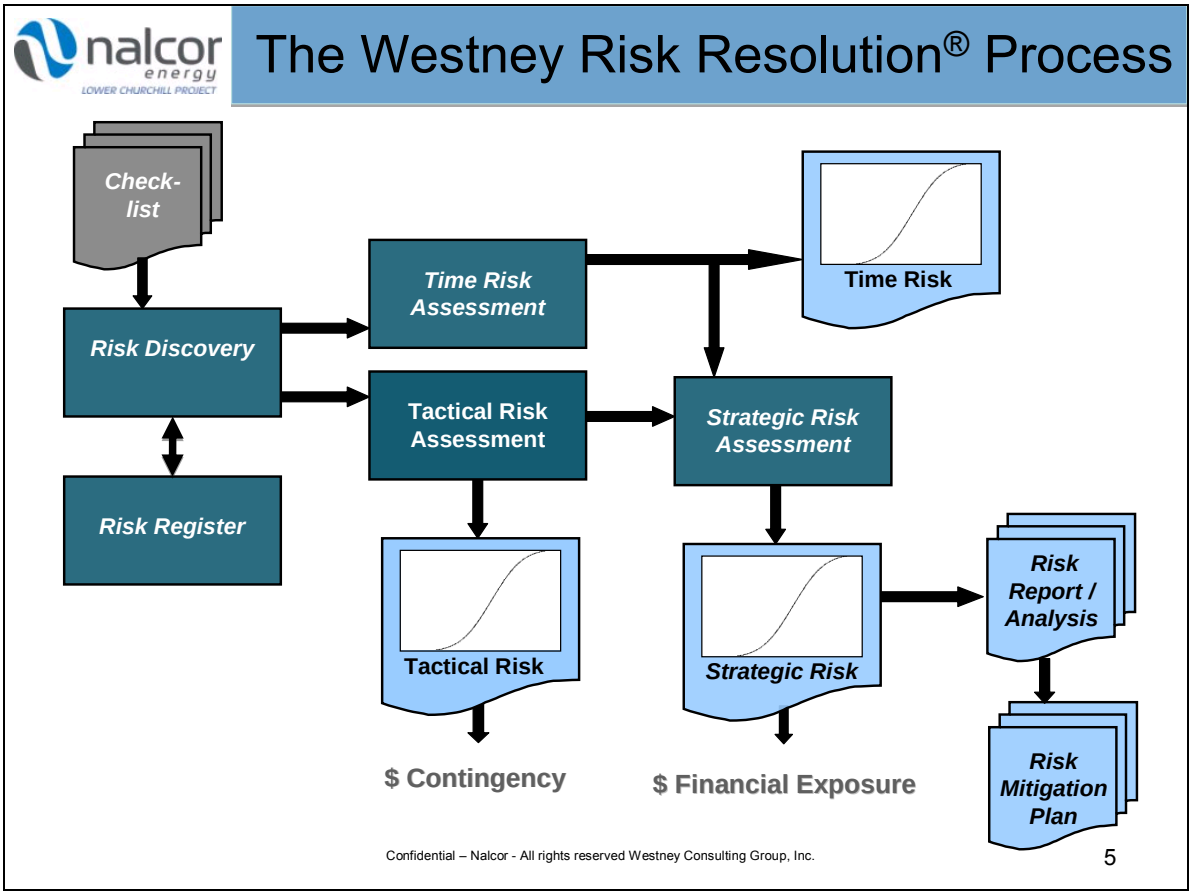
The NE-LCP Project Risk Coordinator, working with the Risk Advisor (Westney Consulting Group), will facilitate the discovery (document review and interviews) and workshop discussions associated with the Risk Assessments. It is intended that a broad range of project knowledge holders participate in the 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

Description of Activity	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

Description of Activity	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 techical 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

Description of Activity	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

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Key Risk Frame

Revised	

Risk #		Category		Current Risk Rating	

Risk Details

Lead	
Risk Description	
Specifics and Root Causes	
Consequence / Impact	
Early Warning Indicator of Risk Materialization	

Unmitigated / Raw Risk Exposure

Unmitigated Best Case Scenario	Basis:
	Exposure $M CDN:
Unmitigated Worst Case Scenario	Basis:
	Exposure $M CDN:

Risk Response

Management Strategy	
Action Plan	

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Key Risk Frame

Revised	

Risk #		Category		Current Risk Rating	

Risk Responsibilities (LACTI)

Unmitigated Risk Rating Rationalization

Residual Risk Exposure Following Implementation of Risk Response

Residual Risk Best Case Scenario

Basis:

Cost of Response $M CDN:

Residual Exposure $M CDN:

Residual Risk Worst Case Scenario

Basis:

Cost of Response $M CDN:

Residual Exposure $M CDN:

Residual Risk Rating Rationalization

Risk Trend and Status Update

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CIMFP Exhibit P-04012

Risk Identification Form

Risk Reference Number: | **Risk Group:** | **WBS Reference Number:** | **Risk Monitor**

Risk Name or Opportunity Description:

Risk Strategy: | **Risk Owner:**

Risk Rating: (reference Project Execution Risk and Uncertainty Ranking Martix)

Likelihood
- Intangeble
- Rare
- Unlikely
- Possible
- Probable
- Almost Certain

Opportunity or Threat:

Potential Consequence On Project Objectives

People (OHS)
- None
- Insignificant
- Minor
- Moderate
- Major
- Catastrophic

Environment (Physical)
- None
- Insignificant
- Minor
- Moderate
- Major
- Catastrophic

Capital Cost
- None
- Insignificant
- Minor
- Moderate
- Major
- Catastrophic

First Power Target Date
- None
- Insignificant
- Minor
- Moderate
- Major
- Catastrophic

Product Quality
- None
- Insignificant
- Minor
- Moderate
- Major
- Catastrophic

Reputation/Image
- None
- Insignificant
- Minor
- Moderate
- Major
- Catastrophic

Urgency
- Very Low
- Low
- Moderate
- High
- Extreme

Manageability
- Easy
- Manageable
- Hard
- Complex
- Extremely Difficult

Keywords:

Risk Action Plan

Potential Risk or Opportunity Response Plan:

Action:

Notes:

Originator and Discipline:

Location and Contact Details:

Action Due Date:

Date Logged:

Action Status:

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MONTHLY KEY RISK STATUS REPORT

ID	Title	Description	Risk Response Plan		Current Status
			Management Strategy	*Action Plan*	
R11	Submarine cable crossing of Strait of Belle Isle	As a result of the many firsts associated with installing a submarine cable across the SOBI, construction and installation challenges may occur, leading to significant cost and schedule exposure.	- Recognize the risks and challenges and evaluate all available opportunities as early as possible (pre Gate 2) in order to Avoid / Mitigate the risk.	- Perform due diligence with additional studies, in particular on trenching technology. - Engage the best consultants available in order to fully understand the subsurface conditions. - Complete a detailed geotechnical program for the area. - Understand the risk of cable loss due to icebergs and fishing activity. - Gather more marine data, i.e. currents, botto survey, geotech., etc. - eve a des with sparing so h sub arine cab in 2 differe rout . - Identi and m imize tallati difficulties. - Establish marine specialist capability within Nalcor. - Engage 2 suppliers in design competition for the preferred crossing solution and pay for it. - Build and test rock trenching equipment.	- Early review of available geotechnical and ocean currents is questioning the basis of the submarine cable option. Further evaluation is required. - Current construction schedule based upon completion of installation 1 year prior to in-service date. - Submarine option requires tunnel from each shore to deep water - 3-4km on Newfoundland side, 2-3 km on Labrador side. - Stattnet final cost estimate was double their original estimate and full of caveats. - A seismic and drilling program in the SOBI was carried out in 2009. - Detailed work completed in 2009 and 2010 have facilitated a better understanding of this risk, thereby reducing the likelihood of materialization. - Cable crossing method decided to be Horizontal Directional Drilling (HDD) at Labrador side and Island side to get down to deeper water. - Cable Protection will be via rock placement. - Ongoing design work is focussed on selected cable crossing method.

MUSKRAT FALLS GENERATION FACILITY AND LABRADOR – ISLAND TRANSMISSION LINK

OVERVIEW OF DECISION GATE 2 CAPITAL COST AND SCHEDULE ESTIMATES

Technical Note

Date: 10-August-2011
Rec. No. 200-160341-00003

[redacted]

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Contents

1.0 Purpose

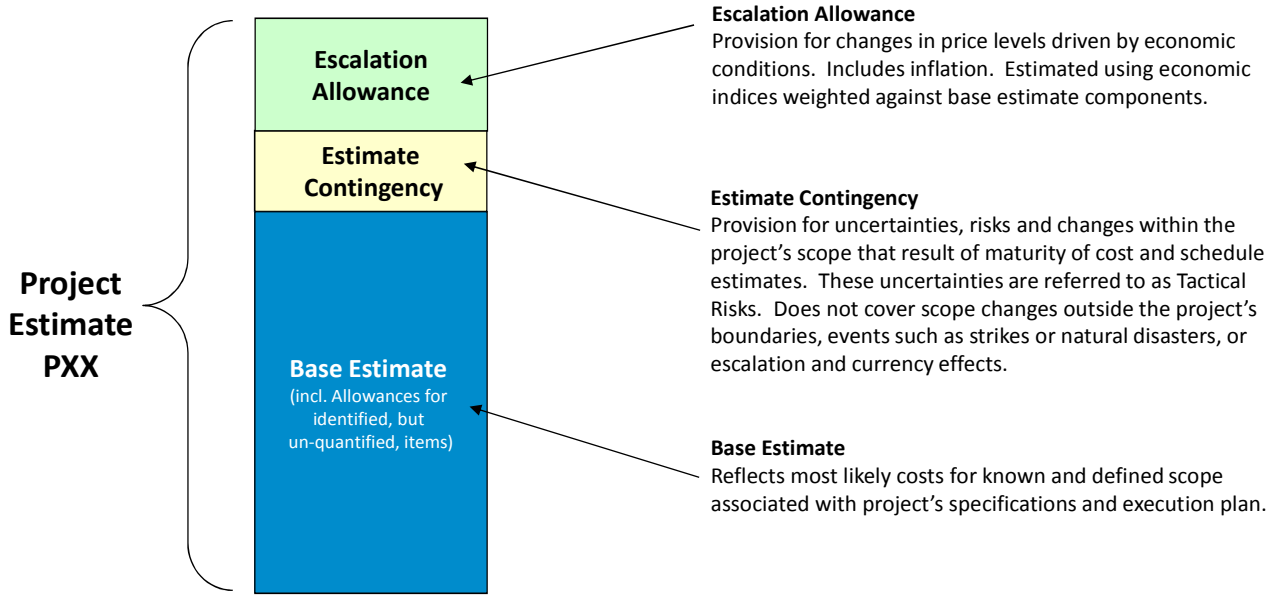
The purpose of this Technical Note is to provide:

- An overview of the process used to arrive at the capital cost estimate for Muskrat Falls Generating Facility (MF) and the Labrador – Island Transmission Link (LIL) forming the basis of investment evaluation at Decision Gate 2.
- A summary of the Decision Gate 2 capital cost and schedule estimates for Muskrat Falls Generating Facility and the Labrador – Island Transmission Link.

2.0 Scope

This Technical Note addresses the Project Capital Cost Estimate for each of the Muskrat Falls Generation Facility and the Labrador – Island Transmission Link projects. This estimate includes Base Estimate, Estimate Contingency and Escalation, but excludes Interest During Construction (IDC) provisions (reference Figure 1).

Figure 1: Project Cost Estimate Components



3.0 Definitions

Term	Definition
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 the project's specifications (i.e. basis of design) and execution plan.
Basis of Design	A compilation of the fundamental criteria, principles and/or assumptions upon which Design Philosophies and Engineering Design Briefs will be developed.
Decision Gate	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, including inflation.
Estimate Contingency	Provision made for variations to the basis of an estimate of time or cost that are likely to occur, that cannot be specifically identified at the time the estimate is prepared but, experience shows, will likely occur. **Note**: Estimate Contingency does not cover scope changes outside the Project's parameters, events such as strikes or natural disasters, escalation or foreign currency impact, or changes that alter the basis upon which the control point for management of change as been established as captured in key project documents (e.g. basis of design, project execution plan).
Gatekeeper	The person responsible for making the decision at the Decision Gate of the Gateway Process.
Gateway Phase	Refers to the period between Decision Gates during which the Project Team completes various work activities in order to produce Key Deliverables required to move the Project forward.

Term	Definition
Inflation	General changes in price levels caused by changes in the value of currency and other broader monetary impacts.
Physical Component	A breakdown of major physical components identified/associated with the Nalcor Energy – Lower Churchill Project (NE-LCP).
Project Scope	A concise and accurate description of the end products or deliverables 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.
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 / scope, (2) construction methodology and schedule, (3) performance factors, and (4) price. It excludes escalation and inflation.
Work Breakdown Structure	A grouping of work elements that organizes and defines all components of the Project. The WBS is a multi-level framework that organizes and graphically displays elements representing work in logical relationships. It divides the entire Project into its component elements in order to establish a framework for effective management control of the Project scope, schedule and budget.

Note: The above definitions are aligned with the Association for the Advancement of Cost Engineering (AACE) International Recommended Practice No. 10S-90.

4.0 Abbreviations and Acronyms

AACE	Association for the Advancement of Cost Engineering
ac	Alternating Current
CAPEX	Capital Expenditure
CPW	Cumulative Present Worth
dc	Direct Current
DG2	Decision Gate 2
EA	Environmental Assessment
EOI	Expression of Interest
EPCM	Engineering, Procurement and Construction Management
HADD	Harmful Alteration, Disruption or Destruction
HV	High Voltage
HVac	High Voltage alternating current
HVdc	High Voltage direct current
IBA	Impacts and Benefits Agreement
IDC	Interest During Construction
IPA	Independent Project Analysts
kV	kilovolt
LATP	Labrador Aboriginal Training Partnership
LCP	Lower Churchill Project
LIL	Labrador – Island Transmission Link
MF	Muskrat Falls
MW	Megawatt
NE	Nalcor Energy
NE-LCP	Nalcor Energy – Lower Churchill Project
OPEX	Operating Expenditure
OPGW	Optical Ground Wire
PCS	Project Control Schedule
PMT	Project Management Team
RCC	Roller-Compacted Concrete
SOBI	Strait of Belle Isle
Te	Metric Tonne (1000 kilograms)
TL	Transmission Line
WBS	Work Breakdown Structure

5.0 Project Scope

Phase I of the Lower Churchill Project is comprised of three (3) sub-projects, namely:

Muskrat Falls Generating Facility is a hydro plant consisting of a north and south RCC dams, close-coupled powerhouse with 4 216 MW Kaplan turbines and generators, 4-radial gated spillway, HV switchyard, and support facilities and services at Muskrat Falls. As part of the Muskrat Falls development, transmission to Churchill Falls consisting of two 345 HVac lines and a switchyard expansion at Churchill Falls was specified as well the clearing of the reservoir, and permanent stabilization measures for the North Spur.

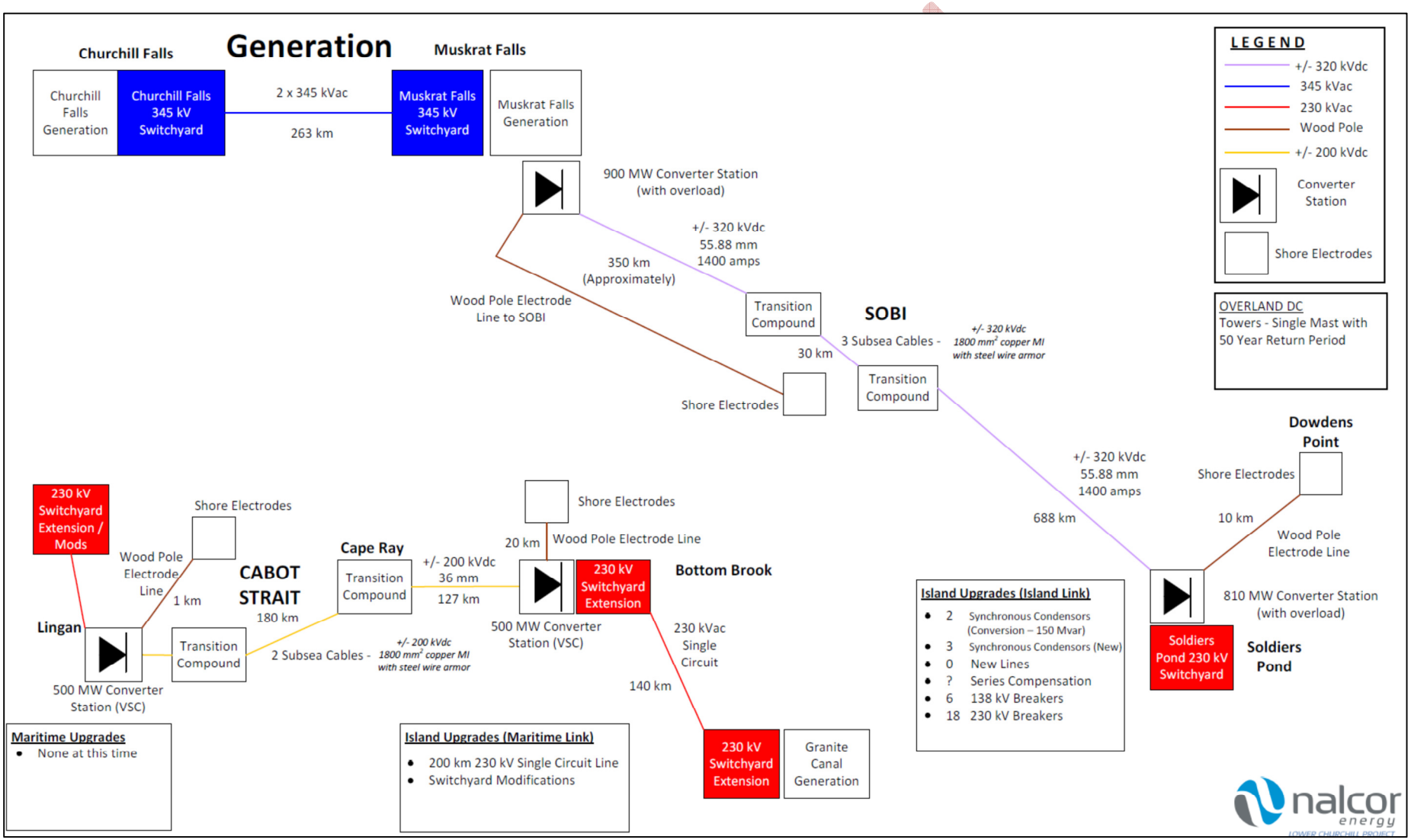
Labrador – Island Transmission Link is a 320 kV, 900 MW HVdc transmission link between Labrador to Newfoundland comprising of converter stations at Muskrat Falls and at Soldiers Pond, a switchyard at Soldiers Pond with interconnect to the existing 230 HVac network, 3 off mass impregnated submarine cables (2 + 1 spare) across the Strait of Belle Isle protected from icebergs and trawling, transition compounds for transitioning from submarine cable to overhead transmission lines, overhead HVdc transmission lines from Muskrat Falls to Soldiers Pond, and electrode lines and shoreline pond electrodes at the Labrador side of the Strait of Belle Isle (SOBI) and at Conception Bay, 3 off 150 Mvar synchronous condensers (2 + 1 spare) at Soldier's Pond, as well as upgrades to the Island transmission system.

Maritime Link is a +/-200 kV, 500 MW HVdc transmission link between the Island of Newfoundland and Nova Scotia which consists of converter stations at Bottom Brook, Newfoundland and at Lingan, Nova Scotia, switchyard extensions at both locations, transition compounds for transitioning from submarine cable to overhead transmission lines, an overhead HVdc transmission line from Bottom Brook to Cape Ray, 2 off mass impregnated subsea dc cables across the Cabot Strait, and electrode lines and shoreline pond electrodes at St. Georges Bay, NL and at Lingan, NS. As well, there are several new 230 HVac transmission lines and switchyard extensions to be added to the existing Newfoundland system.

Figure 2 provides a simplified schematic representation of the major components of the Project.

Note: This Technical Note covers the capital cost estimate of Muskrat Falls Generating Facility and Labrador – Island Transmission Link portions of Phase I.

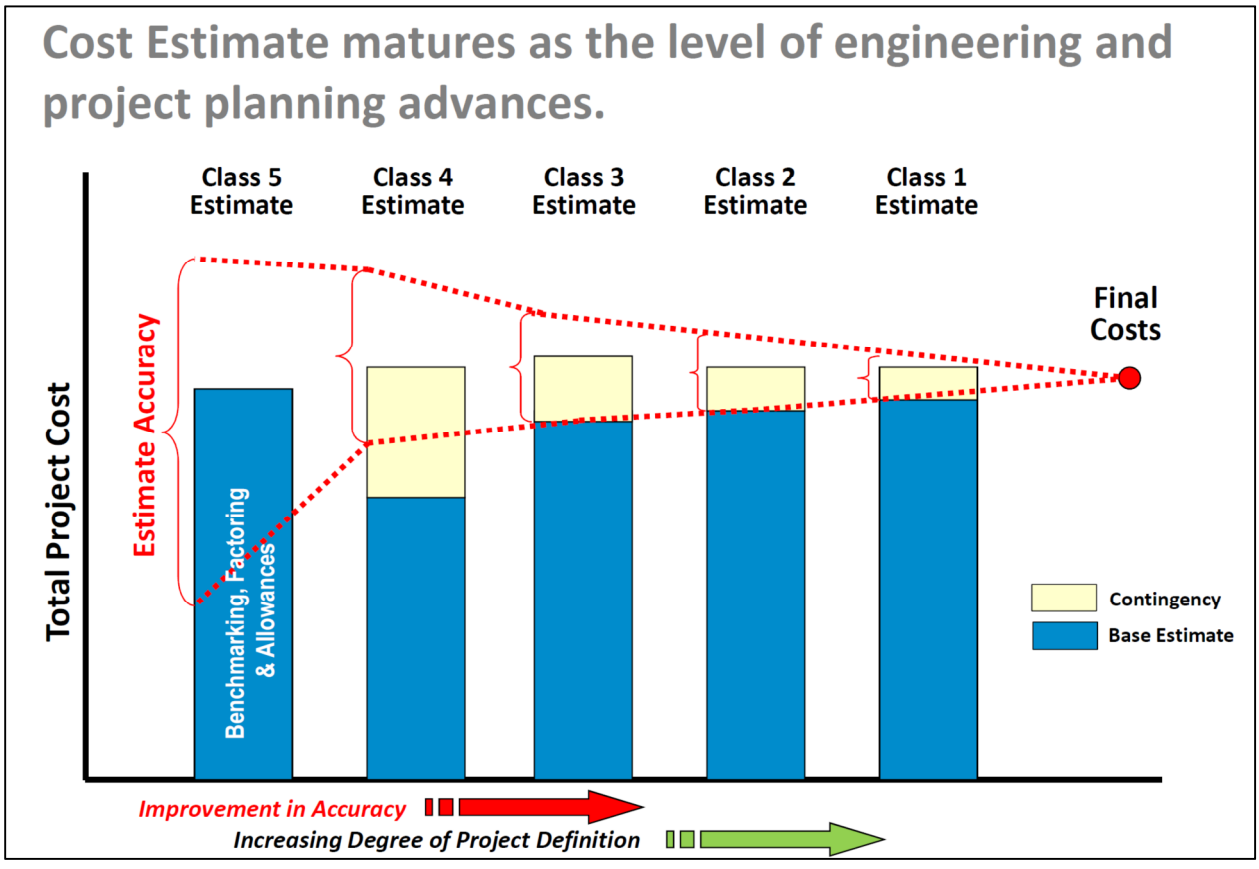
Figure 2: Schematic of LCP Phase I Development



6.0 Basis of Estimate

During the lifecycle of all projects, such as the Lower Churchill Project, it is typical for the capital cost estimate to evolve as the project definition matures, as illustrated in Figure 3. (Note: While the amount of total engineering completed is often used to characterize the level of project definition, according to International Project Analysis Inc. (IPA) a more holistic view should also encompass knowledge of site factors and conditions, as well as the amount of engineering definition and project execution planning). Cost estimates for both the MF and LIL projects have followed such a progression from the late 1990's to present. During this time further technical and execution studies have revealed new insights, constraints, and opportunities that must be considered in the selection of final design layouts, execution strategies, and construction schedules, all of which have led to the ultimate determination of the DG 2 cost estimate.

Figure 3: Cost Estimate Maturity Model



Nalcor has adopted the recommended estimating practices of the Association for Advancement to Cost Engineering (AACE) International for use in planning the development of the Lower Churchill Project. AACE International is recognized within the engineering, procurement and construction industry as the leading authority in total cost management, including cost

estimating standards, practices and methods. AACE International's Cost Estimate Classification System (reference AACE International Recommended Practice No. 17R-97), shown in Table 1, provides guidelines for applying the general principles of estimate classification to project cost estimates. Nalcor Energy has leveraged AACEI's Cost Estimate Classification System to map the level of estimate maturity required for each of the gate decisions within Nalcor's Gateway Process.

Table 1: Estimate Class and Accuracy

LCP DG 2 Estimate

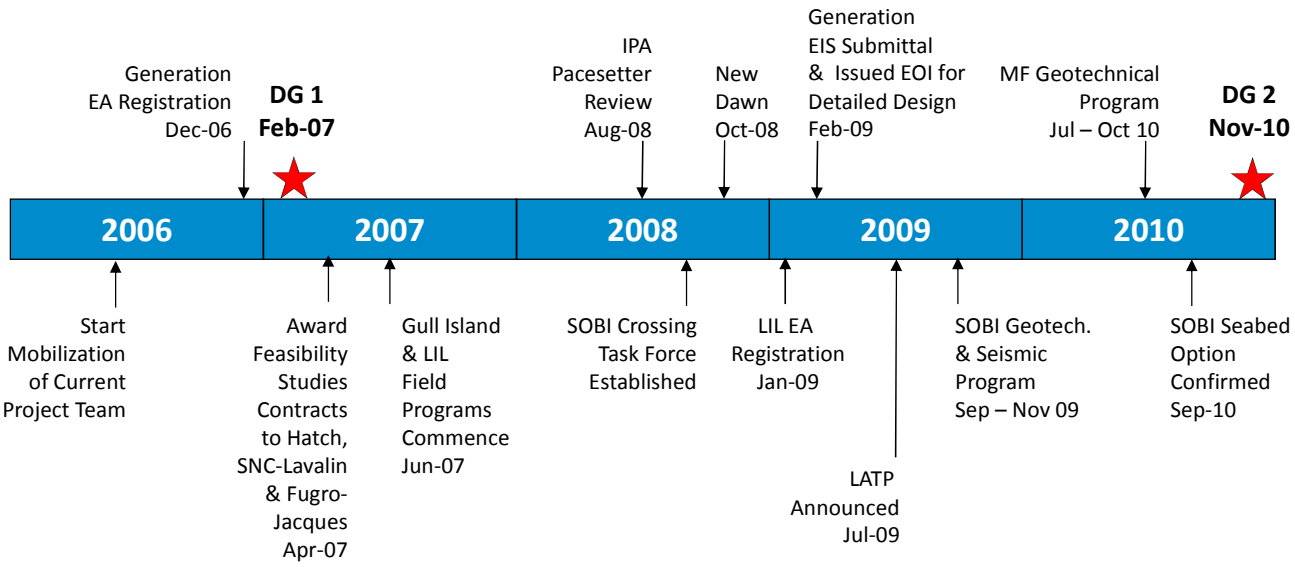
	Primary Characteristic	*Secondary Characteristic*			
ESTIMATE CLASS	**DEGREE OF PROJECT DEFINITION** Expressed as % of complete definition	**END USAGE** Typical purpose of estimate	**METHODOLOGY** Typical estimating method	**EXPECTED ACCURACY RANGE** Typical +/- range relative to index of 1 (i.e. Class 1 estimate) [a]	**PREPARATION EFFORT** Typical degree of effort relative to least cost index of 1 [b]
Class 5	0% to 2%	Screening or feasibility	Stochastic (factors and/or models) or judgment	4 to 20	1
Class 4	1% to 15%	Concept study or feasibility	Primarily stochastic	3 to 12	2 to 4
Class 3	10% to 40%	Budget authorization or control	Mixed but primarily stochastic	2 to 6	3 to 10
Class 2	30% to 70%	Control or bid/tender	Primarily deterministic	1 to 3	5 to 20
Class 1	70% to 100%	Check estimate or bid/tender	Deterministic	1	10 to 100

Notes: [a] If the range index value of "1" represents +10/-5%, then an index value of 10 represents +100/-50%.
[b] If the cost index value of "1" represents 0.005% of project costs, then an index value of 100 represents 0.5%.

The current capital cost estimates for MF and LIL projects were prepared for the purposes of supporting a Decision Gate 2 (DG 2) alternative screening and feasibility recommendation, and are commensurate with the level of technical and execution detail available (i.e. reflect the latest project definition arrived at from the completion of engineering studies and field investigations). The MF project is based upon the Variant 10, Scheme 3b layout which includes a radial gate spillway, and temporary diversion through the spillway structure in lieu of temporary diversion tunnels as had been contemplated with Variant 7 in 1998, which is the design on which previous capital cost estimates were based. Similarly, the current LIL project scope has also changed since previous estimates. This scope reflects a smaller HVdc system than envisioned in 1998 (320 kV versus 400 kV), with the HVdc converter located at Muskrat Falls rather than Gull Island.

The DG 2 cost estimate is founded in all technical, execution, and market intelligence related studies / investigations completed to-date, and explicitly leverages the extensive engineering studies and execution planning completed during the period of 2007 – 2010, referenced as Gateway Phase 2 within Nalcor's Gateway Process (reference Figure 4). The principal purpose of the estimate was to support the evaluation and selection of the optimal development scheme for the lower Churchill River's energy resources.

Figure 4: Key Dates and Events (2006 – 2010)



This DG 2 cost estimate reflects the key timelines and sequences, and execution approach as documented in the Project Execution Plan (PEP). The PEP indicates early works construction commencing following release from Environmental Assessment and ends with commissioning of the final turbine/generator unit and thus full power in May 2017 (reference Section 7.0 for further information on the Project Schedule).

With careful consideration of the key factors of engineering definition, project execution planning, and knowledge of site conditions, including the findings from IPA's Pacesetter Review conducted in August 2010, Nalcor considers the DG 2 capital cost estimate to be a very solid feasibility-level estimate commensurate with an AACE International Class 4 estimate, thereby meeting the requirements for DG 2 of Nalcor's Gateway Process.

Engineering, procurement planning and construction planning activities planned for Gateway Phase 3 will provide the level of inputs required to achieve the DG 3 Key Deliverable of a Class 3 cost estimate that will form the basis of project authorization and effectively become a control budget during the construction execution program of Gateway Phase 4.

7.0 Project Schedule

The Project Schedule for Muskrat Falls Generating Facility and Labrador – Island Transmission Link is based upon extensive studies and planning work done for the development of the lower Churchill River since late 2006. It is structured around the Gateway Process, with DG 3 requirements achieved for approval and passage at the end 2011. The overall Project Schedule following DG3 is designed to be a construction activity driven schedule, with engineering and procurement activities scheduled to support the advancement of construction. The desire to have the supply and installation of the turbine and generator sets as the critical path with the civil construction support installation program.

In advance of DG 2 a "control-level" schedule, referred to as the Project Control Schedule (PCS), was established to as the overall control plan that will be used by Nalcor for monitoring and controlling progress and performance on Project, as well as forms the basis for all cost flows developed in support of economic modeling (see Section 9.5).

The DG 2 PCS represented a roll-up of approximately 800 activities from more detailed engineering, procurement, construction, environmental assessment, and other schedules developed by the PMT using internal and external specialized resources. It represents the envisioned execution sequence as understood at the time of its issue. The DG 2 PCS is closely aligned with DG 2 Base Estimate, with schedule durations aligned with production rates in the estimate.

The PCS includes overall milestones established for the Project, key activity schedule durations, and key dates. The schedule contains the following for each major Project component:

- Entire scope of the Project component
- Project key dates (dates to be monitored which are not milestones)
- Overall critical path
- Key delivery dates
- Significant durations
- Activities representing the major Project components
- Logic, both internal and between Project components

The DG 2 planning basis targets First Power from Muskrat Falls in November 2016, with Full Power in May 2017. The construction schedule assumes that construction occurs throughout the winter, while the seasonal nature of portions of the work, such as Muskrat Falls RCC dam construction, has been considered when developing the labor and equipment requirements.

The driving logic for the Project Control Schedule includes:

- Obtaining EA release for each of the MF and LIL projects, this is required to facilitate the permitting required to start early works / infrastructure construction.

- The completion of geotechnical evaluations at Muskrat Falls to confirm key parameters required by the EPCM Consultant to complete engineering drawings to be included in construction packages.
- The mobilization of the EPCM Consultant which will perform the detailed design, in order to permit the design and contracting for the site works and mass excavation.
- Final feasibility engineering studies to be finalized in the first half of 2011
- Early Site Infrastructure Works for Muskrat Falls (access, accommodations, communications, construction power) to commence following EA release and permitting in June 2011.
- The completion of powerhouse excavation and primary and secondary concreting, in order to allow the assembly of the turbine/generator units.
- First Power from Muskrat Falls via Churchill Falls in Q4-2016 or within 6 years following EA release.

The un-risked critical path for this schedule includes the following milestones:

- Award of the EPCM contract and the mobilization of the EPCM contractor;
- Industrial Relations to arrive at a Special Project Order (SPO) designation;
- Pre-EPCM site design for the Muskrat Falls generating site;
- Critical design elements, such as the design package for the main civil works, the SOBI crossing, converter stations, and the HVdc overhead transmission system;
- Turbine model testing;
- The award of the turbine supply contract;
- The manufacturing and delivery of the embedded components for turbine unit No. 1 (specifically, the stay ring);
- Release from both the Generation Project and LIL EA processes;
- Development of access to the generation site;
- The final excavation of the powerhouse and intake;
- Secondary concreting and structural steel related to turbine unit No. 1;
- Installation, assembly and commissioning of turbine unit No. 1;
- Commissioning of subsequent turbine units 2 to 4;
- Contracting processes for the overland dc transmission;
- Contract award and detailed design for the SOBI crossing;
- Installation and protection of the SOBI cables; and
- Contract award, construction and commissioning of the HVdc converter stations at Soldier's Pond and Muskrat Falls.

8.0 DG 2 Cost Estimate Development Process

The objective of Gateway Phase 2 was to generate and evaluate a number of development options from which a preferred option to develop the business opportunity was selected. In this regard, a number of development options for the lower Churchill River were conceived during the period of 2006 to 2010 (reference Figure 4 for Key Dates) from which a recommendation to proceed with the Phase I development scheme at Decision Gate 2.

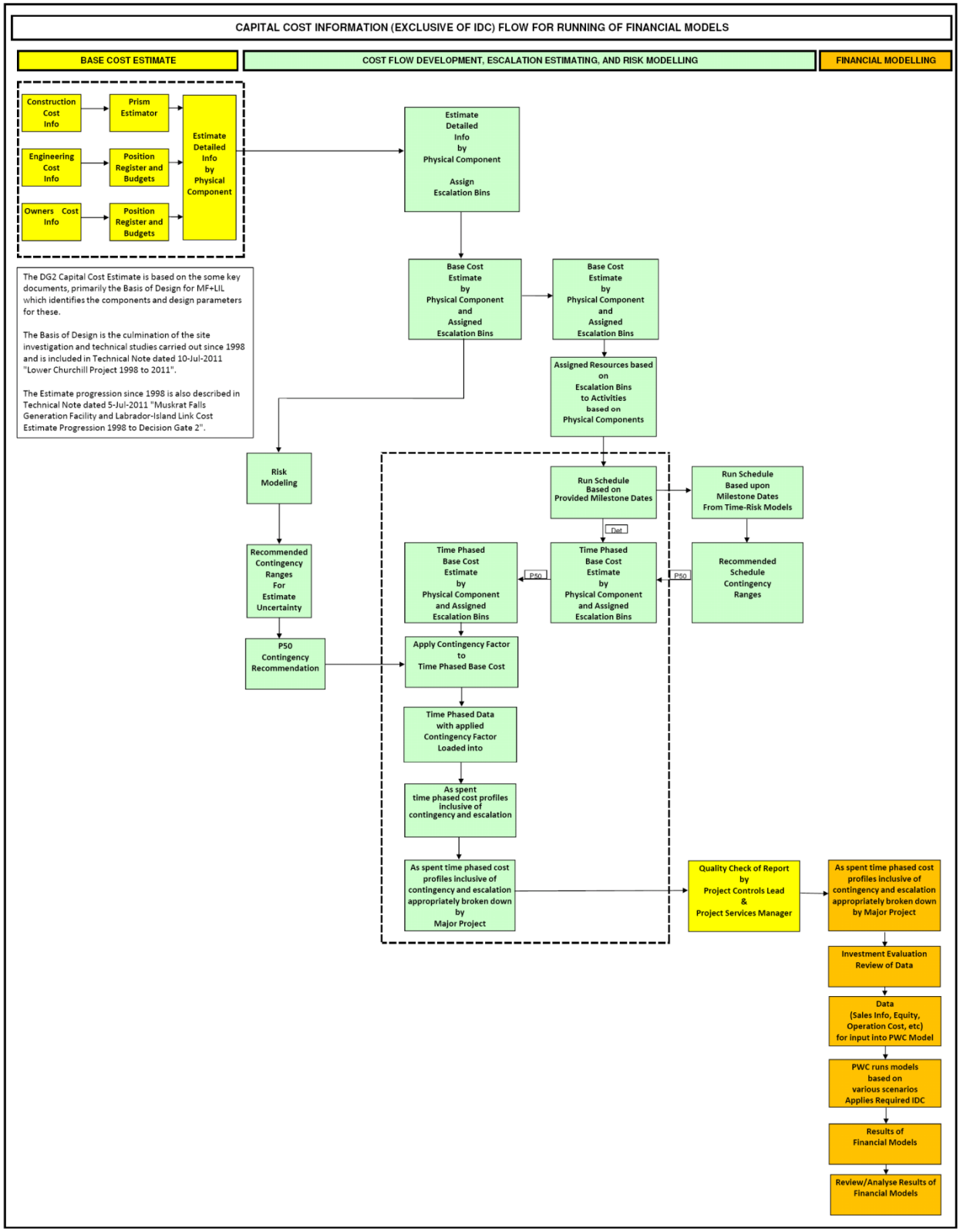
To this effect, during Gateway Phase 2 engineering and project execution planning proceeded concurrently with investment analysis. These two analyses were synchronized when capital cost flows for the development options were fed into the economic model, as per Figure 5.

Figure 5 illustrates the overall process flow for the development of the Decision Gate 2 Capital Cost Estimate which resulted in cost flows for input into economic modeling, which included CPW analysis. This process, developed by Nalcor, is designed to ensure clear and well managed interfaces between all three (3) components of the Capital Cost Estimate as well as to ensure quality information is provided to Nalcor Investment Evaluation for financial and economic modeling activity.

The basis and development of each of these three (3) major components of the Capital Cost Estimate listed below, and shown in Figure 1, are discussed in the following sections:

- Section 9.0 – Component A: Base Estimate
- Section 10.0 – Component B: Estimate Contingency
- Section 11.0 – Component C: Escalation Allowance

Figure 5: Overall Cost Estimate Development Process Flow



9.0 Component A: Base Estimate

9.1 Overview

The Base Estimates for MF and LIL have been developed in accordance to the principles found in AACE International Recommended Practice No. 36R-08. The Base Estimate was developed using four (4) key inputs shown in Figure 6 and in accordance to the Work Breakdown Structure (WBS) shown in Figure 7. Fundamentally the Base Estimate is aligned with the DG 2 Basis of Design.

Figure 6: 4 Key Inputs into the Base Estimate

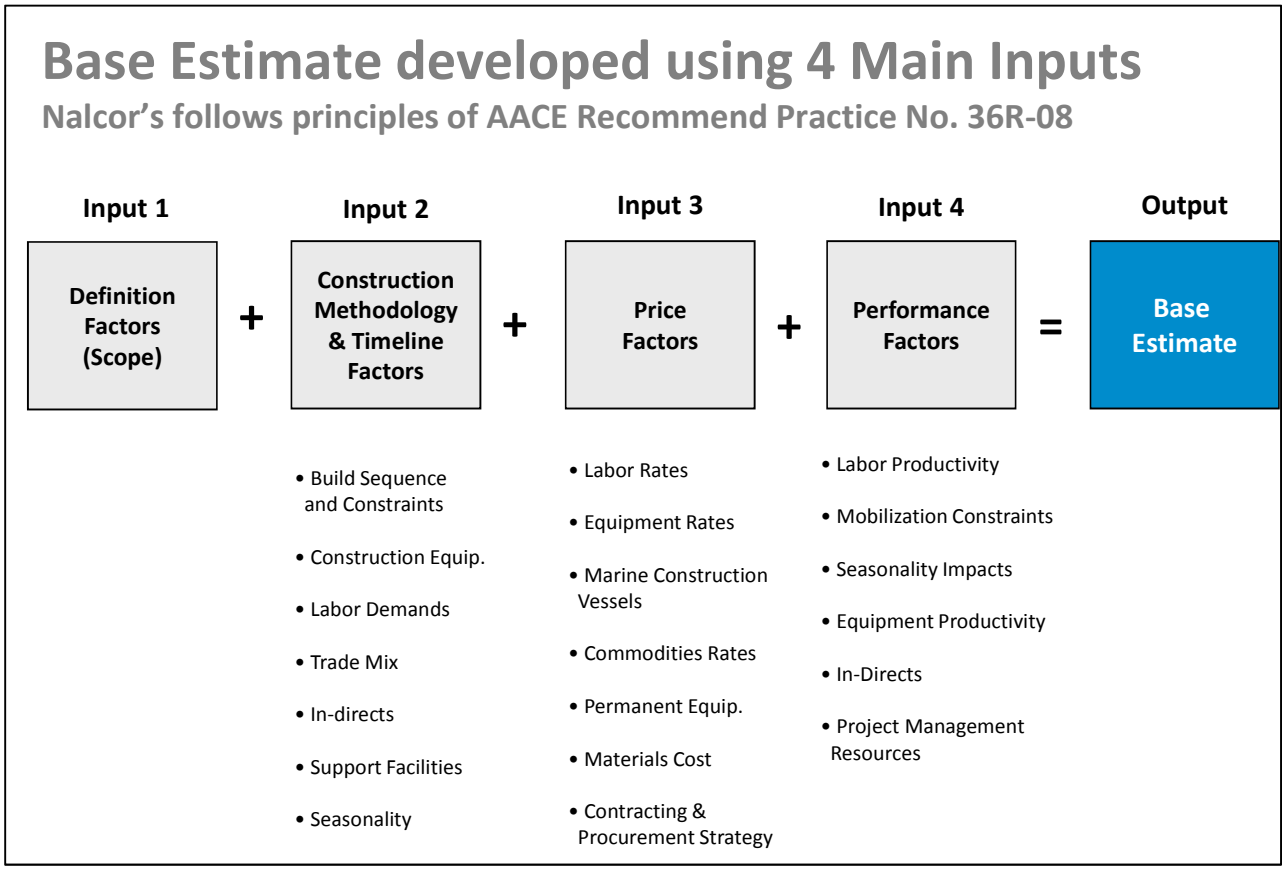


Figure 7: Work Breakdown Structure (WBS)

1 LCP General	3 Muskrat Falls	4 Island Link	5 Maritime Link
1.0 LCP General	3.0 Muskrat Falls General	4.0 Island Link General	5.0 Maritime Link General
1.0.00 General Administration	3.0.00 Muskrat Falls General	4.0.00 Island Link General	5.0.00 Maritime Link General
1.1 Project Management	3.1 Infrastructure and Support	4.1 Infrastructure and Support	5.1 Infrastructure and Support
1.1.00 Project Management General	3.1.00 Infrastructure and Support General	4.1.00 Infrastructure and Support General	5.1.00 Infrastructure and Support General
	3.1.10 Offices	4.1.10 Offices	5.1.10 Offices
	3.1.11 Access	4.1.11 Access	5.1.11 Access
1.2 Engineering	3.1.13 Construction Power	4.1.13 Construction Power	5.1.13 Construction Power
1.2.00 Engineering General	3.1.14 Construction Telecommunications	4.1.14 Construction Telecommunications	5.1.14 Construction Telecommunications
	3.1.15 Accomodation Complex		
1.3 Environmental Affairs	3.1.16 Site Services	4.1.16 Site Services	5.1.16 Site Services
1.3.00 Envronmental Affairs General	3.1.17 Housing Facilities HVGB	4.1.17 Housing Facilities	5.1.17 Housing Facilities
	3.1.18 Offsite Logistics Infrastructure and Support	4.1.18 Offsite Logistics Infrastructure and Support	5.1.18 Offsite Logistics Infrastructure and Support
1.4 Aboriginal Affairs	3.2 Generation Facility		
	3.2.00 Generation Facilty General		
1.4.00 Aboriginal Affairs	3.2.21 Reservoir		
	3.2.23 Dams and Cofferdams		
1.5 Construction Management	3.2.24 Spillway		
1.5.00 Construction Management General	3.2.25 Approach Channel		
	3.2.28 North Spur		
1.8 Power Sales and Marketing	3.2.31 Tailrace		
1.8.00 Power Sales and Marketing General	3.2.32 Intake		
	3.2.33 Powerhouse and Related Facilities		
1.9 Project Financing	3.2.34 Turbines and Generators		
1.9.00 Project Financing General	3.2.35 Balance of Plant		
	3.2.92 Operations Telecommunications		
	3.4 Switchyards	4.4 Switchyards	5.4 Switchyards
	3.4.00 Switchyards General	4.4.00 Switchyards General	5.4.00 Switchyards General
	3.4.10 Churchill Falls Switchyard Extension	4.4.50 Soldiers Pond Switchyard	5.4.60 Maritime Switchyard
	3.4.30 Muskrat Falls Switchyard		5.4.70 Bottom Brook Switchyard
			5.4.80 Granite Canal Switchyard
	3.6 OL Transmission	4.6 OL Transmission	5.6 OL Transmission
	3.6.00 OL Transmission General	4.6.00 OL Transmission General	5.6.00 OL Transmission General
	3.6.14 AC Tx Muskrat Falls to Churchill Falls	4.6.13 AC Tx Muskrat Falls Switchyard to Converter Station	5.6.17 AC Tx Bottom Brook to Granite Canal
	3.6.16 AC Collector Lines to Switchyards	4.6.22 DC TX SOBI to Soldiers Pond	5.6.26 DC Tx Cape Ray to Bottom Brook
		4.6.27 DC Tx Muskrat Falls to SOBI	5.6.33 Electrode Line - Maritimes
		4.6.31 Electrode Line - Labrador	5.6.34 Electrode Line - Newfoundland West
		4.3.32 Electrode Line - Newfoundland East	
		4.7 System Upgrades	5.7 System Upgrades
		4.7.00 System Upgrades General	5.7.00 System Upgrades General
		4.7.10 Island Upgrades - East	5.7.20 Island Upgrades - West
			5.7.30 Maritime Upgrades
		4.8 DC Specialties	5.8 DC Specialties
		4.8.00 DC Specialties General	5.8.00 DC Specialties General
		4.8.11 Marine Crossing - SOBI	5.8.12 Marine Crossing - Maritimes
		4.8.21 Labrador Converter Station	5.8.23 Maritime Converter Station
		4.8.22 Soldiers Pond Converter Station	5.8.24 Newfoundland West Converter Station
		4.8.51 Transition Compound Labrador	5.8.53 Transition Compound Newfoundland West
		4.8.52 Transition Compound Northern Peninsula	5.8.54 Transition Compound Maritimes
		4.8.61 Electrode Labrador	5.8.63 Electrode Maritime
		4.8.62 Electrode Newfoundland East	5.8.64 Electrode Newfoundland West
	3.9 Habitat Compensation	4.9 Habitat Compensation	5.9 Habitat Compensation
	3.9.00 Habitat Compensation General	4.9.00 Habitat Compensation General	5.9.00 Habitat Compensation General
	3.9.11 Muskrat Falls Fish Habitat Compensation	4.9.11 Island Link Fish Habitat Compensation	5.9.11 Maritime Link Fish Habitat Compensation
	3.9.12 Muskrat Falls Terestrial Habitat Compensation		

9.2 Procurement and Construction Costs

In the case of the Muskrat Falls Generating Facility where detailed definition exists, significant portions of the Base Estimate have been developed using a bottom-up approach using available information on quantities, unit costs, wage rates, bulk construction consumables (e.g. Portland cement, diesel fuel, rebar, etc.) construction fleet costs, major permanent equipment quotations, and historical production rates. In some areas such as the balance of plant and spillway gates, third party benchmarks from as-built plants combined with current unit costs have formed the basis of the estimate.

Supporting information for the Muskrat Falls Base Estimate comes from a combination of sources, including the site layouts and quantities contained in reports from experienced consultants and input from NE-LCP Project Team. It should be noted that this is the first bottom-up estimate that has been completed for the Variant 10, Scheme 3b design layout, with major bulk excavation, fill and concrete quantities listed in Table 2 below.

Table 2: MF Bulk Excavation, Fill and Concrete Quantities

	Structure Excavation			Fill and Concrete Materials						
	Overburden	Rock Excavation		Concrete			Fills & Backfills			
Description		Bank	Bulk	Concrete	Fine Ag.	Coarse Ag.	Rock	Crushed	Natural	Till
	m^3	m^3	m^3	m^3	m^3	m^3	m^3	m^3	m^3	m^3
Factor										
Cofferdams - Upstream and Downstream										
RCC Dam Foundation - North and South										
RCC Dam Construction - North and South										
Spillway Structure										
North Spur Stabilization										
Powerhouse/Intake/Tailrace										
Totals	1,360,310	1,621,907	2,027,385	572,201	200,271	371,931	1,095,483	52,949	330,000	238,098
							Total Rock Bulk Volume Required = 1,720,643 m^3			

Surplus Rock Bulk Volume = 306,751 m^3

In the case of the Labrador – Island Transmission Link, the Base Estimate has its foundation set in the 450 kV line studied extensively in the period of 2007 – 2010, including desk top studies and field investigations. This has been significantly augmented with system studies for the current 320 kV link, extensive field work and desk top studies completed for the SOBI cable crossing (reference SOBI Crossing conceptual design studies), and preliminary construction and logistics planning for the construction of the overland transmission line. Vendor quotations for major hardware including overhead conductor, insulators, converter stations, and submarine cable has been obtained and included within the estimate.

For estimating purposes each of MF and LIL projects have been broken down into a series of logical contract packages for construction of various components, for supply and installation of major packages such as turbine/generator units, dams, and for service and support facilities. The estimates for the various contract packages have been developed from the point of view of a contractor and include profit and overhead allowances. The estimates for the specific contract packages have been developed by applying the costs of materials, labor and equipment to the required volume or amount of materials, quantities, and construction equipment. Each subcontract includes a separate evaluation of the contractor's indirect costs. Indirect costs such as accommodations and site services have been estimated in detail for MF. Support facilities have been included in the estimate, including accommodation facilities and equipment repair facilities.

The latest construction methods, engineering technologies and market intelligence are critical to ensuring that the estimate contains current information. To that end, a number of external parties have been engaged to provide engineering studies (e.g. SNC-Lavalin, Hatch, RSW, etc.), scope definition, estimating and construction experience, and market data for inclusion in the estimate.

The basis of productivity used in the estimate is rooted in the underlying assumptions regarding installation methodology (including equipment) and constraints. Labour productivity assumptions for MF are based on experience on previous hydro and large civil projects, while for the overland transmission portion, the assumptions are founded in productivity norms provided by RSW Inc. from their northern Quebec experiences.

A detailed labor rate study has resulted in the establishment of labor rates for the development of the cost estimate, which are considered competitive with other eastern Canada megaprojects.

Estimates for permanent plant equipment (e.g. turbines, submarine cable, transmission towers, insulators, converter stations, transformers) have been based upon recent quotations received from manufacturers, while prices for key construction consumables (e.g. rebar, explosives, etc.) have been obtained from vendors.

Construction equipment hourly costs were calculated from first principles, using current market prices for new equipment, diesel fuel, repairs, etc.

An allowance for contractor's overhead and profit has been added to the subtotal of direct and indirect costs.

9.3 Owner and EPCM Cost

The Owner, Engineering / Design, and Project / Construction Management costs can be broken down into two major categories: (1) Labor Cost, and (2) Other Cost.

Labor costs is largely comprised of personnel costs associated with completion of the detailed design, engineering, construction management activities, and traditional Owner's activities including overall project management, environmental assessment, etc.

Detailed organizational charts and associated mobilization plans for all Nalcor Project Management Team (PMT) and the EPCM Consultant were prepared to account for all individuals to be engaged in the above-mentioned activities. For each identified position there are a number of associated parameters which are used to calculate the cost.

Other Costs are related to non-labor associated costs. Some may be indirectly linked to personnel, such as the office lease, which depends on office size, which in turn depends on staffing levels. Other costs include costs related to office leases, business travel, IT/IS systems and support, helicopter usage, construction insurance, permits and licenses fees, rental and maintenance of project vehicles, public relations, and other miscellaneous items.

9.4 Base Cost Estimate Summary

With reference to Section 8.0, the capital cost flow for Muskrat Falls with a Quebec export option was initially provided in March 2010 (reference Capital Cost Case 4/5) to facilitate the extensive and lengthy economic modelling. This scenario eventually matured into the MF + LIL development scheme in August 2010 (reference Capital Cost Case 11OL with OL denoting the inclusion of overload protection on the LIL), with the capital cost of MF remaining at $2,206 million. However, the on-going completion of engineering studies and project planning did not permit the finalization the current DG 2 Base Estimate for MF until September, resulting in an increase of approximately $75.3 million. The final estimate, considered as the DG2 estimate, is $2,281 million.

Offsetting this increase in the Base Estimate for MF was the removal of overload capacity for the LIL which as per the DG 2 Basis of Design is not required with the decision to develop the Maritime Link. This change reduced the Case 11OL Base Estimate by approximately $87.2 million from the initial $1,616 million to the current $1,529 million.

While the individual costs for each of MF and LIL provided for DG2 economic modelling purposes are not identical to the final documented estimates for each individual project, as indicated in Table 3 the total cost estimate, in aggregate, is within the margin of error inherently characteristic of a Class 4 estimate and is therefore not considered material.

Table 3: Base Cost Estimate Summary for MF + LIL

Component		Economic Model	Final DG 2 Base Estimate	Delta
Muskrat Falls	Site Preparation, Access and Reservoir Clearing	[redacted]	[redacted]	[redacted]
	Accomodations Complex, Supporting Infrastructure, Site Services and Catering	[redacted]	[redacted]	[redacted]
	Main Excavation Works	[redacted]	[redacted]	[redacted]
	Intake, Powerhouse, Turbines and Generators	[redacted]	[redacted]	[redacted]
	Spillway Structure	[redacted]	[redacted]	[redacted]
	RCC Dams (North & South), Cofferdams, and North Spur Stabalization	[redacted]	[redacted]	[redacted]
	Switchyards and MF to CF Transmission Lines	[redacted]	[redacted]	[redacted]
	Owner Team, EPCM, Insurance and HADD	[redacted]	[redacted]	[redacted]
	MF Total	**$ 2,206,405,855**	**$ 2,281,727,000**	**$ 75,321,145**
Labrador - Island Transmission Link	Converter Stations and Electrodes	[redacted]	[redacted]	[redacted]
	SOBI Crossing	[redacted]	[redacted]	[redacted]
	HVdc Overland Transmission	[redacted]	[redacted]	[redacted]
	Island System Upgrades	[redacted]	[redacted]	[redacted]
	Owner Team, EPCM, Insurance and HADD	[redacted]	[redacted]	[redacted]
	LIL Total	**$ 1,615,928,286**	**$ 1,528,759,415**	**$ (87,168,871)**
Grand Total		**$ 3,822,334,141**	**$ 3,810,486,415**	**$ (11,847,726)**

9.5 Determination of Cost Flows

Figure 7 provides an overview of the technique or methodology used to produce cost flows for the Project. In general terms, the Base Estimate is broken into key components of material, equipment and labor resource types of each Physical Component (e.g. Powerhouse, Reservoir Clearing, etc.) and is married with the project schedule in Primavera Project Planner to produce cost flows. The resulting cost flows for the NF and LIL Base Estimates are shown in Figures 8 and 9.

Using a similar approach, the linkage of the Base Estimate and Project Schedule has facilitated the production of labor histograms for each major occupational area (reference Figures 10 & 11).

This cost flow of the Base Estimate is used as an input into estimating escalation (refer to Section 10.0) as illustrated in Figure 5. For the sake of simplicity at Decision Gate 2, the cost flow for Estimate Contingency is assumed to be the same as for the Base Estimate.

Figure 7: Determination of Base Estimate Cost Flow

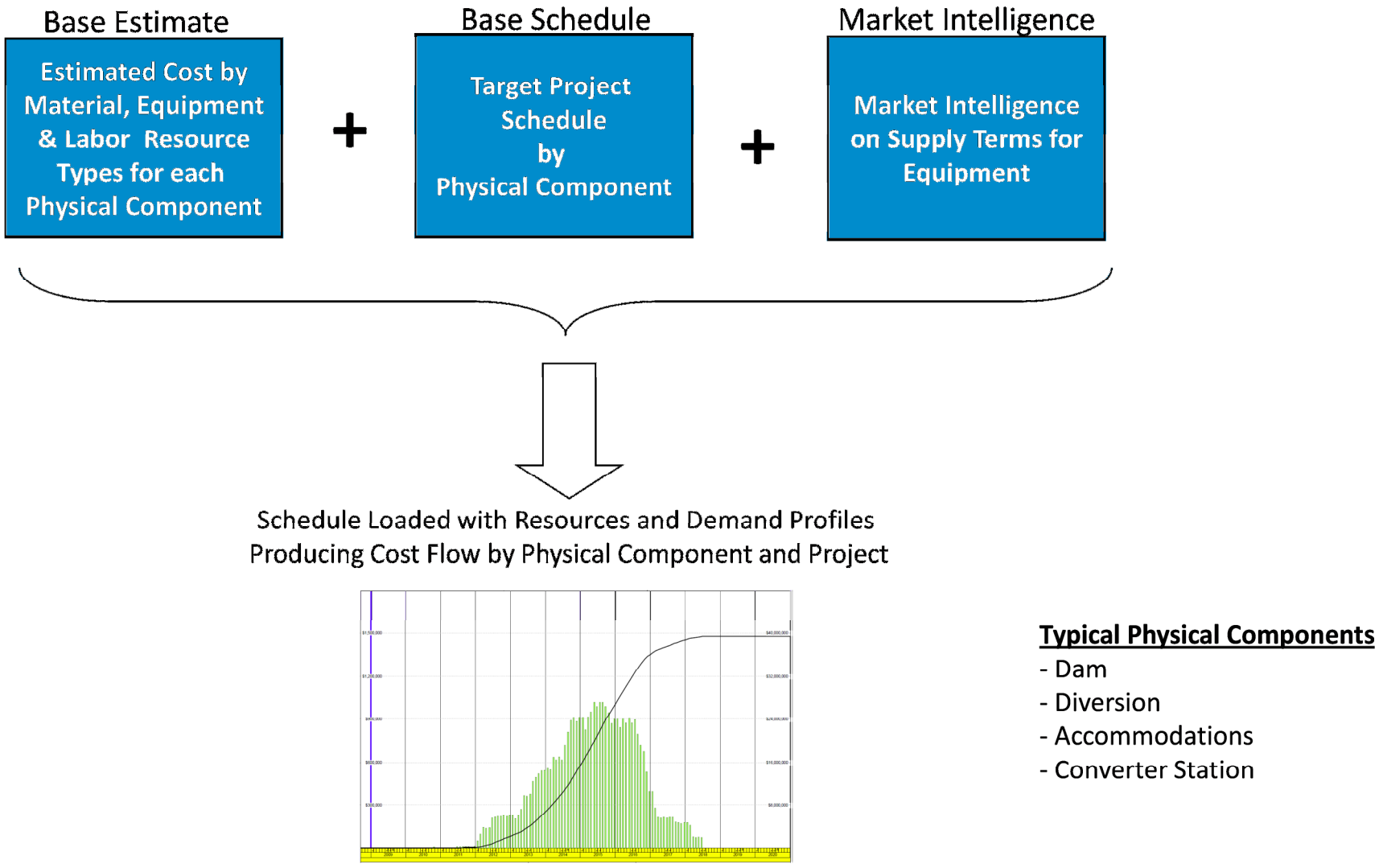


Figure 8: Cost Flow for Muskrat Falls Generation Facility

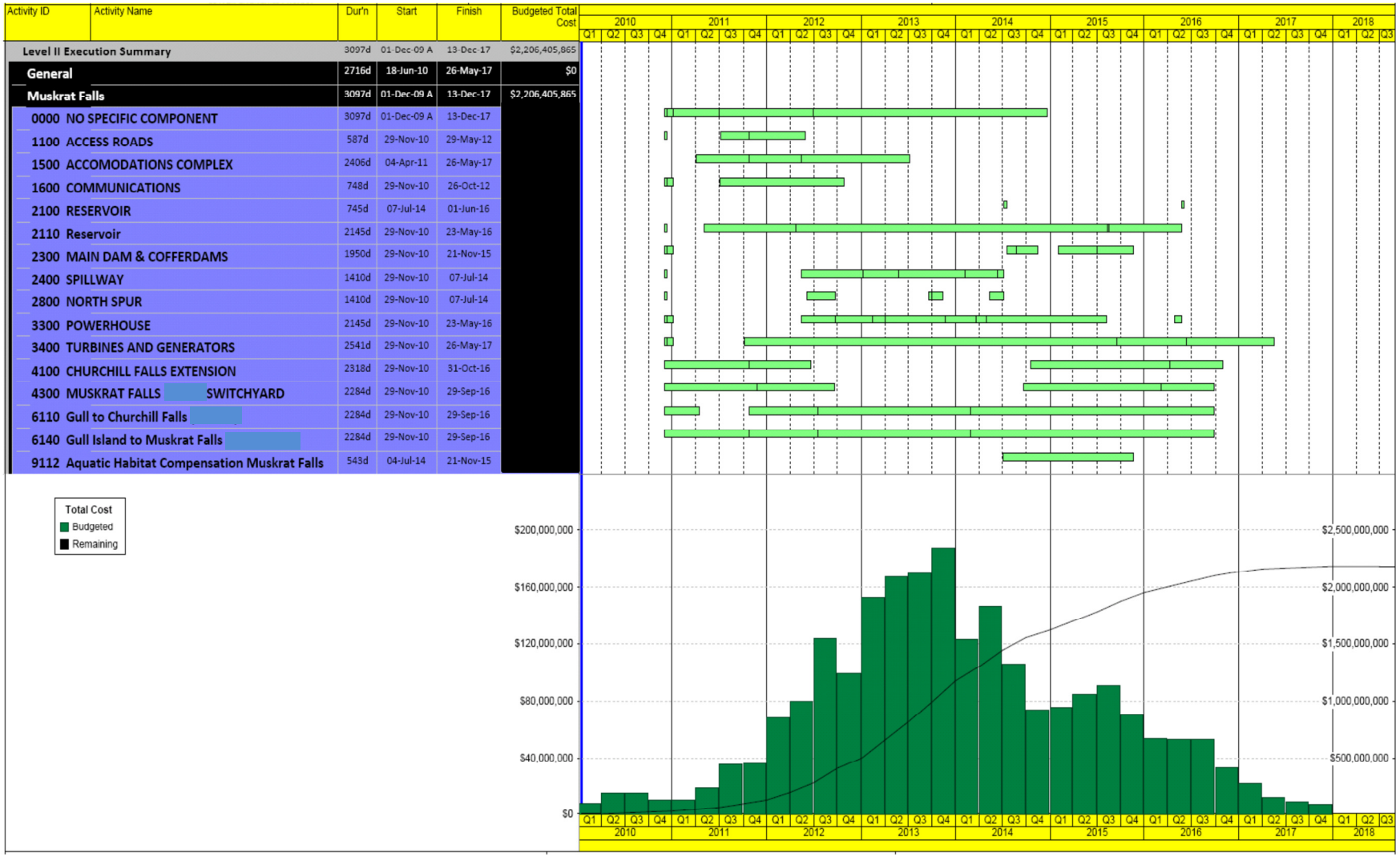


Figure 9: Cost Flow for Labrador – Island Transmission Link

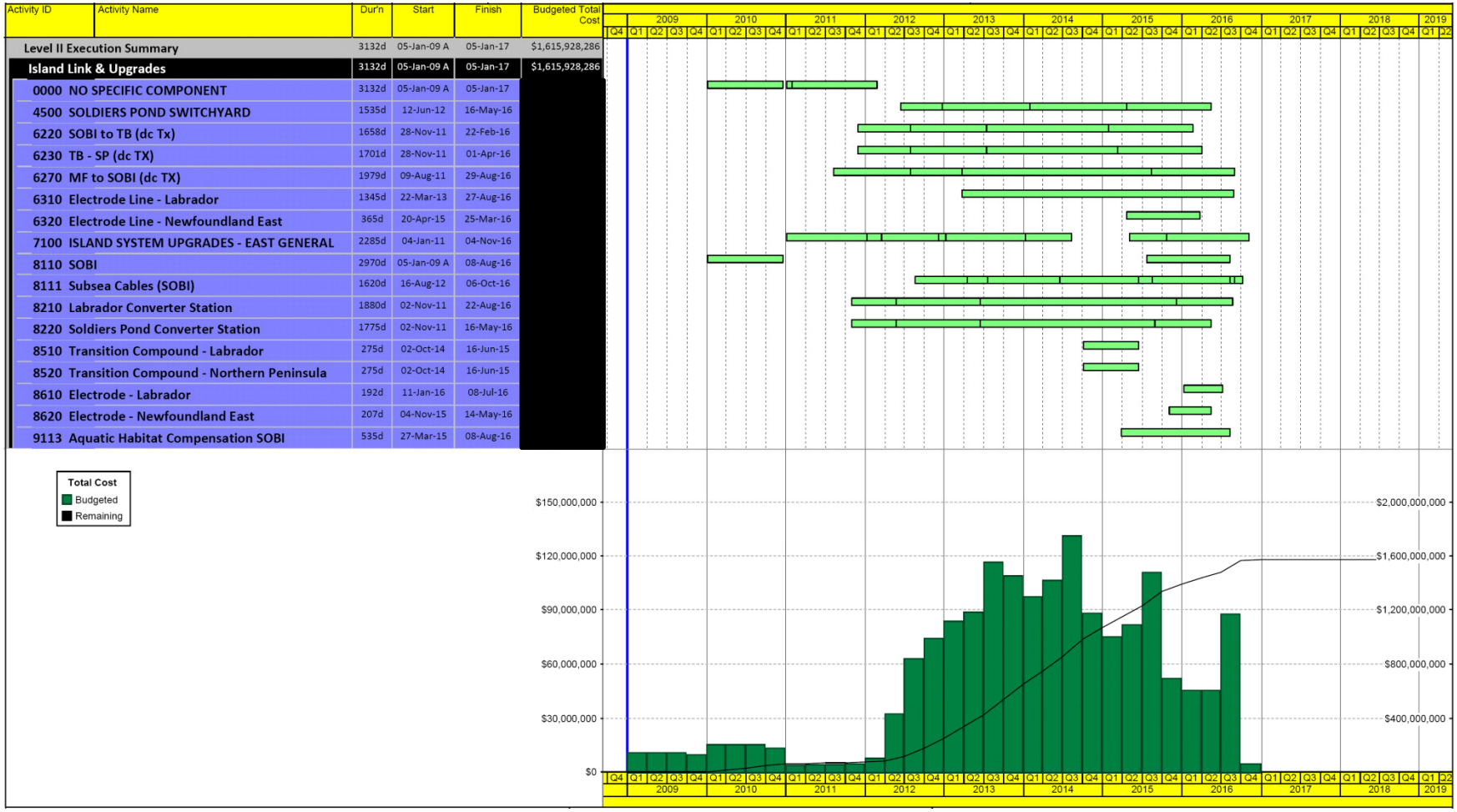


Figure 10: Trade Labor Histogram for Muskrat Falls Generating Facility

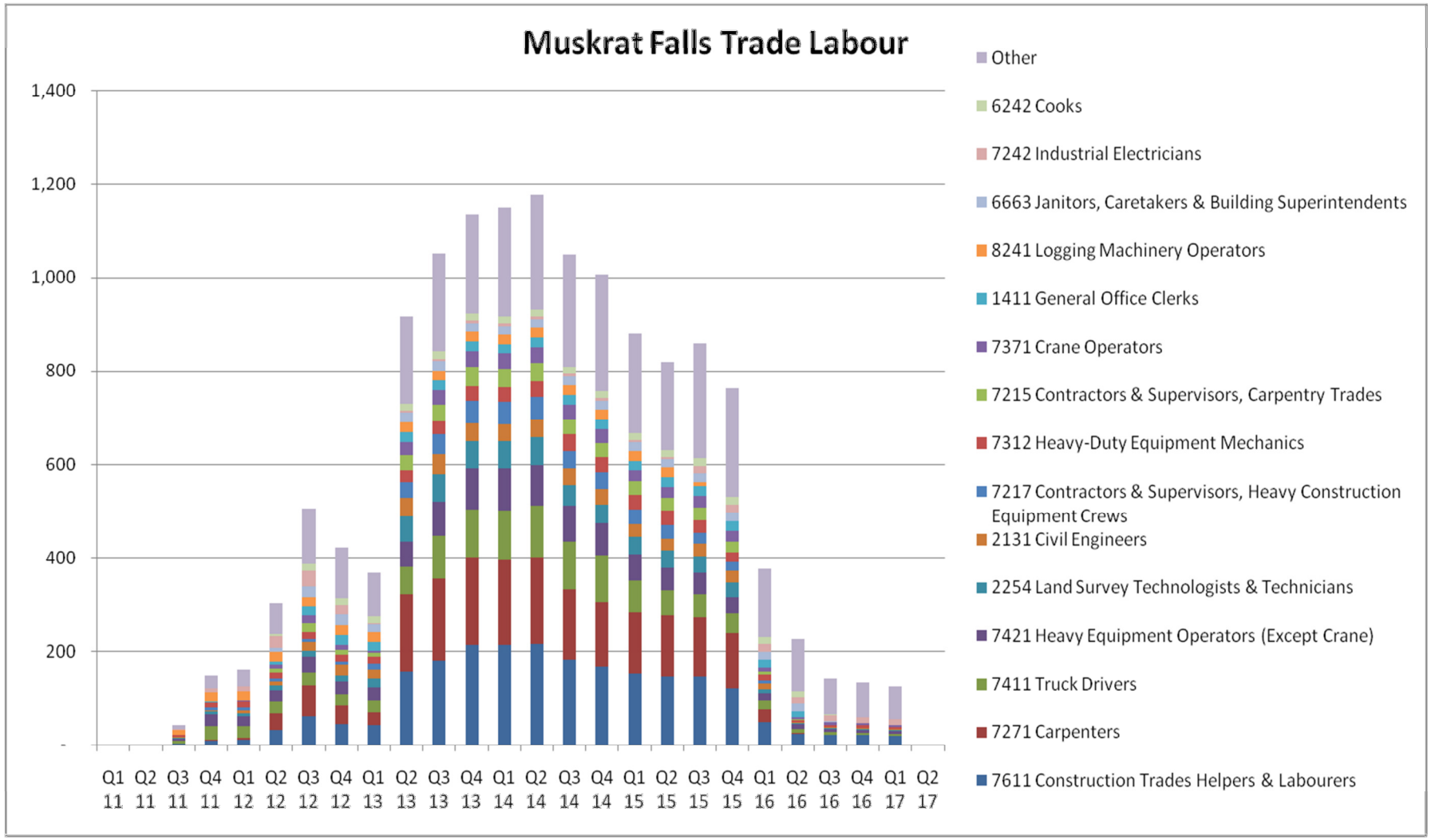
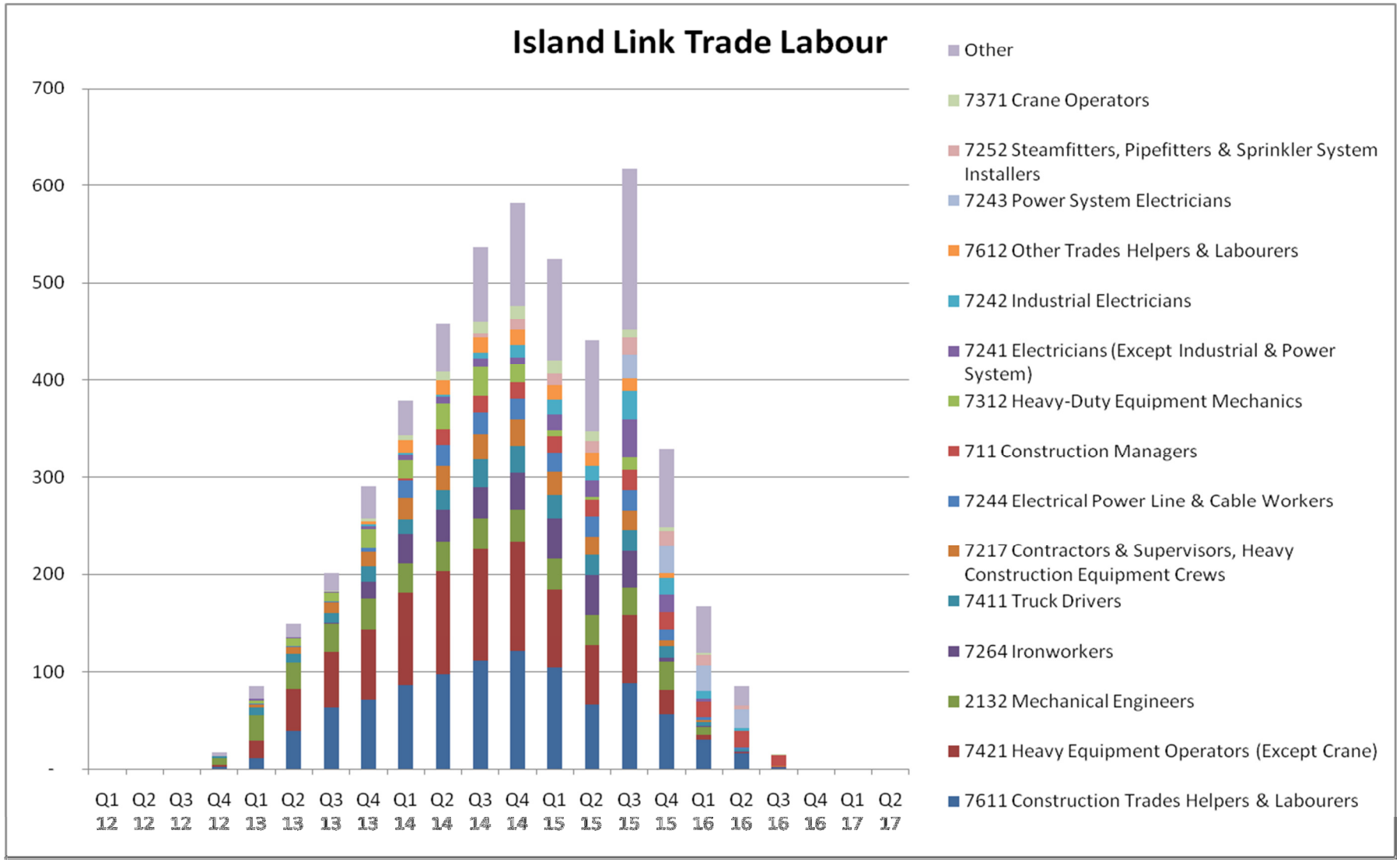


Figure 11: Trade Labor Histogram for Labrador – Island Transmission Link



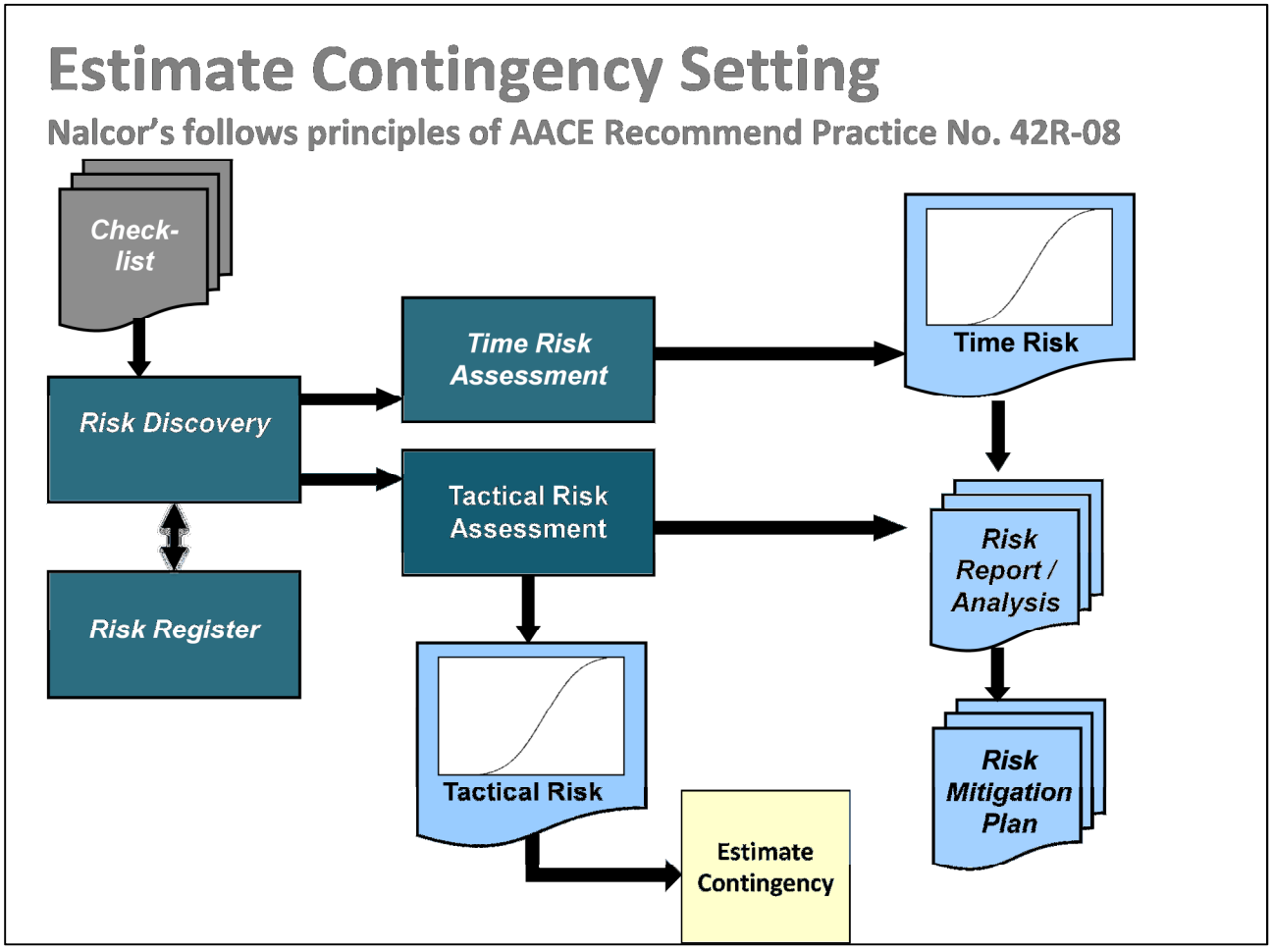
10.0 Component B: Estimate Contingency

10.1 Process Overview

The Base Estimate is a forecast of costs for a given set of conditions, which include scope of work, schedule and execution plans. The accuracy of the Base Estimate is subject to the details known at the time and provided as input to the estimate. Different classes or types of estimates are required to evaluate capital and other work programs, at various stages of the Project. Estimates are classified in terms of quality, or known accuracy, which improves as the Project or work program proceeds as illustrated in Table 1.

For the Project a probabilistic estimating basis has been used in line with the AACE International Recommended Practice 42R-08, with the assistance of Nalcor's risk management consultant, Westney Consulting Group. The general approach is depicted in Figure 12.

Figure 12: Risk Assessment Process for Estimate Contingency Setting



10.2 Basis of Assessment

In June 2010 Westney were engaged to support Nalcor in completing a tactical risk analysis as input into the final determination of an appropriate Estimate Contingency for DG 2. The basis of the assessment was the latest available cost and schedule estimates available at the time of completion of the risk assessment. They were:

Project Components

- Muskrat Falls Generating Facility
- 600 MW 250kV HVdc Island Link (50-year return period)
- No Maritime Link

Base Estimate (2010 CDN $)

- Muskrat Falls Plant $2,215 million
- Labrador – Island Transmission Link $1,144 million
- Total Base Estimate $3,359 million

As in all major projects, risk identification, assessment, management and monitoring is a continual process. To this effect subsequent to the completion of this risk assessment, the planning basis matured to the current Case 11OL which was used as the basis for DG 2 recommendation. Changes included:

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

Similarly, subsequent to the completion of this risk assessment the cost and schedule basis for MF and LIL had matured, in particular our understanding of the key areas of estimate uncertainty. This has resulted in the Base Estimate increasing from the June 2010 risked Base Estimate amount of $3,359 million to the DG 2 Base Estimate $3,822 million, which was considered in the final Estimate Contingency recommendation (see Section 9.4).

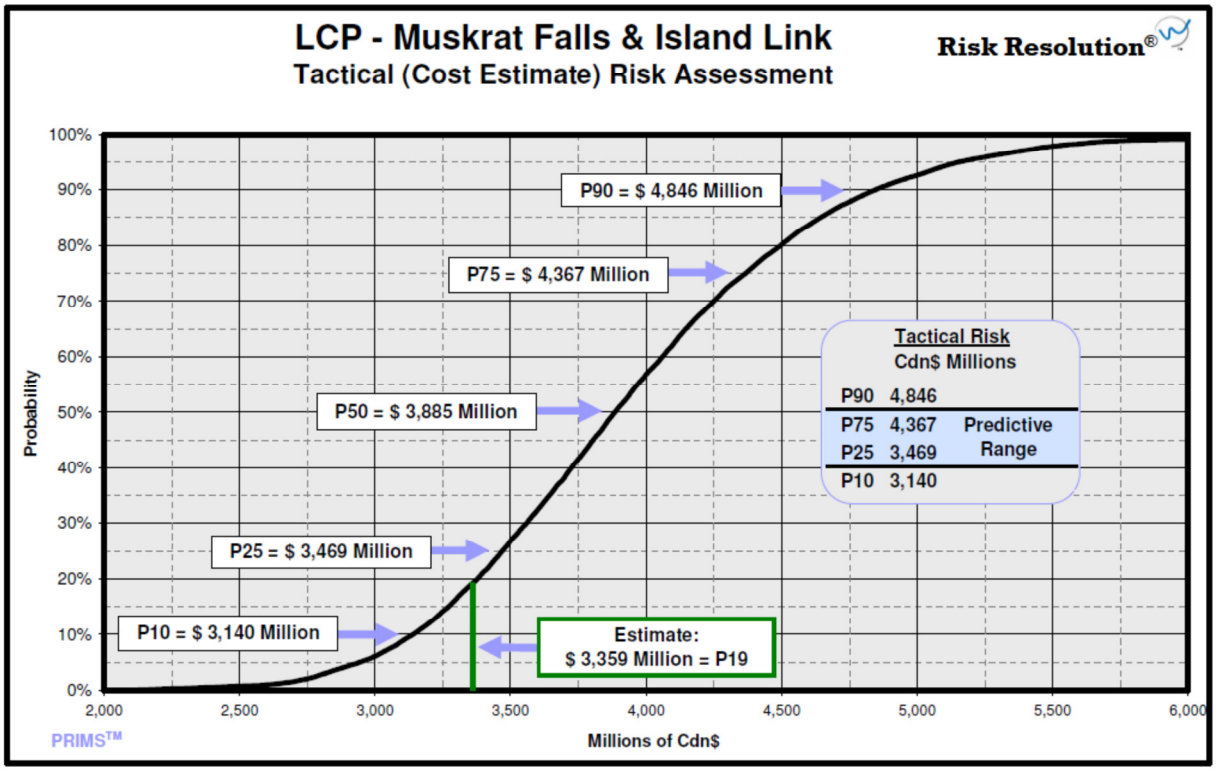
10.3 Results from Tactical Risk Assessment

The Tactical Risk Assessment considers the impact of definition and performance risks (i.e. combination of construction methodology and schedule, performance factors, and price risks) on the Base Estimate. To support the determination of Estimate Contingency, a detailed cost model was prepared for the cost estimate. High / low ranges for each line item of the cost model were then assessed based upon identified tactical risks and uncertainties for each of the four key elements of the Base Cost Estimate: (1) project definition / scope, (2) construction methodology and schedule, (3) performance factors, and (4) price.

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

The analysis, illustrated in Figure 13, concluded that approximately $526 million or 16% of Base Capital was an appropriate P50 Estimate Contingency for MF and LIL projects combined. This projection reflects the uncertainty with respect to key quantities for major excavations and structures at the Muskrat Falls site. At the time of undertaking the assessment, a number of engineering field investigations and desk top studies identified were underway that were anticipated to help facilitate an improved understanding of these uncertainties, which in turn would likely reduce the anticipated calculated Tactical Risk Exposure, and hence Estimate Contingency requirement.

Figure 13: Estimate Contingency Analysis



10.4 Estimate Contingency Recommendations

Using the results of the June 2010 risk assessment context with subsequent progression of project definition, a 15% was of Base Estimate or $564 million was selected for the Estimate Contingency progression during the DG 2 economic modeling. Once added to the Base Estimate, the resultant is considered a proxy P50 Capital Cost Estimate.

11.0 Component C: Escalation Allowance

Cost escalation for large, long-term construction projects such as the Lower Churchill Project is an important factor in determining the ultimate in-service capital costs. Given the long time period required to construct the Project and the lag between cost estimate development and the start of construction, it is critical to understand the causes and effects of cost escalation to be able to make an estimate of the additional costs required as a result of cost increases expected to be incurred over the course of the construction period.

11.1 Background

Escalation refers to cost changes which result from changes in price levels. These changes in price levels in turn are driven by underlying economic conditions. Escalation is driven by changes in productivity, technology, and market conditions, including high demand, labour and material shortages, profit margins, and other factors. Escalation includes the effects of inflation, but is fundamentally different. Inflation refers to general changes in price levels caused by changes in the value of currency and other broader monetary impacts.

Historically, escalation was treated in a simplistic manner. An overall escalation rate was decided upon using global aggregate indices and applied across the entire project costs (i.e. "use 2% per year"). Given changes in the economic climate, particularly volatility in commodity prices, skilled labour shortages, overall global economic uncertainty, globalization of the economy, just-in-time inventories, and shortened supply cycles it was determined that a more sophisticated approach to estimating escalation was required.

11.2 Approach and Methodology

Following extensive research on the topic, Nalcor Energy engaged the services of Validation Estimating [1] – a US-based consultancy which provides various cost engineering services, including cost escalation services – to assist with developing a cost escalation model for the NE-LCP. In its assessment, Validation Estimating recommended a number of best practices for cost escalation. Table 4 below lists the recommended best practices and identifies the extent to which they were met for the Lower Churchill Project escalation model.

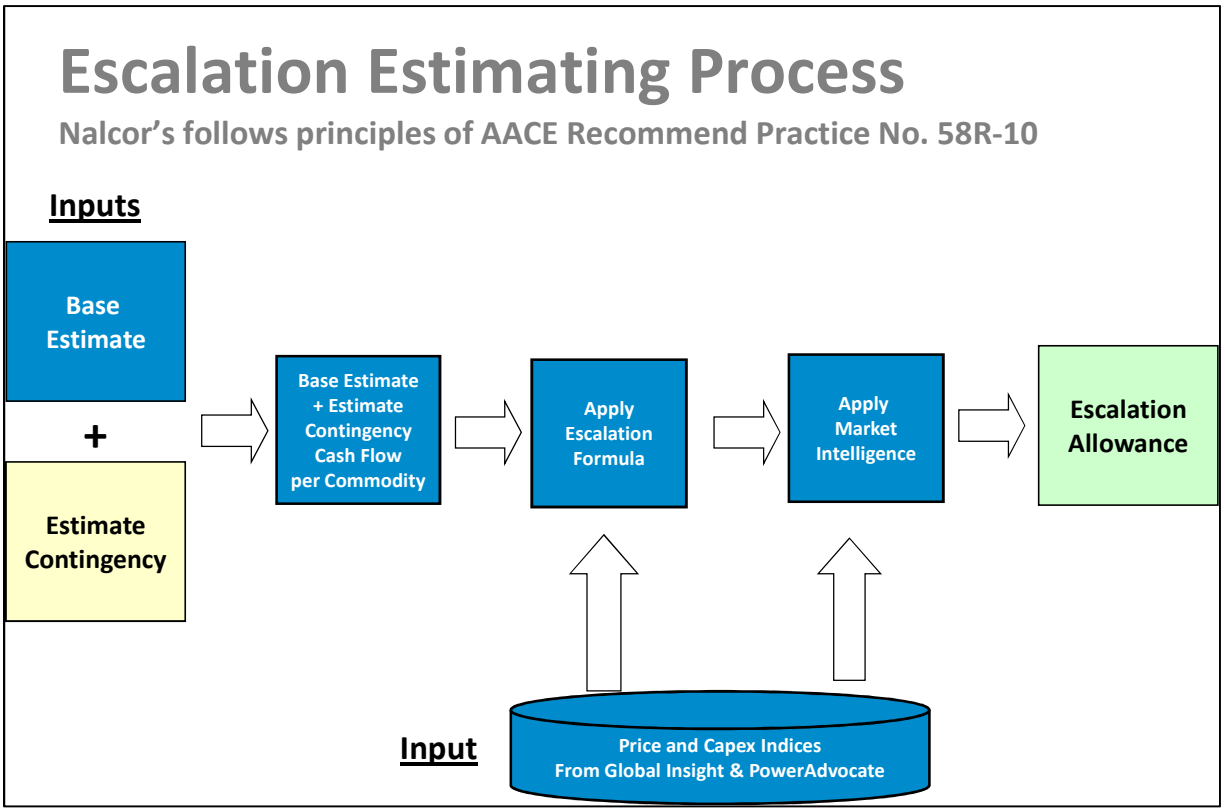
Building on these recommended best practices as well principles contained within AACE International Recommended Practice No. 58R-10, Nalcor Energy developed a methodology for estimating cost escalation that links the capital cost estimate with the project scheduling activities, resulting in a model and system that provides time-phased escalation estimates on commodity, project component and aggregate levels. This resulting escalation estimating process is illustrated in Figure 14.

[1] Validation Estimating has provided services to numerous large companies, including Aramco, BP, Black & Veatch, Chevron, Dow Corning, Eastman, Enbridge, Manitoba Hydro, Ontario Power, Petro-Canada, Rio Tinto Alcan, and Suncor among others.

Table 4: Cost Escalation Best Practices

Best Practice as Recommended by Validation Estimating	Included in NE-LCP Escalation Model
Differentiate between escalation, currency and contingency	Yes
Use indices that address differential price trends between accounts	Yes
Use indices that address levels of detail for various estimate classes	Yes
Leverage procurement/contracting specialist's knowledge of markets	Yes
Leverage economist's knowledge (i.e., based on macroeconomics)	Yes
Ensure that a consistent approach is applied in a model that facilitates best practice	Yes
Calibrate data with historical data	Yes
Use probabilistic methods	To be determined pending further investigation
Use the same economic scenarios for business and capital planning	Yes
Include as a part of an integrated project/cost management process	Yes
Facilitate estimation of appropriate spending or cash flow profile	Yes

Figure 14: Escalation Estimating Process



11.3 Step-by-Step Methodology

The methodology employed to estimate escalation for the Lower Churchill Project involved the following steps:

- The detailed cost estimates for the project components are contained in PRISM Project Estimator[2]. Each line item is detailed with quantities, costs and units for labour, materials, equipment, process equipment and sub-contracts. The costs are expressed in Q1 2010 Canadian dollars.
- The detailed PRISM Project Estimator data was exported to MS Excel identifying each line item by Physical Component of the Project's Work Breakdown Structure (e.g. powerhouse, spillway, switchyard, etc.), quantity, units of measurement, unit costs and current dollar cost.
- Materials were coded against applicable cost indices from Global Insight and Power Advocate.
- Cost indices were selected based on a review of the available indices. Where suitable indices were not available, indices were developed based on our understanding of the breakdown of the costs.
- The PRISM costs were adjusted to remove labour, parts, tires, etc. from the equipment rental costs. The residual amount represented the ownership costs and was escalated at the rates for construction machinery and equipment.
- The PRISM output was entered into the escalation model and each line item was coded with an escalation index category (referred to as Escalation Bins).
- The costs were then compiled into a matrix with all items allocated to Escalation Bins by Physical Component of the plant.
- The costs by bin and physical component were then entered into Primavera[3] and matched against the project schedule. The output from this step was a monthly cash flow by Physical Component and Escalation Bin. Following input of the cost data, Primavera generates a time-phased cost flow for the project for each Escalation Bin, which is then entered back into the escalation model. The escalation model applies the annual escalation factor for each Escalation Bin and generates the escalated cash flows for the Project by physical component. The model then generates results for the escalated costs both by Escalation Bin and by Physical Component over the life of the project.
- The totals are then compiled by both Physical Component and Escalation Bin showing the annual escalation by Physical Component and Escalation Bin for the entire Project. Escalation is calculated quarterly for the first two years and annually thereafter.

[2] PRISM Project Estimator is a project cost estimating tool contained within the PRISM software suite provided by Ares Corporation.

[3] Primavera Project Planning software is an enterprise project management suite provided by Oracle Corporation.

11.4 Escalation Indices

Indices applied to each of the escalation bins were obtained from one of two forecasting services used by the Nalcor. Global Insight and Power Advocate are two commercial services which provide price and economic forecasting services. The indices from Global Insight are the primary indices used in the analysis. The specific indices used in the DG 2 analysis are from Global Insight's Q1 2010 report. For the first two years of the analysis, quarterly indices were used, followed by annual indices thereafter. A brief overview of each service follows.

Global Insight

IHS Global Insight provides the most comprehensive economic, financial, and political coverage available from any source to support planning and decision making. Using a unique combination of expertise, models, data, and software within a common analytical framework, Global Insight covers over 200 countries and more than 170 industries.

Recognized as the most consistently accurate forecasting company in the world, IHS Global Insight has over 3,800 clients in industry, finance, and government with revenues in excess of $100 million, 700 employees, and 25 offices in 14 countries covering North and South America, Europe, Africa, the Middle East, and Asia.

Power Advocate

Established in 1999, Power Advocate is a US-based consultancy which specializes in providing market intelligence and cost forecasting services for the power industry. They provide cost forecasting services at a number of levels from base commodities to the plant/project level (e.g. combined-cycle gas turbine plant or a transmission project). While Global Insight was used as the primary source of indices, they were supplemented where deemed appropriate by information from Power Advocate. The use of Power Advocate's market intelligence was limited because they do not provide any hydro-specific indices or analysis.

11.5 Calculated Escalation

The calculated cumulative escalation factors and resulting cumulative escalation for Muskrat Falls Generating Facility and the Labrador – Island Transmission Link, using the Escalation Model developed in accordance to the above methodology is provided in the Table 5.

Table 5: Calculated Escalation Factors

Component	2010	2011	2012	2013	2014	2015	2016	2017	2018	Estimated Cumulative Escalation
Muskrat Falls Generating Facility	1.00	1.02	1.05	1.11	1.16	1.20	1.23	1.26	1.30	$335 million
Labrador – Island Transmission Link	1.00	1.02	1.04	1.08	1.12	1.16	1.20	1.24	1.29	$208 million

12.0 Capital Cost Estimate Summary

Table 6 provides a summary of the overall components of the Capital Cost Estimate LCP Phase I.

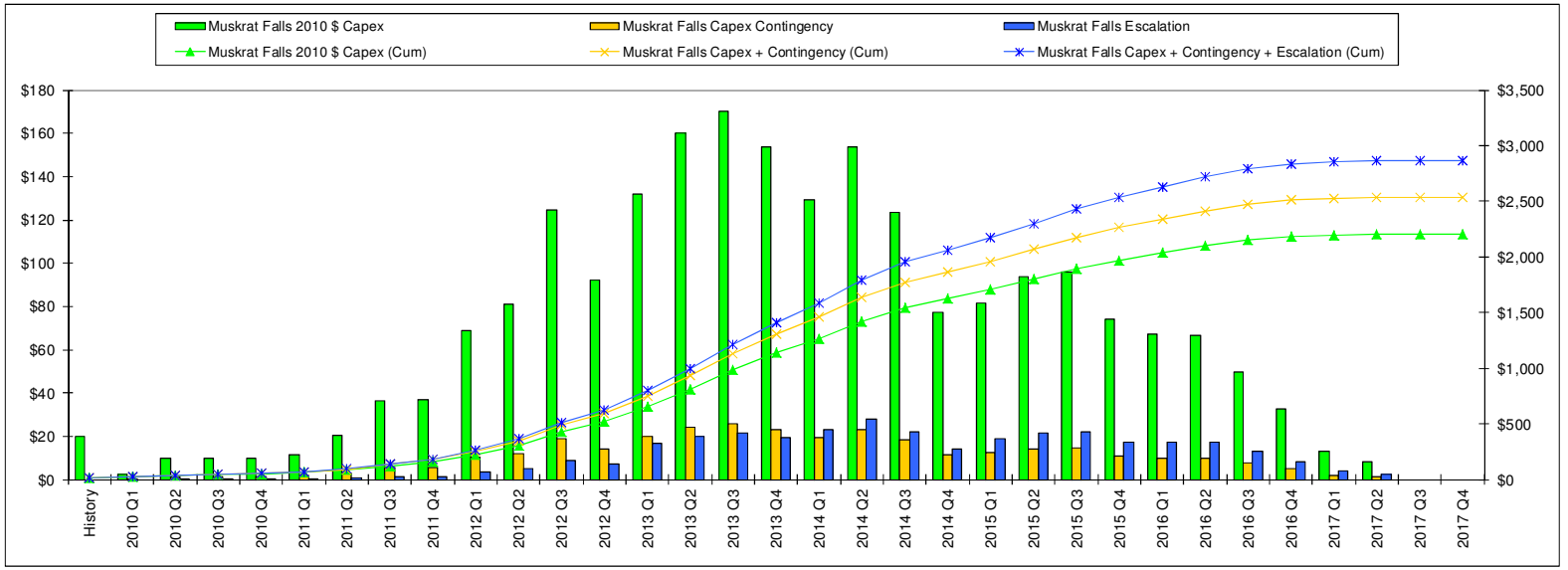
Figures 15 and 16 present the final cost flow for each of the Muskrat Falls Generating Facility and Labrador-Island Transmission Link.

Table 6: Summary of MF and LIL Capital Cost Estimate

Project	**Base Estimate**	**Historical Cost (pre 2010)**	**Adjusted Base Cost (Base Cost – Historical)**	**Estimate Contingency**	**Escalation Allowance**	**Total Project Cost** (Escalated Nominal)
Muskrat Falls Generating Facility	$2,206	$20	$2,186	$328	$335	$2,869
Labrador – Island Transmission Link	$1,616	$42	$1,574	$236	$208	$2,060

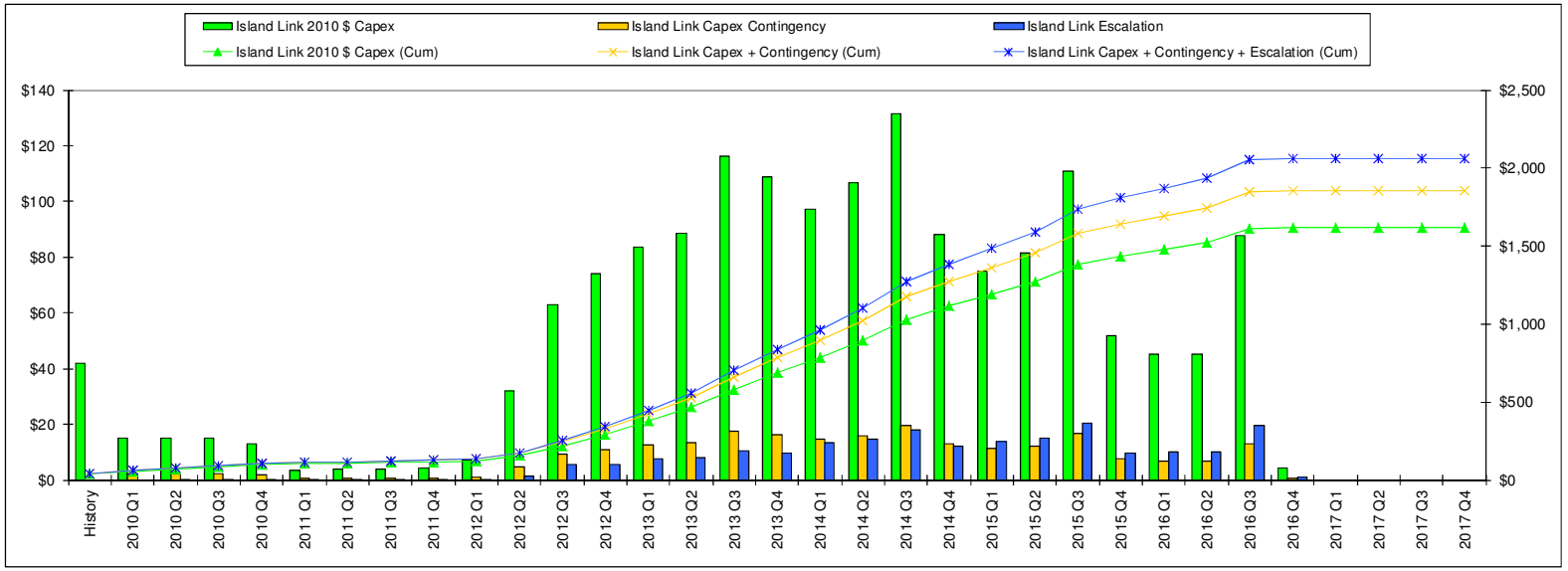
Notes:
1. All costs in millions Jan 2010 CDN $
2. Estimate Contingency = 15% of Adjusted Base Cost
3. Escalation and Contingency are applied to Adjusted Base Cost

Figure 15: DG 2 Cost Flow for Muskrat Falls Generating Facility



	History	2010 Q1	2010 Q2	2010 Q3	2010 Q4	2011 Q1	2011 Q2	2011 Q3	2011 Q4	2012 Q1	2012 Q2	2012 Q3	2012 Q4	2013 Q1	2013 Q2	2013 Q3	2013 Q4	2014 Q1	2014 Q2	2014 Q3	2014 Q4	2015 Q1	2015 Q2	2015 Q3	2015 Q4	2016 Q1	2016 Q2	2016 Q3	2016 Q4	2017 Q1	2017 Q2	2017 Q3	2017 Q4	Total
Muskrat Falls 2010 $ Capex	$20	$2	$10	$10	$10	$11	$20	$36	$37	$69	$81	$125	$92	$132	$160	$170	$154	$129	$154	$123	$77	$82	$93	$96	$74	$67	$67	$50	$33	$13	$8	$0	$0	$2,206
Muskrat Falls Capex Contingency	$0	$0	$1	$1	$1	$2	$3	$5	$6	$10	$12	$19	$14	$20	$24	$26	$23	$19	$23	$19	$12	$12	$14	$14	$11	$10	$10	$7	$5	$2	$1	$0	$0	$328
Muskrat Falls Escalation	$0	$0	$0	$0	$0	$0	$1	$1	$1	$4	$5	$9	$7	$17	$20	$21	$19	$23	$28	$22	$14	$19	$21	$22	$17	$17	$17	$13	$8	$4	$2	$0	$0	$335
Muskrat Falls 2010 $ Capex (Cum)	$20	$22	$32	$42	$51	$63	$83	$120	$156	$225	$306	$431	$523	$655	$816	$986	$1,140	$1,269	$1,423	$1,546	$1,624	$1,705	$1,799	$1,895	$1,969	$2,036	$2,103	$2,152	$2,185	$2,198	$2,206	$2,206	$2,206	
Muskrat Falls Capex + Contingency (Cum)	$20	$23	$34	$45	$56	$69	$93	$134	$177	$256	$349	$493	$599	$751	$935	$1,131	$1,308	$1,457	$1,633	$1,775	$1,864	$1,958	$2,066	$2,176	$2,262	$2,339	$2,415	$2,472	$2,510	$2,525	$2,534	$2,534	$2,534	
Muskrat Falls Capex + Contingency + Escalation (Cum)	$20	$23	$34	$45	$56	$70	$94	$137	$181	$264	$362	$514	$627	$796	$1,000	$1,218	$1,414	$1,586	$1,790	$1,955	$2,058	$2,170	$2,299	$2,432	$2,534	$2,628	$2,722	$2,792	$2,838	$2,857	$2,869	$2,869	$2,869	

Figure 16: DG 2 Cost Flow for Labrador – Island Transmission Link



	History	2010 Q1	2010 Q2	2010 Q3	2010 Q4	2011 Q1	2011 Q2	2011 Q3	2011 Q4	2012 Q1	2012 Q2	2012 Q3	2012 Q4	2013 Q1	2013 Q2	2013 Q3	2013 Q4	2014 Q1	2014 Q2	2014 Q3	2014 Q4	2015 Q1	2015 Q2	2015 Q3	2015 Q4	2016 Q1	2016 Q2	2016 Q3	2016 Q4	2017 Q1	2017 Q2	2017 Q3	2017 Q4	Total
Island Link 2010 $ Capex	$42	$15	$15	$15	$13	$4	$4	$4	$4	$7	$32	$63	$74	$84	$89	$116	$109	$97	$107	$132	$88	$75	$82	$111	$52	$45	$45	$88	$4	$0	$0	$0	$0	$1,616
Island Link Capex Contingency	$0	$2	$2	$2	$2	$1	$1	$1	$1	$1	$5	$9	$11	$13	$13	$17	$16	$15	$16	$20	$13	$11	$12	$17	$8	$7	$7	$13	$1	$0	$0	$0	$0	$236
Island Link Escalation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1	$6	$6	$8	$8	$10	$10	$13	$15	$18	$12	$14	$15	$20	$10	$10	$10	$20	$1	$0	$0	$0	$0	$208
Island Link 2010 $ Capex (Cum)	$42	$57	$72	$87	$100	$103	$108	$112	$116	$123	$156	$219	$293	$377	$465	$582	$691	$788	$894	$1,026	$1,114	$1,189	$1,271	$1,382	$1,433	$1,479	$1,524	$1,612	$1,616	$1,616	$1,616	$1,616	$1,616	
Island Link Capex + Contingency (Cum)	$42	$59	$76	$94	$109	$113	$117	$122	$127	$136	$173	$245	$331	$427	$529	$663	$788	$900	$1,022	$1,174	$1,275	$1,361	$1,455	$1,583	$1,642	$1,694	$1,746	$1,847	$1,852	$1,852	$1,852	$1,852	$1,852	
Island Link Capex + Contingency + Escalation (Cum)	$42	$59	$76	$94	$109	$113	$118	$123	$128	$137	$175	$253	$345	$448	$558	$703	$838	$963	$1,100	$1,269	$1,382	$1,483	$1,592	$1,740	$1,809	$1,871	$1,933	$2,054	$2,060	$2,060	$2,060	$2,060	$2,060	